

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

In the Matter of	)	
	)	
Unlicensed Use of the 6 GHz Band	)	ET Docket No. 18-295
	)	
Expanding Flexible Use in Mid-Band Spectrum	)	GN Docket No. 17-183
Between 3.7 and 24 GHz	)	

**COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS**

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February 15, 2019

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The Association of American Railroads (“AAR”) hereby submits these comments in response to the Notice of Proposed Rulemaking released by the Federal Communications Commission (“FCC” or “Commission”) in the above-captioned proceedings.<sup>1</sup> Introduction of unlicensed services into the 5.925-7.125 GHz band (“6 GHz band”) will create an intolerable risk of interference to incumbent communications systems, which relay mission-critical information for railway operations, other critical infrastructure industries, and public safety operators. The AAR recommends that the Commission reconsider allocating any portion of the 6 GHz band for unlicensed operations. If the Commission nonetheless proceeds with its proposal, these comments provide a number of prophylactic and mitigation measures to better protect incumbent licensed operations and the public interest.

**I. INTRODUCTION AND SUMMARY**

The AAR’s freight railroad members rely on the 5.925-6.425 GHz (“U-NII-5”) and 6.525-6.875 GHz (“U-NII-7”) bands to provide mission-critical railway safety operations. Other licensees in these frequency bands include critical infrastructure industries and public safety organizations. As the Commission has noted, these entities rely on the U-NII-5 and U-NII-7

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<sup>1</sup> *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Proposed Rulemaking, ET Docket No. 18-295 and GN Docket No. 17-183, FCC 18-147 (rel. Oct. 24, 2018) (“*NPRM*”).

bands for a “variety of critical services,” including “police and fire vehicle dispatch,” “control of natural gas and oil pipelines,” and “regulation of electric grids.”<sup>2</sup>

Given incumbent licensees’ need for reliable service in these frequency bands, the AAR opposes introducing new unlicensed services in the 6 GHz band. Operation by unlicensed devices could interfere with incumbents’ mission-critical operations. Should the Commission proceed with its proposal, however, it should:

- Properly define exclusion zones using the free space path model and actual elevation (or, in the absence of actual elevation, worst-case elevation);
- Prohibit co-channel, first adjacent channel, and second adjacent channel operations within the defined exclusion zones of any fixed link;
- Implement an Automated Frequency Coordination (“AFC”) system that is centralized, relies on an accurate database, controls all unlicensed devices (whether indoors or outdoors), and establishes an initial connection with the unlicensed device in a band other than the 6 GHz band;
- Require unlicensed devices to determine their location via GPS and prohibit manual entry of a location by the device user;
- Establish protection criteria as an interference-to-noise power ratio (“I/N ratio”) of -6 dB;
- Limit the initial deployment of unlicensed devices; and
- Implement an interference resolution process that expeditiously resolves interference issues.

These common-sense proposals would fulfill the Commission’s goal to promote unlicensed use in portions of the 6 GHz band while maintaining the Commission’s stated imperative to “ensur[e] that licensed services operating in the band continue to thrive.”<sup>3</sup>

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<sup>2</sup> *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Inquiry, 32 FCC Rcd 96373, ¶¶ 25 (regarding use in the U-NII-5 band), 35 (regarding use in the U-NII-7 band) (2017).

<sup>3</sup> *NPRM* at ¶ 1.

## II. BACKGROUND

The AAR is a voluntary non-profit membership organization whose freight railroad members operate 83 percent of the line-haul mileage, employ 95 percent of the workers, and account for 97 percent of the freight revenues of all railroads in the United States.<sup>4</sup> The AAR's members also include certain passenger railroads that operate intercity passenger trains and provide commuter rail service. Radio communications systems are a vital component of the railroad industry's operations, and much of the radio use by the rail industry is for safety-related purposes.

