



U.S. Department
of Transportation

General Counsel

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Washington, D.C. 20590

Office of the Secretary
of Transportation

November 6, 2020

The Honorable Ajit Pai
Chairman, Federal Communications Commission
45 L Street, N.E.
Washington, D.C. 20554

**Re: First Report and Order, Further Notice of Proposed Rulemaking, and
Order of Proposed Modification from the Federal Communications Commission
In the Matter of Use of the 5.850-5.925 GHz Band (ET Docket No. 19-138)**

Dear Chairman Pai:

The Department of Transportation (DOT or Department) has carefully reviewed the above-referenced decision of the Federal Communications Commission (FCC or the Commission), which has been published for consideration at FCC's November 18, 2020 public meeting. DOT continues to appreciate FCC's consideration of the issues in this proceeding, in which critical American interests are at stake. The 5.9 GHz "Safety Band" is vitally important to DOT and to the public, given the role of Vehicle-to-Everything (V2X) communications in saving lives, reducing injuries, and relieving traffic congestion on our Nation's roadways.

As you know, over the course of this proceeding, DOT has submitted several rounds of comments to FCC and to the National Telecommunications and Information Administration (NTIA) to express our concerns, and to explain in detail the adverse consequences of the Commission's approach on our Nation's transportation system. Although FCC has adopted some minor modifications to its decision, it has not addressed any of DOT's main objections. On the contrary, FCC has substituted its judgment for DOT's on questions of transportation safety, and has declined the Department's offers to collaborate more closely with other key stakeholders on a workable solution for the Safety Band. As a result, the Commission's decision suffers from numerous deficiencies—some of which have become even more pronounced as this proceeding has unfolded.

As DOT's concerns remain essentially the same, we will not repeat them here in detail, but will highlight the major problems that we have identified with the Commission's reallocation plan. In addition, we have enclosed the following: (1) a letter from the Secretary of Transportation, Elaine L. Chao, dated October 15, 2020, to NTIA; (2) my previous letter to NTIA, dated October 8, 2020; and (3) an addendum that details the issues the Department has identified in specific sections in the Commission's decision that warrant further consideration, based upon our

expertise and review of the record. These materials explain DOT's consistent positions on the issues in this proceeding, and demonstrate our commitment to V2X innovation and deployment.

In particular, DOT asks the Commission to revisit its approach in light of the following concerns:

1. ***FCC's reallocation of the 5.9 GHz Band is unworkable and undermines innovation in transportation safety.*** As DOT has previously explained, the Commission is disrupting a V2X ecosystem that is over two decades in the making, and which continues to evolve at a rapid pace. DOT remains convinced that all 75 megahertz (MHz) of spectrum previously allocated for V2X should remain available for that purpose. Reducing that allocation by more than half, to 30 MHz, jeopardizes both the existing deployment of, and innovation in, V2X technology. DOT also disagrees with FCC's conclusion that 30 MHz is adequate for V2X, given the availability of other commercially available services and technologies. In our view, and as a matter of transportation safety, the record is far too thin to support that conclusion. Notwithstanding the comments of telecommunications stakeholders, the Department disagrees that there is sufficient evidence to demonstrate that 30 MHz will suffice to support a safety-driven ecosystem like the one in which DOT and other stakeholders have invested. Furthermore, as we previously explained, until the Commission resolves concerns about interference from Wi-Fi operations, the actual amount of spectrum available for V2X may be much less than FCC anticipates, or perhaps none at all.
2. ***FCC has prematurely chosen an unproven technology "winner."*** FCC is compounding the harm to V2X by choosing to cast aside Dedicated Short-Range Communications (DSRC), a proven technology that has already been deployed in vehicles and infrastructure across the country, and to adopt cellular vehicle-to-everything (CV2X) as the sole permissible technology to support V2X applications. The Department again disagrees with FCC that the record supports this momentous shift. On the contrary, State transportation authorities, safety advocates, and other stakeholders have objected to this rearrangement in light of the adverse impact upon existing DSRC deployments. DOT agrees that Federal agencies should foster, rather than inhibit, innovation, and that technological developments should inform the regulatory approach. However, we are wary of picking "winners," particularly on the basis of such scant evidence. This is particularly so where safety is at issue, and where stakeholder expectations will be upended.
3. ***FCC undervalues the transportation safety benefits of the 5.9 GHz Band, and underestimates the cost and disruption that will result here.*** Although FCC has provided some analysis of the Wi-Fi benefits of its decision, the Commission still does not address the loss of safety benefits that will result. We remain puzzled as to how the Commission can fully consider the impact of its action without properly accounting for this factor. Furthermore, FCC continues to give short shrift to the cost to stakeholders to transition to the new regulatory environment, including the cost to retrofit existing equipment and to reorganize operations. Although we recognize FCC's authority to modify or to terminate licenses, that authority should also be exercised carefully, and in consideration of the public interest concerns that drive V2X installations nationwide.

For these reasons, and for the reasons explained in our prior submissions, we continue to urge the Commission to pause this proceeding and to reengage with DOT and other stakeholders on a lasting solution. We look forward to the opportunity for further dialogue.

Sincerely,

A handwritten signature in black ink, appearing to read "Steven G. Bradbury". The signature is fluid and cursive, with a prominent initial "S" and a long, sweeping tail.

Steven G. Bradbury
General Counsel (and performing the functions and duties of Deputy Secretary)

Enclosures

Addendum: U.S. Department of Transportation (DOT or Department) Technical Comments on the First Report and Order (R&O), Further Notice of Proposed Rulemaking (FNPRM), and Order of Proposed Modification from the Federal Communications Commission (FCC or the Commission), In the Matter of Use of the 5.850-5.925 GHz Band (ET Docket No. 19-138)

As discussed in the Department’s letter to Chairman Pai, this addendum details the issues that the Department has identified in specific sections in the Commission’s R&O/FNPRM that warrant further consideration, based upon our expertise and review of the record. These issues echo many of the concerns that DOT has expressed throughout this proceeding, and are based on the version of the R&O/FNPRM that was made public on October 28, 2020 for discussion at FCC’s November 18, 2020 public meeting.

DOT Concern with FCC’s R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
1 Loss of priority for safety	§3 ¶120, §3 ¶150, §3 ¶152, § 95.3101	<p>The Department believes that FCC’s decision to remove the “priority for safety” requirement for V2X messages in the remaining 30 MHz is flawed for the following reasons:</p> <ul style="list-style-type: none"> • Spectrum cannot be considered for “vital ITS purposes” unless it meets basic conditions for crash-imminent safety. • A time-critical safety message cannot compete with other ongoing messaging in a heavily used channel (<i>i.e.</i>, devices using that channel in urban areas). • The rules remove the priority for safety-of-life and public safety messages, which increases the risk that the safety messages will have to compete against other types of non-safety messages and not reach the drivers, vehicles, or pedestrians that are most at risk of a crash. • There is no analysis as to how this change achieves the basic conditions needed to support safety, nor is there data or test results supporting that conclusion. • FCC provides conflicting statements in this Report and Order. In §3 ¶152, FCC states that its “inclination is that this message prioritization system should be retained as it helps to ensure that the most important messages are successfully transmitted.” Yet, FCC removes protections by eliminating Rule 95.3159; and in the FNPRM, FCC asks, “Should we continue to maintain priority system based on our expectation that dedicated ITS spectrum will be used primarily (if not exclusively) for safety-of-life applications?” The decision to remove the safety priority is not grounded in an analysis sufficient to support such a move.

DOT Concern with FCC's R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
2 Lack of protection for V2X Channels	§2 ¶11, §3 ¶13, §3 ¶67, §3 ¶78, §3 ¶79-81	<p>With respect to interference protection for V2X channels, the Department believes the Commission's decision is unworkable, as it fails to account for harmful interference in the remaining 30 MHz of the 5.9 GHz band (the Safety Band). Moreover, the Commission has not addressed the most significant comments and objections filed in the docket, and the Report and Order misapprehends how V2X cooperative safety messages work.</p> <p>With regard to protections, the decisions articulated in the Report and Order do not address the following interference mechanisms:</p> <ul style="list-style-type: none"> • Adjacent channel interference from Unlicensed Wi-Fi with V2X safety communications. • Interference to V2X safety communications that curtail crash avoidance in the roadways, at intersections, and in other transportation environment scenarios due to: <ul style="list-style-type: none"> ○ Unlicensed Wi-Fi client devices operating outdoors under the control of indoor access points; ○ Unlicensed Wi-Fi client devices operating within a vehicle; and ○ Unlicensed Wi-Fi "leakage" through buildings, especially through windows, reaching the roadways and intersections. • Co-channel and adjacent channel interference between V2X in the 5895-5925 MHz spectrum.
3 Adjacent Channel Interference from Unlicensed Wi-Fi with V2X Safety Communications	§2 ¶11, §3 ¶78, §3 ¶81, §3 ¶67-68, 3 ¶72	The Department anticipates that the decision will result in unacceptable interference with V2X devices—FCC's proposed band plan will not fully support even the limited V2X safety applications already deployed. FCC has not demonstrated that the 30 MHz to be assigned for V2X operations by the band plan established by this Report and Order is in fact sufficiently interference free and offers sufficient capacity and functionality to support the intended safety-of-life critical usage.
4 Interference to ITS Roadway and Intersection Safety	§3 ¶64-66, §3, ¶166-167	The rules in the Report and Order allow for three scenarios that bring considerable risk to the transmission and receipt of time-critical safety messages (e.g., the Basic Safety Message as defined by SAE industry standards) in or nearby critical roadway and intersection scenarios. The Department believes that FCC's protections are inadequate for protecting transportation safety conditions and are inadequate for protecting other incumbents.

