

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

In the Matter of	)	
	)	
Use of Spectrum Above 24 GHz for	)	GN Docket No. 14-177
Mobile Radio Services	)	
	)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95,	)	WT Docket No. 10-112
and 101 to Establish Uniform License Renewal,	)	
Discontinuance of Operation, and Geographic	)	
Partitioning and Spectrum Disaggregation Rules	)	
and Policies for Certain Wireless Radio Services	)	

**REPLY COMMENTS OF UNITED STATES CELLULAR CORPORATION**

United States Cellular Corporation (“USCC”) submits these reply comments in response to the Third Further Notice of Proposed Rulemaking released June 8, 2018 in the above-captioned proceedings and the comments filed in response to that Notice.<sup>1</sup> USCC again urges the Commission to authorize terrestrial fixed and mobile services in the 25.25-27.5 GHz (“26 GHz”) and 42-42.5 GHz (“42 GHz”) bands on an exclusive-use, geographic area basis under the Part 30 Upper Microwave Flexible Use Service (“UMFUS”) rules, and to adopt operability requirements that encompass the entire “tuning range” in which each of these bands is located.

**I. THE COMMISSION SHOULD LICENSE THE 26 GHz AND 42 GHz BANDS ON AN EXCLUSIVE-USE BASIS UNDER THE UMFUS RULES**

USCC again urges the Commission to authorize non-Federal terrestrial fixed and mobile services in the 26 GHz and 42 GHz bands on an exclusive-use, geographic area basis under the Part 30 UMFUS rules. Notably, nearly every commenter that addressed the issue similarly urged the Commission to adopt this licensing framework for both the 26 GHz band<sup>2</sup> and the 42 GHz

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<sup>1</sup> See *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Third Report and Order, Memorandum Opinion and Order, and Third Further Notice of Proposed Rulemaking, GN Docket No. 14-177, WT Docket No. 10-112, FCC 18-73 (rel. June 8, 2018). Unless otherwise noted, all comments cited herein were filed in the above-referenced dockets on September 10, 2018.

<sup>2</sup> See CTIA of Comments, p. 8 (“CTIA Comments”); Comments of Competitive Carriers Association, p. 5 (“CCA Comments”); Comments of T-Mobile USA, Inc., p. 16 (“T-Mobile Comments”); Comments of AT&T Services,

band<sup>3</sup> as a result of the significant public interest benefits that will accrue from such action. For instance, T-Mobile emphasized how the certainty that arises only from exclusively-licensed spectrum has allowed wireless providers to the “make massive investments” which “have facilitated the creation of networks capable of supporting greater speeds and functionalities and have led to new, more powerful and sophisticated devices.”<sup>4</sup> As USCC previously explained, a framework that permits service providers to confidently invest large sums is particularly important where significant research and development costs are required prior to deploying innovative new infrastructure and devices like those anticipated for the mmW bands.

Commenters underscored how both the 26 GHz band and the 42 GHz band are crucial additions to the pool of existing UMFUS bands because certain characteristics of these bands make them especially well-suited for the deployment of 5G services. For instance, Ericsson explained that the 26 GHz band “has considerable value due to the amount of spectrum within the band” given that “5G services’ higher peak data rates and capacity will require wider channelization...”<sup>5</sup> Moreover, because the Commission already adopted geographic area licensing for the 24 GHz and 28 GHz bands, adopting this approach for the 26 GHz band “would provide a nearly contiguous four gigahertz block of spectrum with consistent licensing...”<sup>6</sup>

As USCC and other commenters explained, adopting a similar licensing framework for all three of these bands will prove particularly beneficial given that the 26 GHz band falls within the same “tuning range” as the 24 GHz and 28 GHz bands, which “are already authorized for

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Inc., p. 12 (“AT&T Comments”); Comments of Ericsson Comments, p. 3 (“Ericsson Comments”); 5G Americas Comments on 26 GHz Band, p. 2; Comments of Qualcomm Incorporated, p. 13 (“Qualcomm Comments”); Qualcomm Comments at 13; Comments of Samsung Electronics America, p. 5 (“Samsung Comments”).

<sup>3</sup> See CTIA Comments at 11; CCA Comments at 2; T-Mobile Comments at 3; AT&T Comments at 3; Ericsson Comments at 9; Qualcomm Comments at 14; Samsung Comments at 9; Nokia Comments at 2; Comments of the Telecommunications Industry Association, p. 2 (“TIA Comments”).