The AAR's member railroads rely on at least 1,600 private fixed microwave links in the U-NII-5 and U-NII-7 bands to safely coordinate train movements across the United States. For example, Union Pacific Railroad uses a 6 GHz band microwave system that spans from the Mississippi River to California and from the Mexican border to the Canadian border. BNSF Railway ("BNSF") operates several hundred 6 GHz band point-to-point microwave stations located throughout the BNSF territory, which includes Chicago, Houston, St. Louis, and Seattle and spans hundreds of miles. Kansas City Southern operates 6 GHz band microwave links in Kansas City. These microwave systems serve as critical backbones for the transport of railroad communications, including dispatch radio traffic, centralized train control systems, positive train control ("PTC"), phone systems, and crew train orders.

In addition, these microwave links relay critical data regarding train signals and remote switching of tracks and routing of trains through rights-of-way, depots, and freight yards, as well as telemetry from trackside detectors and communication base stations located throughout the network.<sup>5</sup> For example, data about damaged rails, overheated wheel bearings, dragging

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<sup>4</sup> Additional information on the AAR is available at <https://www.aar.org/>.

<sup>5</sup> *Study of Spectrum Use by Energy, Water and Railroad Service Providers*, Comments of the Association of American Railroads, NTIA Docket No. 010327080-1080-01, ¶ 6 (2001); *see also* Letter from Mitchell Lazarus, Counsel for the Fixed Wireless Communications Coalition, to Marlene H. Dortch, Secretary, Federal Communications Commission, IB Docket No. 02-10, at 3 (Nov. 19, 2004).

equipment, and rock slides is automatically transmitted from these detectors via fixed microwave links to back office systems. These systems can then relay actionable information to dispatchers and ultimately crew members, who can then take the necessary actions. These 6 GHz band microwave systems also are vital to coordination of operations among the different railroads.

Consequently, these railroad communications systems need to be extremely reliable and are typically designed to ensure availability greater than 99.999%, which equals less than five minutes of downtime per year. Since modern microwave systems, such as the ones used by railroads, require clear channels to transmit large amounts of data, even a small amount of interference will negatively impact the microwave system, either degrading the radio link or causing it to fail completely. Furthermore, each microwave link is critical to railroads' overall communications network—if one link drops and no alternative path is available, the entire chain is broken. Minimal interference therefore could disrupt, delay, or otherwise impact the safe operations of railroads.

Because of the reliability and availability needed for these critical communications systems, the railroads have spent more than \$4 billion over the past three decades to build and maintain private communications systems rather than relying upon commercial carriers. The presence of unlicensed devices in this band will risk impairing the high level of reliability and availability that railroads, critical infrastructure industries, and public safety have invested billions to achieve. Alternatives are unavailable. Indeed, BNSF upgraded its entire 6 GHz network, which contains approximately 700 links, to support PTC. Given the statutory deadline to implement PTC industry-wide by December 2020,<sup>6</sup> railroads continue to invest heavily in

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<sup>6</sup> See Positive Train Control Enforcement and Implementation Act of 2015, Pub. L. No. 114-73, § 1302, 129 Stat. 568 (2015). “Positive Train Control (PTC) systems are technologies designed to automatically stop or slow a train before certain accidents related to human error occur.” They do so by accounting for a number of constantly changing factors that measure the appropriate distance for stopping a train. See The AAR, “Freight Railroads & Positive Train Control,” available at <https://www.aar.org/article/freight-rail-positive-train-control/> (last visited Feb. 15, 2019).

improving railway safety and are becoming increasingly reliant on microwave links for their critical operations.

**III. THE FCC SHOULD NOT ALLOW UNLICENSED USE OF THE 6 GHZ BAND, BUT IF IT DOES, IT MUST ADEQUATELY PROTECT LICENSED INCUMBENTS' OPERATIONS.**

The railroads have relied on these microwave links for decades and have heavily utilized the 6 GHz band.<sup>7</sup> Given railroads' intensive use of microwave links for critical communications, the AAR continues to oppose allowing unlicensed operations in the 6 GHz band. At a minimum, the Commission must implement appropriate rules to protect these licensed services so that licensees in the 6 GHz band may continue to perform their mission-critical work free from interference, as outlined below.