DOT Concern with FCC’s R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
5 Roadway Interference due to Wi-Fi “leakage”	§3 ¶79–81	DOT is concerned that FCC’s decision overestimates the effectiveness of building attenuation as a factor in controlling interference. The rules appear to be based on signal attenuation assumptions that do not account for important real-world factors, including windows and more permeable building construction materials. DOT test results have shown that interference does not scale directly with attenuation or signal power in the safety zone, as FCC assumes. DOT test results also show interference through windows to be the same as if the U-NII device were outside. The FCC assumptions used in this decision are inadequate for buildings with windows at street level; buildings with windows facing the street(s); and wood frame buildings. FCC seems to assume that only buildings made from concrete and other radio-frequency-blocking materials will be found along roadways and at intersections.
6 Unlicensed Wi-Fi Client Devices Operating in Vehicles	§3 ¶77, § 15.403	The Department strongly believes that this Report and Order does not adequately constrain the use of U-NII devices in or near motor vehicles using transportation safety communications. In the decision, FCC provides limits to power levels for access points, but provides no information for how this new framework will account for portable device operations when inside a vehicle that is operating with V2X communications. FCC should provide the analysis that determined that this is an appropriate level for U-NII devices in the presence of DSRC or LTE-CV2X. In the Rules, FCC does not provide a definition for Indoor Access Point that prevents U-NII-4 devices from being used within vehicles.
7 Co-channel and Adjacent Channel Interference between the V2X Platforms in the 5895-5925 MHz Spectrum	§3 ¶61, §3 ¶85	§3 ¶61 and §3 ¶85 state that no “special frequency avoidance techniques or similar constraints [are needed] since U-NII-3 devices have shared spectrum with co-channel federal incumbents for years without any specialized frequency avoidance techniques, and in general sharing has been successful.” DOT and other industry research has shown the inability to share a channel or operate in adjacent channels. FCC should provide an explanation on how it factored in DOT’s measurements on this type of interference, as these measurements are inconsistent with FCC’s assertions.
8 Lack of Analysis on which to Base New Rules for the Nation	(Introductory statement)	FCC’s analysis of the economic benefits of Wi-Fi is insufficient because the Report and Order does not provide enough detail about the methodology used for calculating these benefits, and did not provide the public with the opportunity to comment on this new analysis.

DOT Concern with FCC's R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
9 Insufficient Economic Analysis of Benefits	§3 ¶121–123, §3 ¶129–133	<p>The analysis provided in the decision indicates that the Commission is overstating the benefits of providing additional spectrum to Wi-Fi in this band. FCC relies upon an expected contribution to Gross Domestic Product (GDP) resulting from additional Wi-Fi traffic. The implicit assumptions of this methodology are that (1) the 75 MHz of bandwidth is the only spectrum available, and (2) other factors of production needed for the provision of more Wi-Fi service have no opportunity cost. This implies that the only way to generate incremental GDP growth is with this specific piece of spectrum and with Wi-Fi. FCC does not factor in the 1,200 MHz of additional bandwidth in the 6 GHz band that is available for unlicensed Wi-Fi, which dwarfs the 75 MHz of the 5.9 GHz band and greatly diminishes its significance for accommodating increased Wi-Fi demand. Further, FCC did not provide the public with the opportunity to comment on this new analysis.</p>
10 Insufficient Economic Analysis of Benefits	Appendix C	<p>The Order estimates that economic output (GDP) will increase by \$17.2 billion from devoting an additional 45 MHz of unlicensed Wi-Fi, but presents multiple other estimates as well in an effort to demonstrate that \$17.2 billion is a low estimate. However, the Economic Analysis section still does not add more facts or change the reasoning offered in support of the decision.</p> <p>The Department's central concerns with the cost-benefit analysis continue to apply, as FCC's analysis:</p> <ul style="list-style-type: none"> • Fails to estimate the safety benefits forgone from repurposing the 45 MHz away from V2X; • Fails to estimate the market (auction) value of the 45 MHz as an alternative benefit calculation, which is expected to be less than the GDP that can be generated from it, and errs in representing as incremental the entire GDP it attributes to the 45 MHz; • Fails to address coherently the simultaneous opening of the 6 GHz band to Wi-Fi in its commercial benefit estimate for the 45 MHz; and • Fails to attribute any benefit lost from terminating DSRC and committing the remaining 30 MHz to LTE-CV2X.

	DOT Concern with FCC’s R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
11	Insufficient Economic Analysis of Costs	§3 ¶124–128, §3 ¶135, §3 ¶138–139	FCC omits any analysis of the loss of existing investments or costs for the replacement, transition, and potentially increased operating costs associated with transition from DSRC to CV2X and moving operations to the upper 30 MHz, as well as the more general burden to the transportation industry and traveling public. FCC states, “[we] believe that the U.S. DOT’s estimate of transitioning existing licensees is at the high end of total ITS transition costs, and is, in any event, well below our estimated benefits of repurposing the 5.9 GHz band for unlicensed use.” FCC should provide its analysis, which specifically should address where the additional funding for these transition costs will be found. Furthermore, FCC should provide the metrics by which it will judge the transition to be a success—such as how many RSUs and OBUs must be in operation across the Nation, and in what time period these changes will occur.
12	Insufficient Benefits and Economic Analysis	§2 ¶7, §3 ¶31, §3 ¶45, §3 ¶99	FCC has not provided metrics or definitions for what was considered “widely deployed” (<i>i.e.</i> , why are 67 deployment sites and over 20,000 vehicles not enough?) and, again, fails to do so for LTE-CV2X in the proposed 30 MHz.
13	No Technology Alternatives Analysis	§3 ¶17, 21–23	<p>FCC does not properly account for other technical options in their analyses regarding the optimal use of spectrum. For instance, DOT notes four alternative paths that FCC did not pursue in their analysis:</p> <ul style="list-style-type: none"> • Use of Dynamic Frequency Selection (DFS) and Multiple-Input and Multiple-Output (MIMO) in existing 2.4 GHz and 5.8 GHz bands; • Channel bonding; • Inclusion of the 6 GHz band in alternatives analysis; and • The adoption of “detect and vacate” technology that would allow co-channel sharing of the band by both ITS and Wi-Fi applications. <p>Further, DOT notes:</p> <ul style="list-style-type: none"> • While FCC does refer to MIMO with regard to unlicensed use of 802.11ax and 802.11ac (§3 ¶17), it does not apply that as an alternative to repurposing the Safety Band 45 MHz (see also footnote 337); • FCC does not see a need for DFS (using Wi-Fi Alliance analysis as justification, in §3 ¶23) or using channel bonding, despite their great potential for meeting unlicensed Wi-Fi demand; and • Abandons the detect-and-vacate option with no further evidence.

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		<p>Further, the Department's view is that FCC is overstating the additional capacity of the lower 45 MHz, as the U-NII-3 band already offers much of this capacity, and bonding non-contiguous channels can offer even more. DOT believes that the economic benefit of that approach is likely to be significantly higher than by repurposing this 45 MHz.</p>
<p>14 DFS, MIMO, and Channel Bonding in Existing Unlicensed Spectrum Bands</p>	<p>§3 ¶21-23, §3 ¶123, §3 ¶130</p>	<p>The arguments that 320 MHz of DFS spectrum under U-NII-3 are technically not available is not consistent with the DFS routers currently on the market today at typical consumer prices, despite statements to the contrary from the Wi-Fi industry.</p> <p>Furthermore, FCC claims that larger contiguous channels enabled by opening the lower 45 MHz to unlicensed Wi-Fi will boost usage. DOT requests that FCC describe where it included the analysis on the alternatives that prove that Wi-Fi must have contiguous spectrum to form a 160-MHz channel to boost this usage. As DOT has noted before, FCC does not appear to consider the use of Channel Bonding as a path for optimizing unlicensed Wi-Fi spectrum to help meet demand. Nor does FCC analyze the value of alternative approaches or alternative technologies to address unlicensed Wi-Fi demand. These other paths are currently available to the Wi-Fi industry.</p>
<p>15 Lack of Consideration of the availability of Ultra-Wide Channels in the 6 GHz band Allocation</p>	<p>§3 ¶21-22</p>	<p>The FCC appears to rely too heavily on comments provided by the Wi-Fi industry. For example, FCC states, "Comcast submits that because of its proximity to the U-NII-3 band, only software or firmware upgrades to much of the Wi-Fi equipment already deployed and operating are needed to allow consumers to access the 5.9 GHz spectrum, a benefit that would not be possible in any other band."</p> <p>DOT disagrees with this statement. The 6 GHz band will be available shortly, and the hardware to use the 6 GHz band is expected to be available by the end of 2020, per many statements by the Wi-Fi industry, including statements filed on dockets 18-295 and 17-183. This band provides far more potential bandwidth than the amount proposed in the 5.9 GHz reallocation. Moreover, it will provide multiple ultra-wide channels and the flexibility sought by the unlicensed industry, as noted by FCC.</p>

DOT Concern with FCC's R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
16 Spectrum Analysis and Adequacy of 30 MHz	§3 ¶27	<p>FCC relies upon assertions by WISPA regarding the lack of “broadband internet services to rural and underserved areas.” However, access to additional spectrum is not an actual barrier in rural areas, as the primary unlicensed spectrum—the 2.4 GHz and 5.8 GHz bands—is not congested. DOT asks FCC to provide the data and a technical analysis of the usage and congestion of the Wi-Fi channels in rural areas. Further, it is unclear how relatively short-range Wi-Fi technology is relevant to providing service in rural areas where by-definition users are widely dispersed.</p>
17 Spectrum Analysis and Adequacy of 30 MHz	§3 ¶28	<p>FCC presents as a rationale for only preserving 30 MHz for ITS an opinion that ITS has failed to become ubiquitously used, while ignoring the significant amount of deployment across the Nation today. DOT offers the following key points and questions associated with FCC’s rationale:</p> <ul style="list-style-type: none"> • DOT disagrees with the argument to use “spectrum use” as a basis for determination of the 30 MHz as being sufficient for all transportation sites. The problem with using such a variable factor is particularly evident in sites, such as New York City or throughout Texas that require the use of at least six channels or 60 MHz, as explained in ITS America’s recent ex parte communications with FCC. • FCC has not defined the term “ubiquitous” or clearly articulated the FCC’s criteria for the 5.9 GHz band to become used ubiquitously for the broad range of ITS applications. Further, FCC appears to overlook the notion that, to be effective at crash-avoidance, the spectrum has to be available; <i>i.e.</i>, if it is over-congested and vehicles cannot communicate with one another, then crash-avoidance applications cannot perform or perform adequately. This is the advantage of multiple channels—it allows overall driver safety to be managed by allowing continuous situational awareness for all drivers, while still prioritizing the most crash-imminent safety communications for those travelers facing emerging threats and hazards. • FCC’s own economic and spectral efficiency analyses appear to fail to account for the underutilization of existing Wi-Fi bands due to the failure of ubiquitous DFS use, which arguably provides greater ability to meet Wi-Fi demand versus reallocation of this small 45 MHz band. This makes it appear that ITS usage is being held to a higher standard. • FCC should explain how it has accounted for growth in capability for safety communications and whether FCC assumed that safety needs are static while all other spectrum needs grow.