<sup>4</sup> T-Mobile Comments at 4.

<sup>5</sup> Ericsson Comments at 6.

<sup>6</sup> CTIA Comments at 8-9.

mobile services and for which equipment is already being developed and tested.”<sup>7</sup> As a result, manufacturers could integrate the 26 GHz band into equipment initially developed for the 24 GHz and 28 GHz bands, which would accelerate the availability of equipment for the 26 GHz band considerably and lead to lower device costs for all three bands due to greater economies of scale.<sup>8</sup> The 42 GHz band similarly falls within the tuning range of two bands that the Commission already decided to license on an exclusive-use, geographic area basis under the Part 30 UMFUS rules – the 37 GHz and 39 GHz bands. Consequently, adopting the same licensing framework for the 42 GHz band likewise would accelerate equipment availability for that band and increase manufacturing economies of scale for all three of these bands.<sup>9</sup>

Commenters also emphasized that the broad international efforts that already are underway to authorize 5G services in the 26 GHz and 42 GHz bands weigh strongly in favor of licensing both of these bands on an exclusive-use, geographic area basis in order to allow U.S. service providers and their customers to benefit from global harmonization.<sup>10</sup> As Ericsson explained, global harmonization “results in a broader ecosystem for technology, equipment, and engineering expertise, leading to economies of scale, lower costs for deployment, more rapid roll-out of new services, and enhanced competition among suppliers to the U.S. and global markets.”<sup>11</sup> Given these significant benefits, USCC agrees that global harmonization “should be the touchstone for identifying spectrum for 5G.”<sup>12</sup> That being the case, UMFUS operations certainly should be licensed in the 26 GHz and 42 GHz bands.

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<sup>7</sup> T-Mobile Comments at 17; *see* CTIA Comments at 8; Ericsson Comments at 7; Samsung Comments at 7.

<sup>8</sup> *See* CTIA Comments at 8; Samsung Comments at 7; TIA Comments at 5; Ericsson Comments at 3.

<sup>9</sup> *See* AT&T Comments at 4; Ericsson Comments at 10; Nokia Comments at 2.

<sup>10</sup> *See* CTIA Comments at 9, 11; AT&T Comments at 4, 12; T-Mobile Comments at 16; Ericsson Comments at 6; Qualcomm Comments at 13; Samsung Comments at 5.

<sup>11</sup> Ericsson Comments at 6; *see* Samsung Comments at 6; T-Mobile Comments at 16-17; AT&T Comments at 4.

<sup>12</sup> Ericsson Comments at 6.

Another positive attribute of the 26 GHz and 42 GHz bands is that neither band has significant encumbrances as a result of incumbent operations in or adjacent to these bands. For instance, T-Mobile explained how “studies show that Earth Exploration Satellite Service and Space Research Service earth stations [in the 26 GHz band] could be protected using protection zones,” and notes that “there are established protocols for coordinating federal and non-federal point-to-point services that could serve as a model.”<sup>13</sup> Regarding the specific safeguards adopted for these incumbent users, USCC joins T-Mobile and others in urging the Commission to ensure they are “appropriately tailored to permit the greatest level of commercial access to the band.”<sup>14</sup> For instance, Nokia proposes that the rules “protect specific sites on a case-by-case basis using actual UMFUS deployment scenarios,” rather than apply static coordination or exclusion distances to all UMFUS operations regardless of their particular operating parameters.<sup>15</sup>

Likewise, protecting incumbent Radio Astronomy Service (“RAS”) operations in the 42.5-43.5 GHz band from UMFUS operations in the 42 GHz band not only is feasible, but likely would not result in significant encumbrances in the 42 GHz band. As AT&T noted, this type of interference concern has been “adequately addressed in the past through the use of exclusion zones and coordination zones.”<sup>16</sup> And T-Mobile explained that, “because there are relatively few, remote [RAS] sites, exclusion or coordination zones will not likely impact wireless industry efforts to serve most of the U.S. population.”<sup>17</sup>

Given the relatively unencumbered nature of both the 26 GHz and 42 GHz bands, USCC joins various commenters in urging the Commission not to authorize sharing of either band by

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<sup>13</sup> T-Mobile Comments at 17.