**A. All unlicensed devices in the 6 GHz band should be under the control of a centralized and fully accurate Automated Frequency Coordination system.**

Automated Frequency Coordination ("AFC") must be conducted through a centralized database that receives data inputs from the most accurate database possible. Use of decentralized databases will create unnecessary interference risks that may harm railroads' mission-critical operations.

**1. The AFC system architecture should be centralized, and the initial connection should be made in another band.**

If the Commission permits unlicensed use in the 6 GHz band, the AAR supports the FCC's proposal to use an AFC system to determine which specific frequencies unlicensed devices may operate on in a given area.<sup>8</sup> Furthermore, the AFC system's architecture should be centralized rather than decentralized.<sup>9</sup> Compared to a decentralized model where each

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<sup>7</sup> See Letter to Marlene Dortch, Secretary, Federal Communications Commission, from Timothy J. Strafford, Counsel, the Association of American Railroads, GN Docket No. 17-183, at 2 (May 7, 2018) ("Railroads have depended on interference-free communications systems that utilize the 6 GHz band to serve as the backbone for their communications networks for several decades.").

<sup>8</sup> *NPRM* at ¶ 20.

<sup>9</sup> *Id.* at ¶ 25.

unlicensed device “maintains a local database and performs the necessary computations to determine which frequencies are permissible,”<sup>10</sup> a centralized model relies on the AFC system to complete these tasks. A centralized system architecture will minimize the number of data points regarding licensed use in the 6 GHz band that must be continually updated and maintained.

Furthermore, a centralized AFC system architecture will limit the number of functions that an unlicensed device must perform, thereby reducing device complexity and, by extension, the number of ways unlicensed devices may malfunction and cause harmful interference to licensed operators.<sup>11</sup>

Additionally, by requiring the unlicensed device to connect to an AFC system, a centralized model creates an opportunity for the unlicensed device to register its use with the AFC system.<sup>12</sup> Recording this information and making it available to fixed service (“FS”) licensees will be critical to any interference resolution process,<sup>13</sup> facilitating quicker identification of interfering devices and better protection of fixed microwave links’ licensed operations. The Commission has implemented similar requirements for unlicensed use in other bands and should do so here.<sup>14</sup>

Finally, successful implementation of a centralized AFC system architecture will require that unlicensed devices establish an initial connection with an AFC system in a band other than the 6 GHz band. This requirement will ensure that unlicensed devices receive a list of permissible frequencies on which to operate in the 6 GHz band without risking harmful interference to licensed operations.

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<sup>10</sup> *Id.*

<sup>11</sup> *See id.* (seeking comment on the costs and benefits between centralized and decentralized models in terms of “efficiency, device complexity, and ability to protect fixed service stations”).

<sup>12</sup> *See id.* at ¶ 27.

<sup>13</sup> *See id.* at ¶ 90.

<sup>14</sup> *See* 47 C.F.R. § 15.711(g) (requiring fixed white space devices to “transmit identifying information” that “conform[s] to a standard established by a recognized industry standards setting organization”).



**2. The FCC should ensure that an AFC system relies on a fully accurate database to determine the frequencies on which unlicensed devices may transmit.**

To successfully integrate unlicensed operations into the U-NII-5 and U-NII-7 bands without causing harmful interference to licensed operations, an AFC system requires accurate information. While the FCC proposes to have an AFC system rely on data contained in the Commission’s Universal Licensing System (“ULS”),<sup>15</sup> the receiver data in ULS is not as accurate as transmitter data. Therefore, the Commission should explore ways to ensure that an AFC system relies on the most accurate data possible.

Critically, the lag time between frequency coordination and license grant can render ULS data outdated and inaccurate. The database used for the AFC should account for this issue to ensure that frequency coordination is based upon accurate data for every microwave link.

The *NPRM* states that “licensees have significant incentives to maintain the continued accuracy of data in ULS,”<sup>16</sup> but this overlooks a critical disincentive that undermines the accuracy of ULS data. For any major or minor modification in ULS, non-common carriers must pay a fee of \$305, and common carriers must pay \$305 to make any major modification.<sup>17</sup> Given the large number of fixed microwave licenses held by individual railroads in the U-NII-5 and U-NII-7 bands,<sup>18</sup> fees associated with updating information in ULS could quickly run into the tens of thousands of dollars, if not more, to correct inadvertent errors and prospectively ensure that railroads’ licensed operations remain protected.