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		<ul style="list-style-type: none"> • FCC should provide detail on how it calculated the full availability of the 30 MHz with the accounting for adjacent channel interference. • By allowing for the use of only LTE CV2X, which currently is designed for 20-MHz channels, FCC should make clear that the remaining 30 MHz only provides one channel for safety.
18 Spectrum Analysis and Adequacy of 30 MHz	§3 ¶33–35	<p>FCC relies upon advocates of the proposal who were generally not experts in transportation, stating, “Proponents of the Commission’s proposal contend that 30 megahertz of spectrum is the appropriate amount of spectrum for ITS safety-related services in the band.” The record, however, reflects a broad range of comments that contend that 30 MHz is insufficient. Furthermore, the FCC Report and Order lacks any compelling evidence for how core safety-related ITS functions can consistently perform in just 30 MHz. Furthermore, FCC does not define what it considers a core safety-related ITS function, as DOT has done in numerous previous comments.</p> <p>With respect to these FCC statements, the Department believes that allocating just 30 MHz to support V2X applications is insufficient, particularly given accelerating advancements in automated driving systems, cooperative applications, and the safety and mobility benefits offered by such technologies.</p>
19 Spectrum Analysis and Adequacy of 30 MHz	§3 ¶33–35	<p>FCC’s determination that 30 MHz is sufficient for V2X relies on a vague and overly optimistic assessment on the use of the 30 MHz.</p> <ul style="list-style-type: none"> • As the Department has noted several times in other materials, the operation of U-NII-4 devices in the lower 45 MHz using the parameters in this Report and Order will cause interference to V2X operations in the upper 30 MHz. • With regard to the use of Channel 180, it is unclear if FCC is implying that the 10 MHz will be used as a guard band if U-NII devices put too much OOB into the upper 20 MHz channel for LTE-CV2X to perform V2X communications reliably. If so, this position is contrary to the Commission’s spectral efficiency argument. With the expectation of interference (which the Commission has not disproved), FCC should specify how long the 10 MHz should lie fallow as FCC performs testing to determine whether LTE-CV2X features can be employed in a safe manner. • Further, FCC’s restrictions limiting ITS communications to just 30 MHz, as well as the rules in Appendix C, mean that LTE-CV2X will

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		<p>be the only authorized user in the 30 MHz—and that emerging (<i>e.g.</i>, 5G, 6G) technologies will not be accommodated, as they will not be able to operate with today's V2X technologies in only 30 MHz. This leaves the transportation industry potentially unable to leverage the transformative benefits of 5G for safety and mobility applications—and for supporting future automated driving systems.</p>
<p>20 Spectrum Analysis and Adequacy of 30 MHz</p>	<p>§3 ¶38</p>	<p>FCC states that there is a concern about spectrum being “wasted” by messages duplicating information that is readily available. To date, FCC has not identified clearly the messages that it believes are duplicative. DOT (and stakeholders) cannot assess whether this argument has merit and needs to be addressed at a technical level. Further, the Department requests that FCC demonstrate that crash-imminent safety can be achieved with the removal of certain message types. All messages and data from communications and sensors may be needed in a crash-imminent situation in order to initiate the most appropriate response to save lives.</p> <p>DOT further requests that FCC discuss its findings in terms of the National ITS architecture, which illustrates that these are public benefit messages, applications, and services. These messages are not duplicating private sector applications. In fact, with the traffic management/probe data produced by V2X communications, DOT anticipates that the private sector transportation data aggregators' roles will not only expand, but also allow them access to more precise data at a hyper-local plus regional level simultaneously. This is not something that the private sector can achieve, given that their current business models can silo data and information. Nor is it the responsibility of commercial providers to make available important roadway information to travelers throughout all areas of the Nation, including rural and economically depressed areas. However, it is a critical role for public agencies, who will benefit from the richer traffic information data provided by V2X and used to improve safety and operational efficiency.</p>

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21 Spectrum Analysis and Adequacy of 30 MHz	§3 ¶42–44	<p>FCC appears to accept the arguments of the Wi-Fi industry and LTE-CV2X advocates, but dismisses the expertise, analysis, test results, and real-world experiences of commenters, including the Department, who have been active for over a decade in research, standards development, and deployment.</p> <p>Notably, this includes arguments and analyses of the Car-to-Car Communications Consortium (C2C-CC), Continental Corporation (a key automotive industry supplier), and the spectrum expertise of the IEEE 1609 Working Group. In fact, FCC continues to choose selectively from filings in the proceeding including one reference from the -CC filing to argue “that 30 megahertz, even if channelized with no overlap, can accommodate various core safety-related functions, including vehicle-to-vehicle and vehicle-to-infrastructure functions.” Yet, FCC goes on to say in ¶43 that it “disagree[s] with the position of C2C-CC and other commenters that argue that more than 30 megahertz should be reserved to accommodate future advanced ITS safety-related services that are under development.”</p>
22 Spectrum Analysis and Adequacy of 30 MHz	§3 ¶115–116	<p>With regard to the decision that 30 MHz is adequate and technically feasible, DOT notes that FCC offers no data or test findings to support this conclusion, in particular to demonstrate that this 30 MHz can deliver the appropriate level of safety. Instead, the FCC continues with unproven statements that appear to equate the 30 MHz of spectrum with “substantially the same service as currently provided in 75 megahertz.”</p>

DOT Concern with FCC's R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
<p>23 FCC Creates Significant Risk for the Transportation Industry in Choosing LTE-CV2X as the Sole Technology for Connected Vehicle Applications</p>	<p>§1 ¶1, §3 ¶13, §3 ¶97, §3 ¶101–103</p>	<p>By choosing, without any clear evidence, LTE-CV2X as the technology best suited for ITS in the coming years, FCC has rejected the request from DOT and others to encourage technology neutrality, and eliminating the opportunity for the transportation sector to choose the demonstrably best technology approach. FCC states that “we are persuaded that LTE-CV2X, through its ability to achieve greater network effects and leverage cellular networks to reduce infrastructure costs, promises a more efficient and effective use of the spectrum. We do not anticipate any appreciable delay in deployment of this newer technology as many companies are already producing LTE-CV2X devices (including dual-mode devices) and readying their availability for use, many states are already deploying LTE-CV2X or dual-mode equipment.” FCC does not describe how it knows that the technology has reached the appropriate level of maturity to work in a safe and effective manner, particularly given that many of the standards for U.S. interoperability and performance are still in draft form. In addition, other V2X technologies, including DSRC, can also “leverage cellular networks to reduce infrastructure cost” in the exact same manner as LTE-CV2X. Simply put, we are unaware of how, at this stage in development, LTE-CV2X achieves “greater (than DSRC) network effects.”</p> <p>Furthermore, FCC is aware, based upon DOT test results that have been shared with FCC last year, that the DOT and transportation stakeholders are unsure whether LTE-CV2X technology can perform operations under some of the most challenging transportation conditions. Based on the limited test results to date, DOT and many other stakeholders do not see any notable system performance differences of LTE-CV2X versus DSRC. In fact, DSRC offers the same performance in 10 MHz that LTE-CV2X offers in 20 MHz of spectrum, which should address the FCC’s concerns that “[the] ITS messaging system must continue to work to deliver messages more efficiently.”</p> <p>Moreover, FCC’s reallocation of 30 MHz for ITS equates to only one 20 MHz LTE-CV2X channel and a 10 MHz experimental channel (or guard band), further highlighting the inadequacy of the remaining amount of spectrum for safety-of-life purposes.</p>

DOT Concern with FCC's R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
24 FCC Creates Significant Risk for the Transportation Industry in Choosing LTE-CV2X as the Sole Technology for Connected Vehicle Applications	§3 ¶13, §3 ¶101–102	<p>FCC states: “We further conclude that, to promote the most efficient and effective use of the spectrum that will continue to be designated for ITS, only a single technology is appropriate, and we will require use of LTE-CV2X technology.” However, FCC has not provided any data, criteria, or analysis that shows that this decision results in the “most efficient and effective use of this spectrum.” In particular, the Department believes that any FCC analysis should account for the lost transportation benefits, given the losses associated with the established infrastructure and vehicles that are currently equipped with DSRC, as well as lost benefits given the time it will take to dismantle and reinstall new technologies. In addition, the Department questions why safety is not an equal consideration with “effective use” when identifying the public value of this spectrum asset.</p> <p>The Commission is aware, and the record makes clear, that a variety of stakeholders have invested significantly in DSRC and have implemented it in vehicles and infrastructure across the Nation. Despite this evidence, the Commission has chosen a “winner” here without a proven record of technical accomplishment or safe deployment. To the extent that the FCC is of the view that exploratory testing with a minimum number of devices demonstrates a fully realized and analyzed set of safety performance results, the DOT disagrees. Rather, the Department is concerned that this approach is not sufficient for public safety applications. Cost is a significant determinant in how quickly and how broadly life-saving technologies are deployed, yet there appears to have no consideration regarding which technology offers the lower life cycle cost or which might offer a superior benefit-cost ratio. For example, given the relative simplicity and lower cost of IEEE 802 chipsets versus cellular chipsets, one might expect costs for LTE-CV2X to be higher.</p>
25 FCC Creates Significant Risk for the Transportation Industry in Choosing LTE-CV2X as the Sole Technology for Connected Vehicle Applications	§2 ¶9	<p>FCC explains that its decision to choose LTE-CV2X is based, in part, on, “(3) the significant evolution of transportation and vehicular safety-related technologies outside the 5.9 GHz band; and (4) the rising interest in LTE-CV2X as an alternative radio technology that could provide transportation and safety-related communications in the 5.9 GHz band.” Could is a critical word here, as the decision lacks any detail for plans in the case that LTE-CV2X is shown to not be able to perform under challenging transportation conditions. If this were to be the case, it seems that, to be consistent with its position in this order, FCC would need to consider returning the spectrum back to DSRC. Due to this uncertainty, it seems prudent that that FCC, instead of choosing a</p>