<sup>14</sup> *Id.*; see CCA Comments at 5; Samsung Comments at 5.

<sup>15</sup> Nokia Comments at 3.

<sup>16</sup> AT&T Comments at 6-7.

<sup>17</sup> T-Mobile Comments at 8; see Ericsson Comments at 10.

unlicensed or licensed-by-rule operations.<sup>18</sup> As commenters explained, because such sharing “would diminish the benefits of designating spectrum on an exclusive licensed basis,”<sup>19</sup> it could “undermine the operation of new and innovative licensed services” in these bands.<sup>20</sup> CTIA also noted that “there are already ample opportunities for unlicensed use cases in the millimeter wave bands, as the Commission has already provided 14 gigahertz of spectrum at 57-71 GHz for unlicensed uses above 24 GHz.”<sup>21</sup>

USCC also joins CCA and others in urging the Commission to allow future Federal use of the 26 GHz band “only to the extent such operations do not interfere with new commercial operations.”<sup>22</sup> As TIA stressed, “uncertainty due to the prospect of unbounded future federal operations could significantly impact investment.”<sup>23</sup> Likewise, the Commission should not add a Federal fixed or mobile allocation to the 42 GHz band.<sup>24</sup> As Ericsson explained, “such action would reduce commercial interest in the band and lower auction proceeds, as bidders would need to account for the impact that future Federal operations would have on their ability to optimize use of their licensed spectrum.”<sup>25</sup>

Another action necessary to ensure the most productive use of the 26 GHz band is to reject requests to authorize airborne platform systems, such as the Stratospheric-Based Communications Service (“SBCS”) proposed by Elefante Group, Inc., in this band.<sup>26</sup> As

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<sup>18</sup> See T-Mobile Comments at 5; CTIA Comments at 12; Ericsson Comments at 11.

<sup>19</sup> T-Mobile Comments at 5.

<sup>20</sup> CTIA Comments at 12.

<sup>21</sup> *Id.* at 12; see Ericsson Comments at 11.

<sup>22</sup> CCA Comments at 5; see T-Mobile Comments at 17.

<sup>23</sup> TIA Comments at 5; see AT&T Comments at 13 (“[T]he potential for arbitrary revocation of rights post-auction [] would depress spectrum value or limit incentives to invest in infrastructure.”).

<sup>24</sup> See T-Mobile Comments at 6; CCA Comments at 4; TIA Comments at 2;

<sup>25</sup> Ericsson Comments at 11.

<sup>26</sup> See CTIA Comments at 9; T-Mobile Comments at 18; Ericsson Comments at 8; Qualcomm Comments at 14; Samsung Comments at 8; AT&T Comments at 14.

Elefante itself acknowledged, “UMFUS deployments would, absent a significant amount of coordination, pose a material threat of [ ] interference to SBCS [user terminals] over a considerable distance.”<sup>27</sup> In other words, UMFUS operations and Elefante’s proposed service cannot realistically both operate in the 26 GHz band. Thus, if the Commission were to authorize SBCS or other airborne operations in the 26 GHz band, it effectively would be precluding terrestrial mobile operations in this band. While airborne platform systems, if they prove feasible, may benefit the public to some degree, the public interest will be served to a far greater extent if the Commission instead licenses the 26 GHz band for terrestrial flexible use services. As T-Mobile explained, while these airborne systems will serve at most only a niche market, a significant portion of the population will benefit from increased access, speed, and capacity if the Commission licenses UMFUS operations in the 26 GHz band on an exclusive-use basis.<sup>28</sup> The public also would benefit more quickly from UMFUS licensing given that, in contrast to Elefante, who “will not have a prototype airship to test until late 2020,” wireless providers “are already conducting trials of 5G service in millimeter wave spectrum and deploying infrastructure.”<sup>29</sup>

USCC also continues to urge the Commission to license the 26 GHz and 42 GHz bands using 100 megahertz blocks and PEA-based license areas. Notably, there was near unanimous support from commenters for licensing both the 26 GHz band<sup>30</sup> and the 42 GHz band<sup>31</sup> on the basis of 100 megahertz blocks, and every commenter that addressed the issue of license area size

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<sup>27</sup> Comments of Elefante Group, Inc., p. 63.

<sup>28</sup> See T-Mobile Comments at 18-19.

<sup>29</sup> *Id.* at 19.