Such fees would pose an unjustified burden on these licensees. To incentivize the inclusion of fully accurate data in the database, minimize incumbents’ costs, and ultimately

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<sup>15</sup> *NPRM* at ¶¶ 38-39.

<sup>16</sup> *Id.* at ¶ 39.

<sup>17</sup> 47 C.F.R. § 1.1102; *see also Wireless Telecommunications Bureau Fee Filing Guide*, Fact Sheet, at 27-28 (rel. Sept. 4, 2018).

<sup>18</sup> For example, a search in ULS for active licenses reveals that Union Pacific and BNSF each hold over 550 licenses in the U-NII-5 and U-NII-7 bands.

ensure the AFC system functions successfully, the FCC should waive such fees for licensees operating in the U-NII-5 and U-NII-7 bands.<sup>19</sup>

**3. Unlicensed devices operating in the U-NII-5 and U-NII-7 bands should be under the control of the AFC, regardless of whether they are indoors or outdoors.**

The Commission seeks comment on whether it should allow “low power, indoor-only use without the need for authorization from an AFC system.”<sup>20</sup> It should not. An indoor-only device can easily be moved outdoors. All unlicensed devices operating in the U-NII-5 and U-NII-7 bands should be under the control of an AFC system, regardless of whether the devices are indoors or outdoors and regardless of their power level. As the record has already established, point-to-point microwave links typically use horizontally oriented high gain antennas, which make these systems “extremely susceptible to interference.”<sup>21</sup> This risk persists even if unlicensed devices are “transmitting at very low power or from very far distances.”<sup>22</sup>

The Commission cites Section 15.257(a)(1) as a way it has previously “ensure[d] that low-power access points are restricted to indoor use.”<sup>23</sup> This rule, however, concerns operations in the 92-95 GHz band.<sup>24</sup> When the Commission implemented Section 15.257(a)(1), the 92-95 GHz band had no incumbents operating on a commercial or widespread basis.<sup>25</sup> Thus, the 92-95

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<sup>19</sup> See 47 C.F.R. § 1.1116(a) (waiving fees associated with “[a]pplications filed for the sole purpose of modifying an existing authorization . . . in order to comply with new or additional requirements of the Commission’s rules”).

<sup>20</sup> *NPRM* at ¶ 73.

<sup>21</sup> Reply Comments of AT&T Services, Inc., GN Docket No. 17-183, at 17 (filed Nov. 15, 2017).

<sup>22</sup> Reply Comments of the Association of American Railroads, GN Docket No. 17-183, at 4 (filed Nov. 15, 2017).

<sup>23</sup> *NPRM* at ¶ 71; see also 47 C.F.R. § 15.257(a)(1).

<sup>24</sup> See 47 C.F.R. § 15.257(a)(1) (“Operation within the band 92-95 GHz.”).

<sup>25</sup> See *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, *Loea Communications Corporation Petition for Rulemaking*, Report and Order, 18 FCC Rcd 23318, ¶ 3 (2003) (“At present, the highest frequencies for which we authorize licensed services are in the 48.2-50.2 GHz band, and the highest frequencies at which unlicensed services may operate

GHz band's ecosystem was very different than the 6 GHz band's current ecosystem.<sup>26</sup> Given that the spectrum was laying fallow, commenters widely supported unlicensed use in the 92-95 GHz band, including the Fixed Wireless Communications Coalition ("FWCC").<sup>27</sup> The FWCC, however, has opposed similar rules in the 6 GHz band, highlighting the fact that "indoor [Radio Local Area Network devices ('RLANs')] pose a serious interference threat to the FS, and for that reason must be subject to a frequency control regime."<sup>28</sup> The Commission should acknowledge that not all bands are alike and heed the FWCC's advice. Uniform treatment of unlicensed devices in U-NII-5 and U-NII-7 bands, regardless of their physical location, will help ensure that railroads' and other incumbents' mission-critical operations in the 6 GHz band continue uninterrupted.