DOT Concern with FCC's R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
		winner, should adopt the technology neutral position advocated by DOT and others.
26 FCC Creates Additional Risk for the Nation with Suggestions that Other Technologies or Other Spectrum can be Relied Upon, Solely, to Address the Significant Safety Issues we face on our Roadways	§2 ¶7–8, §3 ¶32–33, §3 ¶38, §3 ¶43–44, §3 ¶135, §4 ¶185–186	<p>FCC continues to demonstrate a flawed understanding of cooperative-ITS technologies by maintaining that line-of-sight technologies are just as capable of preventing crashes as V2X communications, which incorporate significant non-line-of-sight capabilities. FCC appears to equate spectrum allocations for vehicular radars as comparable to a spectrum allocation for vehicular communications.</p> <p>In previous docket filings, DOT and many transportation experts have explained to the FCC that technologies such as radar, LIDAR, and cameras are strictly line-of-sight (LOS) and, thus, cannot achieve many of the crash-imminent benefits of V2X communications, which function in non-line-of-sight (NLOS) crash-imminent situations. V2X communications and LOS technologies (radar, LIDAR, camera) cannot be treated as equivalents, but rather complement one another. The effects of this enhancement should be included in any safety and cost-benefit analysis.</p>
27 FCC Creates Additional Risk for the Nation with Suggestions that Other Technologies or Other Spectrum can be Relied Upon, Solely, to Address the Significant Safety Issues we face on our Roadways	§2 ¶8, §3 ¶38, §3 ¶100, §3 ¶102	With regard to reliance upon other spectrum, such as commercial cellular services, DOT notes that while commercial services do provide information that is useful to drivers and travelers of all types, V2X communications are a vastly different form of information. They are trusted public safety messages from authorized entities that assure that the data can be relied upon in crash-imminent situations without producing unintended consequences. Commercial service information, by comparison, is frequently a convenience for the user, who must decide whether the data is trusted enough to be actionable in any critical situation. Further, these commercial services are likely not consistently capable of providing the very low latency essential for effective crash-imminent safety warning.

	DOT Concern with FCC’s R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
28	Transition to LTE-CV2X in the Upper 30 MHz Is More Complicated than FCC Predicts	§3 ¶117	FCC states that, under Title III, the Commission has the authority to transition current DSRC operations to LTE-CV2X: “the argument that the Commission’s action amounts to a ‘fundamental change’ rests on the assertion that it will upend the future plans of DSRC licensees to provide certain advanced ITS services, which some commenters argue require the use of the full 75 megahertz currently allocated to DSRC licensees. But as we explain at length above, our review of the record—including the history, current deployment of safety-related DSRC-based ITS services, and status of future plans for these advanced services—leaves us unconvinced that relocation to the upper 30 megahertz will upend any concrete business plans of DSRC licensees.” FCC goes on to suggest that, “[i]n making this determination, we conclude that the potential deployment of future advanced DSRC-based ITS services that may or may not develop years into the future are too uncertain and remote to warrant the further reservation of spectrum for their deployment.” The Department, as well as many commenters, disagree with this rationale. The loss of 45 MHz of ITS spectrum represents a fundamental change, since it will result in a significant change in the overall utility of the band from its long-established use.
29	Transition to LTE-CV2X in the Upper 30 MHz Is More Complicated than FCC Predicts	§3 ¶143–144	FCC suggests that a Second Report and Order will be needed to clarify elements of the transition rules. Without basis or reasoning, the FCC sets the expectation that within two years of a second R&O, the market and supply chain “will allow the ITS supply chains to become replete with LTE-CV2X equipment.” In addition, the timing for transition activities is inconsistent throughout this First Report and Order, and FCC provides no clear understanding of the timing for a second Report and Order.

DOT Concern with FCC's R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
30 Transition to LTE-CV2X in the Upper 30 MHz Is More Complicated than FCC Predicts	§3 ¶144–146, §3 ¶148	Adding to these inconsistencies, there are confusing statements and typographical errors in Appendices B and C, which will lead to further uncertainty and challenges in transition. FCC provides no guidance on what to do with legacy devices, and is unsure if there is any harm or potential interference if DSRC-equipped vehicles continue to operate after a final transition date. Moreover, FCC appears to base upcoming decisions on LTE-CV2X coexistence with DSRC on a belief that new LTE-CV2X licensees can avoid geographic licensed areas or existing registered roadside units. This misunderstanding is concerning, as vehicles equipped with OBUs can be broadcasting anywhere on the roadway and thereby encounter or cause interference. The majority of crash avoidance benefits stem from these equipped vehicles that are not subject to geographical limitations. Finally, FCC stipulates additional requirements and modifications for RSU registration information should licensees decide to adjust their systems (§3 ¶144).
31 Transition to LTE-CV2X in the Upper 30 MHz Is More Complicated than FCC Predicts	§3 ¶57, §3 ¶153-155, Appendix A	<p>FCC also does not account for the ability of signals to travel beyond zones. The Order is unclear with regard to how the FCC is proposing to balance the need for critical safety communications within an approximate 300-meter zone with the fact that radio signals travel farther and thus congest channels and/or interfere outside of 300-meter range, where the signals provide benefit, specifically, in urban environments. It is important to note that a 20 dBm signal from a vehicle can be decoded at 1600 meters and potentially farther. Increasing EIRP by a factor of about 20 means the signals reach out to 2000-3000 meters. DOT further notes that this may be an issue to examine with exclusion zones.</p> <p>As FCC is aware, DOT has tested DSRC for these effects. DOT seeks data from FCC on any tests of LTE-CV2X for these effects, and asks if FCC has appropriately balanced mitigations to offer based on such measurements.</p>
32 Transition to LTE-CV2X in the Upper 30 MHz Is More Complicated than FCC Predicts	§3, ¶159, Appendix B ¶18 (§ 90.381)	DOT questions why FCC appears to have created OOB limits that are more restrictive for ITS safety-of-life communications than for Wi-Fi transmissions. DOT points out that if these OOB limits are measured from the antenna input rather than antenna requirements. This difference in limits will allow more interference (“spill-over”) from U-NII into adjacent channels of LTE-CV2X safety messaging than LTE-CV2X spillover into U-NII channels.

DOT Concern with FCC's R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
33 Transition to LTE-CV2X in the Upper 30 MHz Is More Complicated than FCC Predicts	§3 ¶127, §3 ¶145	In terms of complexity and establishing points of failure for the ITS industry, FCC minimizes the fact that the current technology in use (DSRC) is asynchronous, while LTE-CV2X is synchronous, meaning that any transition would require hardware changes and not over-the-air updates as implied. They do so with an example whereby FCC, in seeking to confirm that ITS will retain exclusive use of the upper 30-megahertz band segment, contains important omissions in its reasoning. DOT notes that the City of Columbus, Ohio, deployed DSRC and will not be able to use the upper 30 MHz if this reallocation occurs, unless additional funding is made available for an upgrade to LTE-CV2X (for all sites, not just this one). The City of Columbus currently has approximately 1800 OBUs and 113 RSUs in operation. These devices are supporting integrated regional and corridor communications with the nearby Marysville area, as well as with vehicles that traverse the Ohio Turnpike sites for an additional 1215 OBUs and 132 RSUs.
34 Transition to LTE-CV2X in the Upper 30 MHz Is More Complicated than FCC Predicts	§3 ¶139, Footnote 368	Similarly, FCC uses a comment from Georgia DOT as an example of deployment of dual-mode DSRC/LTE-CV2X RSUs, but fails to note that many of the more than 1,000 intersections in the Atlanta metropolitan area cited are DSRC-only, and a number of installations have been put on hold due to the FCC freeze on new licenses and subsequent uncertainty for decision makers.
35 Transition to LTE-CV2X in the Upper 30 MHz Is More Complicated than FCC Predicts	§3 ¶28, §3 ¶50	In this Report and Order, FCC does not account for these concerns, and fails to offer criteria or metrics that define how “the 5.9 GHz band . . . become[s] used ubiquitously.” Furthermore, FCC dismisses (in §3 ¶50) that any such transition is a burden to State and local DOTs. The Department disagrees and notes from our docket filing: <ul style="list-style-type: none"> • “Based on our work assessing the change, we conclude that it would cost more than \$645 million to ‘rip and replace’ all existing technologies, re-test the technologies within each unique operational environment, and re-institute operations.” • DOT seeks FCC’s calculations that demonstrate how a site can move through the steps previously identified within 6 months to 1 year, as DOT believes this period of time is too short.