<sup>30</sup> See CCA Comments at 5; CTIA Comments at 8; T-Mobile Comments at 16; Nokia Comments at 3; AT&T Comments at 16-17; Ericsson Comments at 7.

<sup>31</sup> See CCA Comments at 4; CTIA Comments at 12; T-Mobile Comments at 6; AT&T Comments at 6; Nokia Comments at 2; Ericsson Comments at 9.

urged the Commission to adopt PEA-based license areas for both the 26 GHz band<sup>32</sup> and the 42 GHz band.<sup>33</sup> As T-Mobile explained, in addition to being “consistent with 3rd Generation Partnership Project (‘3GPP’) standards in the millimeter wave bands,” the use of 100 megahertz blocks will “help ensure that multiple entrants can take advantage of these bands while ensuring that channel sizes are large enough to support 5G services.”<sup>34</sup> Similarly, Ericsson noted how 100 megahertz blocks “would promote competitive entry and provide additional flexibility for uses that require less spectrum.”<sup>35</sup> At the same time, “[c]reating blocks of 100 megahertz does not preclude the aggregation of larger ones” by a providers seeking additional bandwidth.<sup>36</sup> Moreover, as AT&T recently explained, because the ascending clock auction format the Commission appears to favor for the UMFUS bands “guarantees contiguity of licenses,” licensing these bands on the basis of 100 megahertz blocks “will not limit bidders’ ability to create licenses that provide larger bandwidths.”<sup>37</sup> With respect to the appropriate license area size for these bands, USCC previously explained how PEAs are small enough to provide rural and regional carriers with a reasonable opportunity to acquire licenses and to allow carriers of all sizes to better target their spectrum acquisitions, while also large enough to simplify frequency coordination.

Various commenters also underscored how PEA-based license areas and bands plans consisting of 100 megahertz blocks would create consistency between the 26 GHz and 42 GHz bands and the licensing frameworks the Commission either has adopted or proposed to adopt for

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<sup>32</sup> See CCA Comments at 5; CTIA Comments at 8; T-Mobile Comments at 16; Nokia Comments at 3; AT&T Comments at 16-17; Qualcomm Comments at 13.

<sup>33</sup> See CTIA Comments at 12; T-Mobile Comments at 5; AT&T Comments at 6; Nokia Comments at 2; Qualcomm Comments at 14.

<sup>34</sup> T-Mobile Comments at 6.

<sup>35</sup> Ericsson Comments at 7.

<sup>36</sup> Comments of T-Mobile USA, Inc., GN Docket 14-177, p. 3 (Sept. 17, 2018) (“T-Mobile 4th FNPRM Comments”).

<sup>37</sup> Comments of AT&T Services, Inc., GN Docket 14-177, p. 2 (Sept. 17, 2018).

every UMFUS band except the 28 GHz band.<sup>38</sup> As AT&T explained, by “adhering to the framework established for existing UMFUS bands, the Commission will foster consistency, familiarity, and efficiency in the rollout of 5G services.”<sup>39</sup> In addition, T-Mobile recently noted that, where licenses for multiple bands will be made available in the same auction, “[h]aving channel blocks of the same size will increase efficiency by allowing participants to better implement a bidding strategy that allows substitution and complementarities between all bands in that auction.”<sup>40</sup>

## **II. THE COMMISSION SHOULD REQUIRE DEVICE OPERABILITY ACROSS THE “TUNING RANGES” ENCOMPASSING THE 26 GHz AND 42 GHz BANDS**

USCC again strongly urges the Commission to adopt operability requirements covering the 26 GHz and 42 GHz bands to ensure this valuable spectrum sufficiently promotes competition and the deployment of 5G networks in rural and other underserved areas. As discussed above, both the 26 GHz band and the 42 GHz band fall within a tuning range which also encompasses two other mmW bands that the Commission already has allocated for UMFUS operations. Specifically, the 24 GHz, 26 GHz, and 28 GHz bands all fall within the 24.25-29.5 GHz tuning range, and the 37 GHz, 39 GHz, and 42 GHz bands all fall within the 37-42.5 GHz tuning range. Accordingly, USCC again proposes the following operability requirements:

Mobile and transportable stations that operate on any portion of either the 24.25-24.45 GHz band or the 24.75-28.35 GHz band must be capable of operating on all frequencies within both of those bands.