**B. Unlicensed devices should be prohibited from both co-channel and adjacent channel operations within the defined exclusion zones of any fixed link.**

The AAR supports the Commission's proposal to prohibit unlicensed devices from transmitting on frequencies used by any fixed microwave link in the U-NII-5 and U-NII-7 bands "within that link's defined exclusion zone."<sup>29</sup> To define a microwave link's exclusion zone, the

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are in the 76-77 GHz band. . . . [D]evices for operation above 77 GHz on either a licensed or unlicensed basis may not be marketed.").

<sup>26</sup> See *NPRM* at ¶ 9 (listing the "critical services" that rely on the 6 GHz band, including "backhaul for police and fire vehicle dispatch," railroad safety for freight and passenger trains, "control of natural gas and oil pipelines," and "management of electric grids").

<sup>27</sup> See *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, *Loea Communications Corporation Petition for Rulemaking*, Report and Order, 18 FCC Rcd 23318, ¶ 40 (2003) ("[T]he FWCC points out that unlicensed devices are ideal for a wide range of applications which require low cost or rapid installation and successfully underlay other applications in the same spectrum.").

<sup>28</sup> See Letter to Marlene H. Dortch, Secretary, Federal Communications Commission, from Cheng-yi Liu and Mitchell Lazarus, Counsel for the Fixed Wireless Communications Coalition, GN Docket No. 17-183, ET Docket No. 18-295, at 4 (Oct. 2, 2018) ("Uncontrolled indoor RLAN operation poses serious interference risks.").

<sup>29</sup> *NPRM* at ¶ 23.

Commission should rely on the free space path loss model.<sup>30</sup> Furthermore, actual elevation—or, in the absence of actual elevation, worst-case elevation—should be used to build a three-dimensional exclusion zone.<sup>31</sup> While use of the free space path loss model and actual elevation (or worst-case elevation) may overestimate potential interference in some cases, conservative assumptions will help ensure that the Commission satisfies its goal of protecting incumbent operations while expanding unlicensed use.<sup>32</sup>

Incumbent FS licensees must also be protected from interference due to unlicensed transmissions in the first and second adjacent channels. While the Commission states that “out-of-band emission (OOBE) limits will act to protect adjacent channel fixed service links,”<sup>33</sup> this statement ignores the other half of the interference equation. Interference is often a function of the victim receiver, not just emissions from the interfering transmitter.<sup>34</sup> Receivers can experience interference even when transmitters in adjacent channels have no out-of-band emissions. Reliance upon OOBE limits alone would increase costs on licensees by requiring them to improve receiver performance in a way that accounts for unlicensed transmissions in first and second adjacent channels.<sup>35</sup> The Commission should not effectively require such

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<sup>30</sup> *Id.* at ¶¶ 48-49.

<sup>31</sup> *Id.* at ¶¶ 51-52.

<sup>32</sup> *See id.* at ¶ 9 (“The fixed service is used for highly reliable point-to-point microwave links that support a variety of critical services such as public safety (including backhaul for police and fire vehicle dispatch), coordination of railroad train movements, control of natural gas and oil pipelines, [and] management of electric grids.”).

<sup>33</sup> *Id.* at ¶ 44.

<sup>34</sup> Letter to Marlene H. Dortch, Secretary, Federal Communications Commission, from Cheng-yi Liu and Mitchell Lazarus, Counsel for the Fixed Wireless Communications Coalition, GN Docket No. 17-183, at 12 (June 8, 2018) (“A microwave receiver (like all others) is sensitive to interference in the channels adjacent to the channel it is tuned to, and for strong interference, in second-adjacent channels as well. This further broadens the interference threat into frequencies.”).

