

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

In the Matter of	)	
	)	
Petition for Rulemaking to Amend the Commission's Rules Regarding the Citizens Broadband Radio Service in the 3550-3700 MHz Band	)	RM-11788
	)	
	)	
Petition for Rulemaking to Maximize Deployment of 5G Technologies in the Citizens Broadband Radio Service	)	RM-11789
	)	
	)	
Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550- 3650 MHz Band	)	GN Docket 12-354
	)	

**REPLY COMMENTS OF T-MOBILE USA, INC.**

Steve B. Sharkey  
John Hunter  
Christopher Wiczorek

T-MOBILE USA, INC.  
601 Pennsylvania Avenue, N.W.  
Suite 800  
Washington, DC 20004  
(202) 654-5900

August 8, 2017

## TABLE OF CONTENTS

I.	CHANGED CIRCUMSTANCES REQUIRE THE COMMISSION TO EXERCISE ITS SPECTRUM MANAGEMENT RESPONSIBILITIES IN THE 3.5 GHz BAND .....	2
II.	CHANGING THE 3.5 GHz RULES WILL NOT DELAY INTRODUCTION OF SERVICE .....	5
III.	THERE IS BROAD AGREEMENT THAT CERTAIN RULES REQUIRE CHANGE IN ORDER TO SPUR INVESTMENT.....	7
A.	PAL License Terms Must Be Extended.....	7
B.	Census Tract Are Too Small for Licensing.....	10
C.	All PALs Should Be Available at Auction. ....	13
D.	PAL Bidding Should Be Permitted on Specific Blocks.....	13
E.	Technical Rules Should Be Revised. ....	14
F.	CBSD Information Should Be Preserved.....	19
IV.	DESIGNATION OF THE ENTIRE 3.5 GHz BAND IS IN THE PUBLIC INTEREST .....	20
V.	CONCLUSION .....	22

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

In the Matter of	)	
	)	
Petition for Rulemaking to Amend the Commission’s Rules Regarding the Citizens Broadband Radio Service in the 3550-3700 MHz Band	)	RM-11788
	)	
Petition for Rulemaking to Maximize Deployment of 5G Technologies in the Citizens Broadband Radio Service	)	RM-11789
	)	
Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550- 3650 MHz Band	)	GN Docket 12-354
	)	

**REPLY COMMENTS OF T-MOBILE USA, INC.**

T-Mobile USA, Inc. (“T-Mobile”)<sup>1/</sup> submits these reply comments in response to the comments filed regarding T-Mobile’s and CTIA’s Petitions for Rulemaking<sup>2/</sup> and QUALCOMM Incorporated’s (“Qualcomm”) recent *ex parte* letter<sup>3/</sup> in the above-referenced dockets. Each of the Petitions and the Qualcomm *Ex Parte* proposed modest changes to the rules governing the 3550-3700 MHz band (“3.5 GHz band”) Citizens Broadband Radio Service (“CBRS”) so that the 3.5 GHz band can better support the deployment of Fifth Generation (“5G”) technologies. By adopting the proposed changes, the Commission has a unique opportunity to engage in

---

<sup>1/</sup> T-Mobile USA, Inc. is a wholly-owned subsidiary of T-Mobile US, Inc., a publicly traded company.

<sup>2/</sup> See CTIA Petition for Rulemaking, GN Dkt. No. 12-354, RM-11788 (filed June 16, 2017) (“CTIA Petition”); T-Mobile USA, Inc. Petition for Rulemaking, GN Dkt. No. 12-354, RM-11789 (filed June 19, 2017) (“T-Mobile Petition” and collectively with the CTIA Petition for Rulemaking, the “Petitions”).

<sup>3/</sup> See Letter from Dean R. Brenner, Senior Vice President, Spectrum Strategy & Technology Policy, and John W. Kuzin, Vice President and Regulatory Counsel, Qualcomm, Inc. to Marlene H. Dortch, Secretary, FCC, GN Dkt. No. 12-354 (filed June 19, 2017) (“Qualcomm *Ex Parte*”).

meaningful spectrum management in response to recent events so that the United States can remain a global leader in next generation technologies – just as Chairman Pai envisions.<sup>4/</sup>

Together, the proposals will create greater incentives for investment by Priority Access License (“PAL”) licensees while continuing to provide opportunities to use the 3.5 GHz band on a licensed-by-rule, General Authorized Access (“GAA”) basis under the Spectrum Access System (“SAS”) and Environmental Sensing Capability (“ESC”) being developed. Indeed, the important investments made in those access mechanisms will be preserved under the proposed rule changes.