	DOT Concern with FCC's R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
36	Transition to LTE-CV2X in the Upper 30 MHz Is More Complicated than FCC Predicts	§3 ¶67–68, §3 ¶104	As to the decision to allow DSRC and LTE-CV2X to share the upper 30 MHz of the Safety Band during a transition period, DSRC communications are put at risk of interference from LTE-CV2X, as illustrated by DOT's interference analyses provided to the FCC at an earlier stage. Since FCC is allowing for immediate use of U-NII in the lower 45 MHz, FCC is effectively putting the entire ITS ecosystem in place today at great risk. Indeed, FCC increases the risk by relying upon labeling and device manuals to prevent prohibited uses. As the Commission is aware, there have been many instances in which these measures failed to protect licensed users. The best prevention is to preclude these devices from using a band that supports safety-of-life applications.
37	Transition to LTE-CV2X in the Upper 30 MHz Is More Complicated than FCC Predicts	§3 ¶48–51, §3 ¶54, §3 ¶57, §3 ¶66, §3 ¶77	<p>Despite these open issues, FCC's Report and Order presents an aggressive timeline to move U-NII devices into the lower 45 MHz, move DSRC into the upper 30 MHz, and allow LTE-CV2X to operate in the upper 30 MHz. How this will happen is unclear, as FCC appears to equivocate (using words such as "consider" or "explore"), while pushing the answer as to how these technologies will coexist into a planned Second Report and Order. For example:</p> <ul style="list-style-type: none"> • "We decline to allow full-power unlicensed outdoor operations at this time. Instead, such use across the band will be allowed at a later time, after ITS operations have ceased to operate in the 5.850-5.895 GHz band and after we have adopted rules that will ensure protection of federal operations from these outdoor operations." • "In the Further Notice below, we explore options for enabling outdoor U-NII-4 device operation, including reasonable interference avoidance and mitigation techniques to protect federal radar operations." • "We explore in the Further Notice whether we can remove the prohibition on client-to-client communications after ITS systems move out of the U-NII-4 band and only federal radiolocation sites will need to be protected."

DOT Concern with FCC's R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
38 Transition to LTE-CV2X in the Upper 30 MHz Is More Complicated than FCC Predicts	§3, ¶90–92	FCC similarly dismisses the concerns of Amateur Radio Operators, including those that filed from the Amateur Radio Emergency Data Network, suggesting that these filings do not provide any specific technical analysis for their particular position. Instead, in a DOT review of these filings from AREDN and other amateur radio commenters, we note the expressed concern for harmful interference. If correct, and these problems may have a negative economic impact, this is another consideration missing from the FCC's economic analysis, including impacts to those public safety systems that help to save lives during wildfires, hurricanes and floods, or other emergency events.
39 Erroneous Assumptions And Calculations That Lead To Flawed Rules	(Introductory statement)	Where FCC does provide analysis in this Report and Order, DOT has serious concerns with the use of flawed inputs, “worst case scenarios,” modeling approaches, and modeling assumptions in several key areas, as described in the following items below.
40 Probability of ITS and U-NII Interactions	§3 ¶ 68–79, and others; and footnotes 173 and 174	<p>FCC's calculations on the percentage of interactions between U-NII and DSCR or LTE-CV2X devices in the near future are not a valid representation of normal traffic conditions. The assumptions in these calculations thus lead to a significant under-estimation of the U-NII interference effects to current operational sites, as well as to an under-estimation of the need for safety spectrum, both now and into the future.</p> <ul style="list-style-type: none"> • FCC references RSU and OBU deployment numbers (§3 ¶ 69) that are lower than the numbers publicly available on the Safety Band website, leading to an underestimation throughout this Report and Order. • Due to the nature of how V2X communications work, calculations need to be integrated over time and geography, not as isolated, one-time events. • Taking average spectrum use (¶ 72) across the U.S., as FCC has done, in terms of calculating risk of interference is incorrect. V2X communications are used differently in various geographic locations and in different transportation environments. Note that the greatest crash risks often occur in the most congested areas, where the spectrum is already often most congested; thus, analyses based on peak spectrum use are most appropriate. Differences extend to varying uses at different times. FCC should take this into account in its calculations or there will be interference and risk conditions with continued V2X use. • With regard to Packet Error Rate (PER) free-range analysis (¶ 70-71), it should be noted that even if all assumptions given are valid, the

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		<p>calculation is a probability of interference in one 600 meter area at any one time, not an overall probability of interference in any 600 meter area. Making further calculations to account for the overall possibility of interference in any 600 meter area would result in a very high probability of an interference event somewhere, if the total number of congested 600 meter areas were sufficiently high.</p> <ul style="list-style-type: none"> • The assumptions are very broad and do not readily translate to known real-world scenarios (such as a random distribution of DSRC devices among all vehicles, when they are likely to be concentrated in certain areas). • Any FCC calculations or modeling must incorporate time, space, density, and geography. • Uniform random distribution modeling from a national perspective offers an erroneous and flawed set of results. It is not a model suitable for application to calculating interference risk at a deployed site. • Calculations used (such as those referenced in footnotes 173 and 174, ¶ 70) can be misleading because vehicle encounters are not randomly distributed across time and space with uniform distributions, which is FCC's fundamental assumption. The total number of vehicles on the road is less important than the number of V2X equipped vehicles within a particular region; and the likelihood of a specific vehicle being on a major highway or arterial is much greater than the probability it will be on any random street.

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41 Contention-based Protocol Assumptions	§3 ¶70–71, §3 ¶75	<p>FCC “require[s] that the indoor devices, both access points and their associated client devices, employ a contention-based protocol.” DOT’s view is that this requirement appears to base assurances of non-interference, during the transition period, on the above inaccurate calculations (¶ 70), as well as “on the inclusion of a contention-based protocol, a low load factor on the ITS network, a 12 dB margin below the OBU received power, and a low activity factor.” Each of these base assumptions raises additional questions. For example:</p> <ul style="list-style-type: none"> • Has FCC factored in that the contention-based protocol is dependent on the energy detection threshold of the U-NII devices, rather than recognition of transmission preambles, in order to avoid interference with DSRC? • How did FCC derive the 12 dB margin (¶ 74–75) (it appears to be in error)? • How were the “low load factor” and “low activity factor” (¶ 75) assumptions justified in terms of realistic traffic scenarios? <p>These factors suggest that the transition time deserves a more in-depth interference analysis before declaring interference improbable.</p>
42 Antenna EIRP Patterns	§3 ¶73	<p>FCC should make clear its assumptions about direction (<i>e.g.</i>, up or down?). Most terrestrial radios operate in roughly the same plane preferring peak gain on or near the horizon. Conversely, GPS antennas would have peak gain in a vertical direction to communicate with satellites.</p>
43 Polarization Loss	§3 ¶73	<p>FCC states, “We also assume a polarization loss factor of 3 dB that accounts for losses due to the relative orientation of transmit and receive antennas.” DOT finds that the factors FCC has chosen to include are significantly helpful to substantiate the Wi-Fi case.</p> <p>By comparison, it appears that FCC has not addressed V2X factors, such as ground-bounce nulls or hidden node issues (among other factors) which means V2X radios are more vulnerable to interference. Another gap that is not accounted for in the FCC assumptions is the scenario of when the V2X device is in between two Wi-Fi devices just outside of their CS and ED detection ranges so they do not hear each other. FCC does not describe how the rules and Wi-Fi device parameters account for these vulnerabilities or other scenarios.</p>

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44 Wi-Fi Interference Assumptions	§3 ¶74	FCC states, "In the 6 GHz Report and Order the Commission recognized that interference from Wi-Fi devices is dominated by the single closest Wi-Fi device to the victim." This assumption (and the subsequent discussion) seems to be missing a key factor—that Wi-Fi interference is predominantly driven by Wi-Fi traffic in the air, rather than transmission power levels. With this consideration, performing this analysis based on only a single device will underestimate interference, especially in a typical environment with many APs and clients in range.
45 Out of Band Emission Limits and the Suitability of using "Average" Measurements	§3 ¶82-83	The suitability of RMS measurements depends on the standard deviation. It is less suitable where the result is the average of widely varying power levels. DOT has taken test measurements that demonstrate Wi-Fi devices leak significantly despite FCC defined limits. It would be important for the FCC to clarify if the WISPA arguments are based on actual measurements. If that is the case, FCC should provide these measurements to the DOT for further analysis. Conversely, would FCC consider participating in taking RMS measurements before enacting any rules? These types of tests and measurements are critical to demonstrate that basic conditions for safety will be met in the presence of both or either V2X communications technologies.
46 Transmitted Power and Emission Limits	§3 ¶169, §3 ¶172	<p>FCC references a statement from the Wi-Fi Alliance: "It states that if a different power level is adopted for the U-NII-4 band, U-NII devices would not be able to operate across both the U-NII-3 and U-NII-4 bands, eliminating the potential use of wider channels, equipment commonality, reduced cost and complexity, superior performance, and other benefits that may be realized by the Commission's proposal." DOT questions this statement, as Wi-Fi devices constantly vary power and modulation and coding schemes (MCS), depending on channel quality metrics.</p> <p>The Department also notes that U-NII devices straddling both bands would need to use the more restrictive power level, and thereby not eliminate the use of wider channels. And, again, in making these statements, DOT would like to know if FCC has factored in how much more Wi-Fi demand can be met through higher quality Wi-Fi performance with less self-inflicted adjacent channel interference.</p>

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47 Increased Wi-Fi Power will Increase Likelihood of Interference	§3 ¶181	In the First Report and Order, FCC adopted a 20 dBm/MHz limit for indoor U-NII-4 access points, largely to protect co-channel ITS incumbent operations. FCC is now proposing that indoor U-NII-4 devices be permitted to increase power to 23 dBm/MHz or 36 dBm radiated power for all bandwidths upon either (a) the later of one year following the effective date of the First Report and Order (<i>i.e.</i> , the date by when ITS operations must transition out of the 5.850-5.895 GHz band) or (b) the effective date of a Second Report and Order adopting these proposed power increases. In making this proposal, FCC does not propose to change any other aspect of indoor U-NII-4 devices; these devices will still be required to incorporate all the mitigation features that FCC adopted in the First Report and Order, including the requirement to obtain power from a wired connection, a prohibition on weatherized enclosures and a requirement for an integrated antenna. Client devices will be limited to power levels 6 dB below the power limits for access points.
48 Loss Of Market Leadership	(Introductory statement)	This Report and Order creates significant obstacles to continued international harmonization of Cooperative-ITS marketplaces and challenges U.S. market leadership in 5G as it applies to the evolutions and adaptations needed by the transportation industry. The Department concludes that this Report and Order will likely eliminate the basic conditions necessary for transportation safety communications, effectively destroying the significant work of DOT and many other public and private sector stakeholders to develop V2X ecosystems that are in operation today, and further delaying the deployments that the FCC states that it seeks to foster.