<sup>35</sup> To protect against interfering signals in the first and second adjacent channels, FS licensees will need to install additional receiver filtering on each link. This will not only be very costly,

improvements, given its mandate to protect licensed services. Instead, the Commission should recognize that OOB limits alone will be insufficient to protect incumbent operations. In addition to the *NPRM*'s proposal to implement exclusion zones for unlicensed co-channel operations, the Commission should also define separate exclusion zones for unlicensed operations in the first and second adjacent channels.<sup>36</sup>

For example, an RLAN device operating within a co-channel exclusion zone will be restricted from transmitting on frequencies that overlap the FS receive band. An RLAN device operating within a (presumably smaller) exclusion zone will also be restricted from transmitting on frequencies that overlap the first adjacent channel of the FS receive band.<sup>37</sup> Similarly, an RLAN device operating within a (presumably even smaller) exclusion zone will be restricted from transmitting on frequencies that overlap the second adjacent channel of the FS receive band.<sup>38</sup>

**C. The Commission should establish I/N as an interference protection criteria and a limit of no more than -6 db.**

The Commission seeks comment on whether it should use the ratio of interference-to-noise power ("I/N") or the ratio of carrier-to-interference power ("C/I") as the parameter for interference protection criteria.<sup>39</sup> As the simpler metric,<sup>40</sup> I/N is easier to apply. The FWCC and

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but it will also negatively affect the performance of the link. Therefore, in many cases, this will not be a practical solution.

<sup>36</sup> The AAR understands that the FWCC proposes using variable-width guard bands to adequately protect fixed links. This proposal should be considered as a potential alternative to variable-sized exclusion zones and warrants further study.

<sup>37</sup> The first adjacent channel is defined as the range from the edge of the FS channel to a frequency equal to the bandwidth of the FS channel (BW). For example, if  $f_u$  is defined as the upper channel edge frequency and  $f_l$  is defined as the lower channel edge frequency, then the first adjacent channels extend from  $f_u$  to  $f_u + BW$  and from  $f_l$  to  $f_l - BW$ .

<sup>38</sup> Using the terminology above, the second adjacent channels will extend from  $f_u + BW$  to  $f_u + 2*BW$  and from  $f_l - BW$  to  $f_l - 2*BW$ .

<sup>39</sup> *NPRM* at ¶ 42.

<sup>40</sup> *See id.* ("The I/N ratio is a simpler metric than the C/I.").

certain RLAN proponents have settled on an I/N of -6 dB,<sup>41</sup> which is consistent with national and international frequency coordination protocols.<sup>42</sup> Therefore, the Commission should adopt an I/N of -6 dB.

**D. The Commission must address a number of additional issues to ensure that unlicensed devices do not interfere with incumbent operations in the 6 GHz band.**

To ensure that any unlicensed use in the 6 GHz band does not harm incumbent operations,<sup>43</sup> the Commission should fully consider and resolve a number of other issues in this proceeding.

*Limit the Initial Deployment of Unlicensed Devices.* At the outset, the Commission should temporarily limit the number of unlicensed devices and limit those devices' operations to a segment of the U-NII-5 and U-NII-7 bands. A "trial run" will provide an opportunity for real-world testing and generate the data needed to ensure that the AFC can protect incumbent users from unlicensed devices before such devices are deployed more widely.

Recently, the Commission implemented a similar limited deployment "to allow [a] service to rollout in a controlled manner in order to minimize any potential negative impact on

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<sup>41</sup> See Letter to Marlene H. Dortch, Secretary, Federal Communications Commission, from Cheng-yi Liu and Mitchell Lazarus, Counsel for the Fixed Wireless Communications Coalition, GN Docket No. 17-183, ET Docket No. 18-295, Attachment at 2 (Oct. 2, 2018) (using an I/N of -6 dB in a study of indoor interference in the 6 GHz band because it was "the value adopted by the RLAN Group and accepted by the Wi-Fi Alliance").

<sup>42</sup> See TIA/EIA, *Interference Criteria for Microwave Systems*, Telecommunications Systems Bulletin TSB10-F at B-1, Annex B, Section B-2 (June 1994); ITU-R Recommendation F.758-6, *System Parameters and Considerations in the Development of Criteria for Sharing or Compatibility between Digital Fixed Wireless Systems in the Fixed Service and Systems in Other Services and Other Sources of Interference*, Geneva: International Telecommunication Union, Radiocommunication Sector at 9, Table 2 (Sept. 2015) (citing a criterion of I/N = -6).