## **I. CHANGED CIRCUMSTANCES REQUIRE THE COMMISSION TO EXERCISE ITS SPECTRUM MANAGEMENT RESPONSIBILITIES IN THE 3.5 GHZ BAND**

Commissioner O’Reilly recently recognized that circumstances have changed since the Commission initiated this proceeding in 2012.<sup>5/</sup> He explained that the international focus on 5G spectrum has shifted to mid-band spectrum with the 3.5 GHz band in the spotlight and that the global race has begun on who will be the leader of next-generation wireless services.<sup>6/</sup> T-Mobile agrees. In order to best perform its role as a spectrum regulator, the Commission cannot and should not ignore those changed circumstances by simply allowing the 3.5 GHz band to be used under the current rules. Accordingly, commenters in this proceeding that argue that the Commission should preserve the *status quo* – solely for that purpose<sup>7/</sup> – ignore the Commission’s

---

<sup>4/</sup> See CTIA Petition at 3.

<sup>5/</sup> See Remarks of FCC Commissioner Michael O’Reilly Before the CBRS Alliance, at 2 (Aug. 1, 2017) (“Commissioner O’Reilly CBRS Remarks”), [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-346028A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-346028A1.pdf).

<sup>6/</sup> *Id.* at 2-3.

<sup>7/</sup> See, e.g., Comments of Southern Communications Services, Inc. d/b/a Southern Linc, GN Dkt. No. 12-354, RM-11788, RM 11789, at 3 (filed July 24, 2017) (“Southern Linc Comments”); Comments of Google Inc. and Alphabet Access, GN Dkt. No. 12-354, RM-11788, RM 11789, at 3 (filed July 24, 2017) (“Google Comments”).

critical spectrum management function, which must be responsive to changes in real-world technology and consumer demands.

Moreover, evaluation of the potential use of the 3.5 GHz band cannot occur in a vacuum. The Commission must take a holistic approach to spectrum management and assess the domestic use of adjacent spectrum on the one hand and international use of both the 3.5 GHz band and adjacent spectrum on the other. In particular, assessment of the use of the 3.5 GHz band must take into account the recently released mid-band spectrum Notice of Inquiry<sup>8/</sup> and bipartisan introduction of the AIRWAVES Act,<sup>9/</sup> both of which illustrate the importance of mid-band spectrum for 5G operations. The *Mid-Band NOI* will, among other things, explore how the 3.7-4.2 GHz band will be used in the future.<sup>10/</sup> The Commission cannot ignore that the 3.5 GHz band is immediately adjacent to that spectrum and should consider now how the 3.5 GHz rules can be best positioned to take into consideration potential use of the 3.7-4.2 GHz band for 5G mobile broadband use in the future.

International activity also supports reassessing the 3.5 GHz band rules. 3 GHz frequencies and other mid-band spectrum are being evaluated around the world for 5G services, including licensed 5G uses.<sup>11/</sup> For instance, China, Japan, Australia and several countries in

---

<sup>8/</sup> *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, GN Dkt. No. 17-183, Notice of Inquiry (rel. Aug. 3, 2017) (“*Mid-Band NOI*”)

<sup>9/</sup> S.1682, 115th Cong. (2017); *see also Gardner, Hassan Introduce Bipartisan Legislation to Support Wireless Innovation and Close the Urban-Rural Divide*, Press Release, (Aug. 1, 2017), <https://www.gardner.senate.gov/newsroom/press-releases/gardner-hassan-introduce-bipartisan-legislation-to-support-wireless-innovation-and-close-the-urban-rural-divide>.

<sup>10/</sup> *See, e.g., Mid-Band NOI* at 10-15.

<sup>11/</sup> *See, e.g., Commissioner O’Reilly CBRS Remarks* at 2 (explaining that “the international focus on 5G spectrum has now shifted to the mid bands that carry more data than low bands, but propagate farther than millimeter wave. And the 3.5 GHz band is in the spotlight, right in the middle of the frequencies being considered”).



band suitable for introduction of 5G services in Europe.<sup>16/</sup> In keeping with this analysis, European countries have begun to take action to make the 3 GHz band available for 5G.<sup>17/</sup> Germany plans to allocate spectrum at 3.6 GHz for 5G operations next year.<sup>18/</sup> Re-assessment of the 3.5 GHz band will allow the Commission to recognize this global harmonization, which will best promote innovation and investment in the 3.5 GHz band, and will allow for efficiency-promoting economies of scale.