DOT Concern with FCC's R&O/FNPRM, Dated October 28, 2020	R&O/FNPRM Section # and Para #	DOT Technical Response to R&O/FNPRM
49 Significant Changes in International Harmonization	§3 ¶41, footnote 104	<p>This Report and Order relies significantly on false assumptions that other nations, in particular, the member states of the European Union, are satisfied with an allocation of 30 MHz and, as such, this FCC shift in rules continues harmonization of the worldwide market for vehicles, automotive parts and supplies, and infrastructure technologies. For example,:</p> <ul style="list-style-type: none"> • In §3 ¶41, FCC states, “For example, Open Technology Institute and Public Knowledge describe Japan’s use of a single 10-megahertz channel to provide V2X safety-related benefits.” DOT notes that this omits a second set of channels that Japan is using in the 5.8 GHz band; in total, Japan has allocated 89 MHz to ITS. • In footnote 104, FCC notes, “The International Telecommunication Union Radiocommunication Sector (ITU-R) recommends designating the 5.9 GHz band for ITS. See Car2Car Comments at 4.”
50 Significant Changes in International Harmonization	§3 ¶41, §4 ¶184	<p>As per the international assignment of spectrum, DOT’s analysis shows that FCC’s conclusion that other nations are setting aside less spectrum is incorrect, as most nations listed demonstrate a mere 5 MHz difference from the current U.S. allocation. FCC also disregards the information provided regarding how many of these countries are seeking additional spectrum, particularly to ensure the ability to pursue 5G New Radio (NR) V2X as technology evolves. 5G NR is on the horizon and will require spectrum. The transportation industry and safety experts are best equipped to determine whether DSRC, LTE-CV2X or 5G NR should be used for cooperative and automated ITS and for which applications. Designating the 30 MHz for LTE-CV2X may also have negative impacts on the tailoring of 5G New Radio for V2X communications.</p>
51 Lack of Spectrum for 5G Cooperative-ITS	(General statement)	<p>The rules provided in Appendix C specify 4G (Release 14) LTE-CV2X vehicle-to-vehicle safety messaging, thus eliminating the possibility of developing and using 5G V2X technologies in this spectrum. No spectrum beyond that used by LTE-CV2X will be available for 5G V2X technology in the United States, as LTE-CV2X and 5G V2X are not compatible. By choosing LTE-CV2X as the “winner,” the Commission would prevent the development for R&D and other uses of 5G in the 5.9 GHz spectrum, which would be allowed under the Department’s preferred technology neutral approach. Further, it is unclear how and at what cost 4G-LTE based systems can be supportable across the decades-long lifecycle of vehicles and transportation infrastructure, noting that 5G is already supplanting 4G-LTE in the consumer cellular marketplace.</p>

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52 Loss of Market Leadership	(General statement)	By truncating the available spectrum, FCC severely limits the opportunities for the U.S. transportation industry to maintain or increase leadership in the global marketplace. A few years ago, most DSRC manufacturers were U.S. based. With the entrant of the Cellular Vehicle-to-Everything (CV2X) devices, the major manufacturing focus has shifted to China, particularly with chipsets (there is one chipset manufacturer for this technology in the U.S.). To date, the dominant (only) approved and published LTE-CV2X standard is for China that has dedicated only 20 MHz to this technology (the U.S. standard is still in development, which suggests that it is premature and possibly unsafe to focus on this technology). We further understand that China is also testing 5G "New Radio" (3GPP Release 16) V2X in the same spectrum, and has not yet determined which technology it will pursue.
53 Loss of Market Leadership	(General statement)	In addition, the majority of other developed countries have dedicated a greater amount (up to 70 MHz) of spectrum to transportation, including Canada, Mexico, Australia, South Korea, Europe, and Russia. Moreover, FCC is removing any opportunity for transportation to research and put 5G V2X capabilities into use as the proposed rules in Appendix C clearly specify 4G (Release 14) LTE-CV2X vehicle-to-vehicle safety messaging. This decision, therefore, will mean that 5G V2X technology will not be available in the United States, as LTE-CV2X and 5G New Radio V2X are different waveforms that are not compatible and cannot operate in the same 30 MHz spectrum.



THE SECRETARY OF TRANSPORTATION
WASHINGTON, DC 20590

October 15, 2020

VIA E-MAIL

Adam Candeub

Acting Assistant Secretary of Commerce for Communications and Information
National Telecommunications and Information Administration
1401 Constitution Ave., N.W.
Washington, D.C. 20230

**Re: Draft of First Report and Order and Further Notice of Proposed Rulemaking
From the Federal Communications Commission
In the Matter of Use of the 5.850-5.925 GHz Band
ET Docket No. 19-138**

Dear Mr. Candeub:

The Department of Transportation (DOT or the Department) appreciates the opportunity to review the draft of the above-referenced decision of the Federal Communications Commission (FCC or the Commission) dated October 1, 2020. This proceeding involves issues that are of critical importance to the Department, given the impact upon transportation safety and innovation. We appreciate the efforts of the National Telecommunications and Information Administration (NTIA) to consider DOT's input and to seek further dialogue with FCC.

Nonetheless, the Department remains deeply concerned about the path that FCC has chosen for the 5.9 GHz spectrum band, the "Safety Band," which the American public and stakeholders have relied upon for over two decades to improve the Nation's transportation system. We are disappointed that FCC has ignored or rejected DOT's previous comments in this proceeding, and has failed to give sufficient weight to the Department's expertise in matters of transportation safety. For these reasons, and for the reasons expressed in Steven Bradbury's October 8, 2020 letter to NTIA on DOT's behalf, we urge the Commission to pause this proceeding and to reconsider its approach.

As you know, the Safety Band is vital to innovations in Vehicle-to-Everything (V2X) communications used to prevent motor vehicle crashes and to improve mobility. There is no higher priority for the Department than to reduce the number of injuries and fatalities resulting from these crashes. As we have previously explained, our Nation suffers extraordinary harm from motor vehicle crashes—more than 36,000 lost lives; over 2.7 million injuries; and nearly \$800 billion in direct and indirect costs per year. Traffic congestion adds to these costs and puts further strain upon our roadways. In addition, DOT is concerned about any measures that might adversely affect the safety of first responders, including firefighters, police officers, and emergency medical technicians, who must rely upon an efficient transportation network to ensure public safety.

At DOT, we remain convinced that V2X communications will reduce these harmful effects, based upon our extensive analysis and engagement with transportation stakeholders. We continue to support the efforts of States and municipalities, the automotive industry, safety advocates, and others who have already made great strides in the deployment of V2X communications, and who continue to innovate in this area.

FCC's decision puts these efforts in peril. The Commission plans to cut back the spectrum available for V2X communications by more than half. As we have explained in previous comments, V2X simply will not work as intended under this arrangement. Indeed, unless the Commission resolves the problem of interference from Wi-Fi devices into the remaining 30 megahertz of spectrum reserved for V2X, it remains unclear how much usable spectrum will actually be available for transportation applications, if any.

Furthermore, FCC has compounded the problem by prematurely selecting a "winner," Cellular Vehicle-to-Everything technology (CV2X), while discarding the Dedicated Short-Range Communications (DSRC) technology that stakeholders have already deployed. This decision, which is at odds with the regulatory approaches of other countries, is not a market-driven solution, nor is it grounded in data or sound science. It will also reduce the ability of U.S. companies to compete in the global connected vehicle and safety arena. The Commission's benefit-cost analysis is also fatally flawed. FCC undervalues the safety benefits of this spectrum band, and underestimates the significant cost of transitioning the existing V2X ecosystem to fit into these new regulatory strictures.

As NTIA requested, DOT is now providing a detailed set of specific comments and suggestions on the draft of FCC's decision on the 5.9 GHz band. These comments expand upon the points in Mr. Bradbury's October 8 letter. We ask NTIA to provide these comments to FCC and to reiterate our concerns about the Commission's course of action. DOT remains committed to working closely with FCC, NTIA, and other interested parties in the public and private sectors to develop a more sustainable solution for the 5.9 GHz band in the public interest.

Sincerely,

 Elaine L. Chao

Enclosure

cc: Doug Kinkoph, NTIA
Peter Tenhula, NTIA
Ed Drocella, NTIA

[REDACTED]

[REDACTED]

V2X innovations are expected to play a key role in reducing the number of fatalities, injuries, and other social costs of motor vehicle crashes, which remains the Department’s overarching priority. According to the most recent annual crash statistics (from 2018), our Nation faces over 6 million police-reported vehicle crashes per year, which resulted in 36,560 lives lost and over 2.7 million injuries; 4,807,058 of these crashes resulted in property damage.² These crashes translate into an annual economic harm to the Nation of approximately \$300 billion in direct costs and over \$800 billion when accounting for the loss of life, injuries, and other quality-of-life factors.³ The Department continues to believe that V2X communications will play a significant role in reducing these crashes, particularly crashes involving conditions that remain challenging for vehicle-based technologies, such as radar, LIDAR, or cameras. Furthermore, numerous Vehicle-to-Infrastructure (V2I) applications already exist that can help to reduce congestion, which, based on estimates from the transportation industry, leads to over \$166 billion in annual costs,⁴ and will also assist States in enhancing the performance and safety of their existing roadway infrastructure.