<sup>43</sup> See *NPRM*, Statement of Commissioner Michael O'Rielly ("[T]he beauty of unlicensed spectrum is that no one can predict what American innovators and creative geniuses will think up next.").

primary users.”<sup>44</sup> More specifically, the Commission allowed the applicant to deploy a limited number of terminals per quarter and required the applicant to notify the Commission when certain deployment targets were reached.<sup>45</sup> A similar phased roll out of unlicensed devices in the U-NII-5 and U-NII-7 bands would ensure that incumbent users are protected without unduly burdening unlicensed device manufacturers and users. For example, this may be accomplished through the AFC by limiting the number of unlicensed devices that may be registered at a given time.

*Interference Resolution Process.*<sup>46</sup> While adoption of certain proposals discussed above will help timely resolve potential interference issues (*e.g.*, requiring the registration of use with the AFC system),<sup>47</sup> the Commission should formalize an interference resolution process so that licensees can expeditiously and efficiently resolve any unforeseen problems. At a fundamental level, a 6 GHz band licensee should be able to report interference issues, which the AFC would promptly remedy. A formalized process will provide certainty to both parties involved and reduce the cost of resolving interference issues.

*Aggregate Interference.*<sup>48</sup> The NPRM assumes only a single interferer and does not propose a method by which the aggregate interference from multiple devices can be calculated. Given the “explosive” demand for unlicensed spectrum,<sup>49</sup> however, incumbent operations could experience interference from the aggregate power of multiple unlicensed devices, and the Commission must consider how to account for the greater impact of this aggregate interference.

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<sup>44</sup> *Higher Ground LLC Application for Blanket Earth Station License*, Order and Authorization, 32 FCC Rcd 728, ¶ 20 (2017).

<sup>45</sup> *Id.* at ¶ 36.

<sup>46</sup> *NPRM* at ¶ 90.

<sup>47</sup> *See supra* Section III.A (noting that a centralized AFC system architecture creates an opportunity to transmit identifying information along with the request for permissible frequencies); *see also NPRM* at ¶ 27 (“Device Registration”).

<sup>48</sup> *NPRM* at ¶¶ 55-58.

<sup>49</sup> *See id.* at ¶¶ 3-7.

*Other Interference Mitigation Requirements.* In addition to the above, the Commission should address other potential interference mitigation techniques, such as requiring professional installation.<sup>50</sup> To further safeguard incumbents' operations, the Commission also should adopt its proposed prohibition on use of unlicensed devices in moving vehicles (*e.g.*, automobiles, trains, and aircraft).<sup>51</sup>

*GPS location identification.* All unlicensed devices should be required to track their location via GPS. Users should not be provided the capability to manually enter a location, which could lead to manipulation and interference to licensed services. If the AFC does not receive an unlicensed device's GPS location information or cannot otherwise verify the location data, it should not allow such a device to operate in the 6 GHz band.

*Cost allocation.* All costs associated with deployment of the AFC system (*e.g.*, siting, construction, testing, operations, and maintenance) should be borne solely by the RLAN industry.

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<sup>50</sup> *Id.* at ¶ 91.

<sup>51</sup> *Id.* at ¶¶ 84-85; *see also id.*, App. B.



#### IV. CONCLUSION

Critical infrastructure industries and public safety organizations continue to rely on the 6 GHz band. These systems are vital to the missions they serve. Given the threat of harmful interference to these incumbent systems, the AAR continues to oppose introducing new unlicensed services in the 6 GHz band. If the Commission proceeds with its proposal to permit unlicensed use in these bands, however, it must carefully consider the interference issues discussed above and implement the necessary safeguards to “ensur[e] that licensed services operating in the band continue to thrive.”<sup>52</sup>

Respectfully submitted,

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<sup>52</sup> *Id.* at ¶ 1.