Mobile and transportable stations that operate on any portion of either the 37-40 GHz band or the 42-42.5 GHz band must be capable of operating on all frequencies within both of those bands.

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<sup>38</sup> See T-Mobile Comments at 6, 16; AT&T Comments at 3; CTIA Comments at 8, 12; CCA Comments at 4; Qualcomm Comments at 14.

<sup>39</sup> AT&T Comments at 3.

<sup>40</sup> T-Mobile 4th FNPRM Comments at 3-4.



Significantly, commenters recognized that designing equipment capable of complying with these proposed operability requirements not only is feasible, but would not be difficult. For instance, T-Mobile noted that “equipment manufacturers can *readily integrate* the 26 GHz band into a tuning range that includes the 24 GHz and 28 GHz bands,”<sup>41</sup> and Nokia explained that the 26 GHz band “can *easily be used* in conjunction with the nearby 24 GHz and 28 GHz bands...”<sup>42</sup> In addition, Samsung noted that “both 3GPP standards and radio development have matured in a manner that includes the 26 GHz band frequencies with bands above and below.”<sup>43</sup> With respect to the 37-42.5 GHz tuning range, Ericsson explained that, “with unwanted emission requirements set at -13 dBm/MHz, [it] sees *no issues* with tuning a radio over the full frequency span of 37-42.5 GHz.”<sup>44</sup> Ericsson also noted that “in 3GPP there have been discussions to extend the frequency range from band n260 (37-40 GHz) to 43.5 GHz.”<sup>45</sup>

USCC previously detailed the significant public interest benefits that arise from a device ecosystem that is fully operable across a broad swath of spectrum, and why the only way to ensure that such a device ecosystem develops is through clear *ex ante* operability requirements. USCC also previously explained why its proposed operability requirements, which cover both newly-authorized and existing UMFUS bands, would greatly enhance the public interest benefits that would arise from the adoption of a separate operability requirement for each individual UMFUS band. Similarly, CTIA explained how adopting a licensing framework for the 26 GHz

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<sup>41</sup> T-Mobile Comments at 17 (emphasis added).

<sup>42</sup> Nokia Comments at 3 (emphasis added); *see also* TIA Comments at 2 (“[E]quipment manufacturers could readily integrate the 26 GHz band into a tuning range that already includes the 24 GHz and 28 GHz bands...”).

<sup>43</sup> Samsung Comments at 7 (internal citation omitted).

<sup>44</sup> Ericsson Comments at 10 (emphasis added); *see also* CTIA Comments at 11-12 (“[E]quipment can be designed to have a tuning range that covers the entire 37-43.5 GHz band...”); TIA Comments at 2 (“[A]uthorizing UMFUS [] in the 42 GHz band would place it within the tuning range of radio equipment designed for the 37-40 GHz bands.”).

<sup>45</sup> Ericsson Comments at 10.

band similar to those adopted for the 24 GHz and 28 GHz bands “would result in a number of key benefits for wireless consumers,” including lower prices as a result of the economies of scale made possible by “the development of equipment that can cover multiple millimeter wave bands in a single radio,” “international roaming with affordable user devices,” and accelerated availability of equipment for the newly-authorized band.<sup>46</sup> Samsung likewise explained how the integration of the 26 GHz band into the 24.25-29.5 GHz tuning range would “offer[] device manufacturers opportunities to capture economies of scale and accelerate the equipment ecosystem in these bands,” and that these opportunities would “stimulate 5G deployment” and “giv[e] network operators and consumers more choice at lower prices.”<sup>47</sup>

### III. CONCLUSION

For the reasons discussed above, USCC urges the Commission to adopt exclusive-use, geographic area licensing for the 26 GHz and 42 GHz bands, and to adopt operability requirements which span the tuning ranges that encompass these bands.

Respectfully submitted,

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<sup>46</sup> CTIA Comments at 8.

<sup>47</sup> Samsung Comments at 7; *see also* TIA Comments at 5-6 (explaining that the benefits of integrating the 26 GHz band into the 24.25-29.5 GHz tuning range “would include manufacturing economies by covering several bands with a single radio, providing international roaming capability in affordable user devices, and accelerating the availability of equipment”); Ericsson Comments at 3 (explaining that integrating the 26 GHz band into the 24.25-29.5 GHz tuning range would “allow[] for economies of scale and a reduction in equipment costs”).