DOT recognizes the growing demand for wireless broadband access to support Wi-Fi devices that Americans use at home, at school, and at work. To that end, DOT took note of the Commission’s recent allocation of 1200 MHz in the 6 GHz band specifically for meeting this demand.⁵ However, with regard to the 5.9 GHz band of spectrum (the “Safety Band”), providing additional Wi-Fi access should not come at the expense of transportation and public safety—particularly when doing so will upend innovation and investment and sow significant uncertainty about the future of connected vehicle technology and transportation safety for America.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

² Statistics generated from the National Highway Traffic Safety Administration (NHTSA) query tool at: <https://cdan.nhtsa.gov/guery>.

³ For the methodology used to determine costs, *see* Blincoe, L. J., Miller, T. R., Zaloshnja, E., & Lawrence, B. A. (May 2015). *The economic and societal impact of motor vehicle crashes, 2010. (Revised)* (Report No. DOT HS 812 013). Washington, D.C: National Highway Traffic Safety Administration, at: <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812013>.

⁴ Statistics from Urban Mobility Report by Texas A&M Transportation Institute with cooperation from INRIX at: <https://static.tti.tamu.edu/tti.tamu.edu/documents/mobility-report-2019.pdf>, pages 2 and 10.

⁵ *FCC Adopts New Rules For The 6 GHz Band, Unleashing 1,200 Megahertz Of Spectrum For Unlicensed Use*, adopted on April 23, 2020, issued on April 23, 2020, at: <https://www.fcc.gov/document/fcc-opens-6-ghz-band-wi-fi-and-other-unlicensed-uses>.

[REDACTED]

[REDACTED] The Commission takes this action over the objections of the nearly 90 percent of commenters who filed responses on the docket, and who have been working in the V2X space for decades. [REDACTED]

[REDACTED]

[REDACTED]

We regret that FCC has chosen not to accept any of DOT's inputs or to work with our safety experts, as well as with members of the auto industry, States, municipalities, safety organizations, and many others who commented in this proceeding. The Department agrees with these stakeholders that this particular spectrum band remains critical to the future of connected and automated transportation and the safety of Americans traveling on our Nation's roads. Without repeating each of the detailed comments that the Department provided to the Commission at earlier stages, [REDACTED]

[REDACTED]

[REDACTED]

In sum, the Department's major concerns, conclusions and recommendations are as follows:

- ***FCC should preserve the entire 5.9 GHz Safety Band for V2X purposes.*** DOT, State and local authorities, and automotive industry stakeholders are unified around the need for at least 75 MHz of spectrum dedicated for V2X communications to support the Nation's transportation safety and mobility needs now and in the future. DOT offered an analysis of this issue in prior comments, and the point was recently reinforced by many stakeholders in their docket filings, but specifically by Continental Automotive Systems' presentation to the FCC of a detailed analysis of advanced communication requirements.⁶ Further, an examination of spectrum reserved for V2X communications by other countries reinforces the need for adequate bandwidth, as well as the negative impact on international competitiveness in transportation efficiency and safety products that would result from a highly constrained (30 MHz) V2X spectrum environment in the U.S.
- [REDACTED] Research recently presented to FCC by an industry consortium (Crash Avoidance Metrics Partners, LLC, or CAMP) shows that unlicensed UNII-4 devices operating in the lower 45 MHz of the Safety Band will cause significant interference to V2X communications devices, potentially

⁶ See Notice of *Ex Parte*: Use of the 5.850-5.925 GHz Band, ET Docket No. 19-138, October 1, 2020, located at:

<https://ecfsapi.fcc.gov/file/1001764119686/Ex%20Parte%20Notice%20of%20October%201%20Meeting%20with%20Erin%20McGrath.pdf>; Notice of *Ex Parte*: Use of the 5.850-5.925 GHz Band, ET Docket No. 19-138, September 30, 2020, located at:

<https://ecfsapi.fcc.gov/file/1093066727652/Ex%20Parte%20Notice%20of%20September%2028%20Meeting%20with%20Umair%20Javed.pdf>; Public Comment: Use of the 5.850-5.925 GHz Band, ET Docket No. 19-138, March 9, 2020, located at:

[https://ecfsapi.fcc.gov/file/10310257413231/Comment_Continental_\(ET%20Docket%20No.%2019-138\)_3.09.2020.pdf](https://ecfsapi.fcc.gov/file/10310257413231/Comment_Continental_(ET%20Docket%20No.%2019-138)_3.09.2020.pdf).

making V2X technologies unusable for safety-of-life communications.⁷ Further, this analysis does not consider the potential for additional interference from unlicensed UNII-5 devices that will operate in the 1200 MHz band just above the Safety Band and that was recently reassigned by FCC for such purposes. [REDACTED]

- **Allow the market to determine the most appropriate technology for V2X.** [REDACTED]

[REDACTED] While CV2X shows promise, it is still not fully test-proven—particularly with respect to performance in real-world congested environments. Furthermore, true 5G-based device-to-device communication protocols have recently been adopted by the 3rd Generation Partnership Project (3GPP), and such technology may have advantages over either Dedicated Short-Range Communications (DSRC) or CV2X. The marketplace—*i.e.*, those entities destined to build, operate and warrant products that use the spectrum in question—should be given the opportunity to innovate in technologies for moving forward with V2X.

- **Recommended next steps.** DOT again urges the Commission to pause this proceeding and to return to working with the Department, the auto and infrastructure industries, transportation safety experts, and other stakeholders through a collaborative and transparent process, perhaps a negotiated rulemaking, to develop a better, more sustainable solution for the 5.9 GHz Safety Band. Such a collaborative process need not be protracted or open-ended, as we also recognize the significant opportunity cost from under-utilization of this valuable resource. FCC has participated in similar collaborative processes that have resulted in successful spectrum regulatory actions, and we would propose that similar processes be followed for the 5.9 GHz band. We would welcome the opportunity to meet to discuss these comments in greater detail, and are committed to supporting a collaborative process.

Analysis of the Department's Concerns [REDACTED]

I. [REDACTED]

[REDACTED] advances rules that do not meet the basic conditions necessary for transportation safety communications. Instead, the Commission has not addressed the most significant comments and objections filed in the docket, and [REDACTED] misapprehends how V2X cooperative messages work. These shortcomings include the following:

⁷ Notice of *Ex Parte*: Use of the 5.850-5.925 GHz Band, ET Docket No. 19-138, October 1, 2020, located at: <https://ecfsapi.fcc.gov/file/1002750125594/5GAA%20C-V2X%20Consortium%20Testing%20Presentation%20w%20Attachment.pdf>.

- [REDACTED]
- The technical framework that the Commission plans to adopt would cause unacceptable interference with V2X devices. This is particularly of concern with regard to the outdoor device parameters for unlicensed national information infrastructure (UNII). DOT laboratory testing, as well as work performed by industry experts, demonstrates this danger, and has been made available to the Commission in the docket.⁹ In particular, DOT calls the Commission’s attention to test results using the proposed UNII parameters in a recent filing by CAMP.¹⁰ These results show significant interference that FCC ignores, and for which the Commission provides no effective form of mitigation.
- [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
- [REDACTED]

■ [REDACTED]

⁹ Located at: https://www.fcc.gov/ecfs/search/filings?limit=25&offset=50&proceedings_name=19-138&sort=date_disseminated,DESC.

¹⁰ Located at: <https://ecfsapi.fcc.gov/file/1002750125594/5GAA%20C-V2X%20Consortium%20Testing%20Presentation%20w%20Attachment.pdf>.

[REDACTED]

- FCC offers no data or test findings that document that 30 MHz of spectrum is adequate to provide appropriate level of safety.

Finally, we note that the Commission has not offered data or test findings to assure investors and stakeholders that the remaining 30 MHz of spectrum in the Safety Band will be protected against harmful interference from unlicensed devices in the neighboring spectrum bands. Absent such assurances, the Commission’s decision to preserve 30 MHz for V2X is illusory. What remains might effectively be much less than 30 MHz, and perhaps little to no usable spectrum from a functional perspective.

II. FCC Has Failed to Give Sufficient Weight to DOT’s Comments and Expertise.

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

These decisions, which relate to transportation safety, mobility, and architecture, are squarely within the Department’s expertise, and DOT respectfully disagrees with FCC’s assumptions and conclusions about these issues. Neither the Commission nor DOT has tested, much less evaluated, CV2X with real-world, challenging transportation use cases. For the reasons discussed here, DOT does not share the Commission’s confidence in the adoption of an untested technology as the sole form of connected vehicle technology, a decision outside of FCC’s purview and expertise. Furthermore, the Department has done extensive testing in laboratories and in the field with real vehicles and commercial-scale devices under different weather and geographic conditions for three years to ensure that our approach is well founded on validated data.

Based on this experience and results (documented on our publicly available Safety Band website¹² and discussed in the Department’s previously filed comments), DOT is concerned that [REDACTED] is based upon premature and unrealistic assumptions about safety in a rapidly moving, ever-changing vehicular environment. At a minimum, further examination of open questions and testing of any new technology or band plan is both critical and necessary when developing rules for technology intended for use with crash-imminent safety-of-life implications.

III. FCC Creates Significant Risk for the Transportation Industry in Choosing CV2X as the Sole Technology for Connected Vehicle Applications.

The Commission is misguided in adopting CV2X as the sole form of connected vehicle technology and in jettisoning all DSRC technologies. DSRC is well proven and mature, and is already being used in the real world in vehicles and infrastructure. As noted above, the choice of using CV2X exclusively is not based on sufficient evidence of safe performance under truly challenging transportation conditions—the types of conditions that tend to result in crashes.

The Commission is aware, and the record makes clear, that a variety of stakeholders have invested significantly in DSRC and have implemented it in vehicles and infrastructure across the

¹² Located at <https://www.transportation.gov/content/safety-band>.

Nation. Despite this evidence, the Commission has chosen a “winner” here without a proven record of technical accomplishment or safe deployment. To the extent that FCC is of the view that exploratory testing with a minimum number of devices demonstrates a fully realized and analyzed set of safety performance results, DOT disagrees. Rather, the Department is concerned that this is a particularly dangerous regulatory approach when public safety is at stake.

DOT remains of the view that a technology-neutral approach is the optimal path for advancing a safe and productive American transportation system. Remaining technology neutral is particularly important where, as in this proceeding, government action is taken to encourage industry innovation; where the government and industry are in consensus on test results regarding safety; and where the government makes judicious regulatory choices based upon the best available scientific data. [REDACTED] Furthermore, [REDACTED]

[REDACTED] thus allowing for the potential of different, incompatible forms of the devices to seek to use the remaining 30 MHz. “CV2X” is not a “singular specific technology.” Without more precise definition, FCC puts safety and interoperability at risk and provides rules that are likely to be confusing for the stakeholder community, and that further delay deployment of technologies that can save lives and reduce injuries.

IV. [REDACTED] Establishes Obstacles to International Harmonization and U.S. Market Leadership in 5G.

As per the international assignment of spectrum [REDACTED], DOT’s analysis shows that the FCC’s conclusion that other nations are setting aside less spectrum is incorrect, as most nations listed demonstrate a mere 5 MHz difference from the current U.S. allocation. FCC also disregards the information provided that many of these countries are seeking *additional* spectrum, particularly to ensure the ability to pursue 5G new radio V2X as technology evolves. In sum:

Country or Region	Frequency Band	Bandwidth	Comms Protocols	Deployment Scenario	Status	Reference Link
USA	5.850 to 5.925	75 MHz	DSRC	ITS (V2V, V2I, V2P, V2X)	Enacted in 1999/2003	https://docs.fcc.gov/public/attachments/FCC-03-324A1.pdf
Japan	5 770-5 850 MHz	89 MHz	DSRC	V2I	Revised 2008	http://www.arib.or.jp/english/html/overview/doc/5-STD-T109v1_1-E1.pdf & https://www.arib.or.jp/english/std_tr/telecommunications/desc/std-t88.html http://www.arib.or.jp/english/html/overview/doc/5-STD-T55v1_0-E.pdf
	755.5-764.5 MHz		DSRC	V2V, V2I	revised 2013	
Australia	5.855 to 5.925	70 MHz	DSRC (G5)	ITS (V2V, V2I, V2P, V2X)	Enacted in 2017	https://www.acma.gov.au/sites/default/files/2019-07/Five-year%20spectrum%20outlook%202018-22.pdf & https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2444-2019-PDF-E.pdf
Canada	5.850 to 5.925	75 MHz	DSRC (G5)	ITS (V2V, V2I, V2P, V2X)	Enacted in 2004 with	https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2444-

Country or Region	Frequency Band	Bandwidth	Comms Protocols	Deployment Scenario	Status	Reference Link
					revisions in 2006, 2007	2019-PDF-E.pdf & http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08745.html
Korea	5.855 to 5.925	70 MHz	DSRC	ITS (V2V, V2I, V2P, V2X)	Enacted in 2016	https://www.itu.int/dms_pub/itu-r/md/15/wp5a/c/R15-WP5A-C-0650!N29!MSW-E.docx
European Union	5.855-5.875	20 MHz	Technology Neutral—new devices have to be interoperable with G5	ITS (V2V, V2I, V2P, V2X)	Enacted in 2005 with revisions in 2008, 2018	https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2444-2019-PDF-E.pdf
	5.875-5.925	50 MHz				
Singapore	5.855 to 5.925	70 MHz	DSRC	ITS (V2V, V2I, V2P, V2X)	Enacted in 2017	https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2444-2019-PDF-E.pdf
China	5.905-5.925	20 MHz	LTE-CV2X	V2V/V2I	Enacted in 2018	https://en.imsilkroad.com/p/119878.html & https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2444-2019-PDF-E.pdf

Notably, China is the only country in the Table specifically pursuing CV2X, and presumably would stand to benefit the most in economic competitiveness and market leadership by the FCC’s proposed action. [REDACTED]

[REDACTED] No spectrum beyond that used by LTE-CV2X will be available for 5G V2X technology in the United States, as LTE-CV2X and 5G V2X are not compatible. By choosing CV2X as the “winner,” the Commission would prevent the development for R&D and other uses of 5G in the 5.9GHz spectrum, which would be allowed under the Department’s preferred technology neutral approach.

V. FCC’s Consideration of Costs and Benefits Is Flawed.

Best practices for regulations, particularly regulations with major economic effects, require that agencies conduct more rigorous economic analyses. [REDACTED]

[REDACTED] The Department, however, has significant experience in conducting benefit-cost analyses that are consistent with Circular A-4, particularly those requirements for rules whose economic effect is expected to exceed \$1 billion in annual effects, and so would be happy to discuss these issues and concerns with FCC in greater depth. DOT’s concerns are as follows:

- [REDACTED]

- Once FCC does establish an appropriate baseline, the Commission would need to explain why [REDACTED] produces the net benefits relative to the status quo. To do so, FCC will need to provide a more detailed explanation of the magnitude, timing, and uncertainty of the benefits and costs. Such an analysis would provide the public with a better understanding of how FCC made the tradeoffs inherent in this action, most prominently, how the Commission weigh the short term economic benefits of allocating the spectrum to Wi-Fi over the longer-term safety and other transportation benefits of continuing the current allocation. The analysis also does not discuss regulatory alternatives, which is a crucial component of a strong regulatory analysis, as it forces an agency to explain why its preferred approach maximizes net societal benefits.

- [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] The Department will not repeat here the detailed comments provided to the Commission’s earlier proposal, nor those provided by other transportation stakeholders, but the record makes clear that there will be safety and other transportation benefits of V2X once it becomes deployed, as was beginning to happen prior to FCC’s initiation of this rulemaking.

- [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] Further, the Department and other commenters, particularly Continental, have provided significant evidence that the full 75 MHz will play an important part in a connected and automated future.

- [REDACTED]
[REDACTED]
The analysis in the V2V NPRM was limited only to V2V, not any other uses of the 5.9 GHz spectrum, and quantified only benefits associated with two safety applications whose functions were least likely to be replicated by in-vehicle technologies. [REDACTED]

- [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] NHTSA’s NPRM always recognized the broader uses of the 5.9 GHz Safety Band.

- [REDACTED] the harmful effect [REDACTED] will have on police, fire, emergency rescue, and other first responders, and their ability to deliver their public safety mission, as per the numerous comments filed in the docket.

[REDACTED]
[REDACTED]

[REDACTED]

Furthermore, FCC does not properly account for other technical options that offer orders of magnitude more data transfer capacity than can be achieved by reallocating the lower 45 MHz of the 5.9 GHz band. FCC is aware of data throughput, economic, and spectral efficiency gains that can be achieved in current Wi-Fi bands by vigorously adopting newer Wi-Fi technologies such as massive multiple-input and multiple-output (MIMO) methods and Dynamic Frequency Selection (DFS) to more effectively use existing spectrum. [REDACTED]

[REDACTED] is disproven by DFS routers currently on the market today at typical consumer prices.

VI. A Transition to CV2X in the Upper 30 MHz Is More Complicated [REDACTED].

As we have explained previously, the buildout of transportation environments is based on long-term investment commitments, which move at a different pace than the market for consumer wireless devices and their associated communications standards. This fact has obvious implications for the speed at which transportation providers can deploy V2X at scale. In addition, public officials must wait until new V2X technologies are sufficiently mature and available in commercial markets to justify long-term investments. Before long-term V2X investments can be made in infrastructure, new technologies must first be tested and proven safe and effective, including providing assurance that the technology is free from spectrum interference and achieves the required latency.

[REDACTED]

[REDACTED] Instead, the evidence before the Commission strongly suggest that any transition will be costly and take significant time. [REDACTED]

[REDACTED] DOT further notes that if costs of transitioning are not covered by external (including Federal) funding, the likelihood of current sites making the change is low.

¹³ For example, “Analysts suggest more than 316 million Wi-Fi 6E devices will enter the market in 2021, with the first Wi-Fi 6E access points available as soon as Q4 2020,” FCC opens up more bandwidth for Wi-Fi traffic in unanimous, enthusiastic vote, April 23, 2020, at: <https://www.techrepublic.com/article/fcc-opens-up-more-bandwidth-for-wi-fi-traffic-in-unanimous-enthusiastic-vote/>.

[REDACTED]

[REDACTED]

[REDACTED]

Conclusion

DOT reaffirms the importance of promoting transportation safety and other V2X benefits, and sees a continuing and expanding role for the 75 MHz in the 5.9 GHz Safety Band as part of a larger ecosystem enabling V2X services and providing critical benefits to the American public. DOT and FCC agree that there are certain functions that are well-suited for the 5.9 GHz band—including non-line-of-site applications, certain V2I applications, and (emerging soon on the market) cooperative maneuvering and other cooperative automated driving systems. The entire 75 MHz of the Safety Band was allocated to be a critical part of securing improved transportation safety applications in the coming years.

In earlier comments, DOT pointed out that FCC’s reallocation of a fraction of the 5.9 GHz Safety Band would be insufficient even to accomplish the Commission’s own purposes, given the risk of harmful interference to V2X applications. [REDACTED]

[REDACTED]

We appreciate your attention to DOT's comments and concerns in this proceeding. [REDACTED]
[REDACTED] we welcome the
opportunity to discuss the issues here in more detail.

Sincerely,

A handwritten signature in black ink, appearing to read "Steven G. Bradbury". The signature is fluid and cursive, with a prominent loop at the end of the last name.

Steven G. Bradbury
General Counsel (and performing the functions and duties of Deputy Secretary)

cc: Doug Kinkoph, NTIA
Peter Tenhula, NTIA
Ed Drocella, NTIA