## II. CHANGING THE 3.5 GHz RULES WILL NOT DELAY INTRODUCTION OF SERVICE

The Commission should revisit the rules now, before operations are introduced in the 3.5 GHz band. Amending and creating rules to apply to operations that have already begun will be more difficult. T-Mobile recognizes that many companies have invested in the development of the 3.5 GHz band and does not seek to strand or delay that investment. Indeed, through the Wireless Innovation Forum (“WinnForum”) Spectrum Sharing Committee and the CBRS

---

<sup>16/</sup> See EUROPEAN COMMISSION, RADIO SPECTRUM POLICY GROUP, STRATEGIC ROADMAP TOWARDS 5G FOR EUROPE, 3 (2016), [http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion\\_5G.pdf](http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion_5G.pdf).

<sup>17/</sup> The United Kingdom is auctioning 150 megahertz of spectrum in the 3.4 GHz band for 5G mobile use and has proposed making the 3.6-3.8 GHz band available for mobile services including 5G; Ireland recently auctioned spectrum in the 3.4-3.8 GHz band for 5G deployment; Italy will begin auctioning spectrum in the 3.6-3.8 GHz band for 5G by 2018; and Germany announced a 5G plan that includes making the 3.5 GHz band available in 2018. See *Ofcom sets rules for mobile spectrum auction*, OFCOM (July 11, 2017), <https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2017/ofcom-sets-rules-for-mobile-spectrum-auction>; OFCOM, IMPROVING CONSUMER ACCESS TO MOBILE SERVICES AT 3.6 TO 3.8 GHz (rel. Oct. 6, 2016), [https://www.ofcom.org.uk/\\_\\_data/assets/pdf\\_file/0035/91997/3-6-3-8ghz-consultation.pdf](https://www.ofcom.org.uk/__data/assets/pdf_file/0035/91997/3-6-3-8ghz-consultation.pdf); *Five Winning Bidders in ComReg’s 3.6 GHz Band Spectrum Award*, Press Release, COMMISSION FOR COMMUNICATIONS REGULATION (May 22, 2017), <https://www.comreg.ie/five-winning-bidders-comregs-3-6-ghz-band-spectrum-award/>; *Spectrum for 4G and 5G*, QUALCOMM, 19 (July 2017) (“*Spectrum for 4G and 5G*”), <https://www.qualcomm.com/media/documents/files/spectrum-for-4g-and-5g.pdf>; *5G-Strategie für Deutschland*, Federal Ministry of Transport and Digital Infrastructure (2017), [http://www.bmvi.de/SharedDocs/DE/Anlage/Presse/098-dobrindt-5g-strategie.pdf?\\_\\_blob=publicationFile](http://www.bmvi.de/SharedDocs/DE/Anlage/Presse/098-dobrindt-5g-strategie.pdf?__blob=publicationFile); Scott Bicheno, *Germany unveils its cunning plan for 5G*, TELECOMS.COM (July 13, 2017), <http://telecoms.com/483379/germany-unveils-its-cunning-plan-for-5g/>.

<sup>18/</sup> See *German Spectrum Allocation 2018: Wholesale Obligation Back in the Licenses*, Jeffries (Aug. 1, 2017); *Spectrum for 4G and 5G*.

Alliance, T-Mobile has also invested time and resources in the development of the 3.5 GHz band. However, as detailed below, considering the changes proposed by the Petitions and the Qualcomm *Ex Parte* will not delay the introduction of service in the 3.5 GHz band.<sup>19/</sup>

*First*, while recent filings may have formalized suggestions for reassessing the current 3.5 GHz band rules, Commissioner O’Rielly’s statement demonstrate that the Commission had already decided to revisit the issues that were raised in the Petitions. And, Commissioner O’Rielly’s statement shows that the Commission intends to move quickly in changing the 3.5 GHz rules, observing that it planned to adopt “an order by the New Year or soon thereafter.”<sup>20/</sup> In fact, the extensive record that is being developed in response to the Petitions and the Qualcomm *Ex Parte* will help *accelerate* that process once the proposed rules are released.

*Second*, neither the Petitions nor the Qualcomm *Ex Parte* seek the type of fundamental changes to rules governing the 3.5 GHz band that would strand past investment or prevent the continued development of innovative technologies or databases. As T-Mobile has noted, it, CTIA, and Qualcomm propose only modest changes to the rules governing the 3.5 GHz band. The three-tiered framework requiring the development and certification of SAS administrators and ESC operators will remain. To the contrary, the changes that T-Mobile, CTIA, and Qualcomm suggest will drive *more* investment in the band by providing carriers with additional certainty than is currently available, aligning the use of the band with other domestic and international efforts and preserving the U.S. role as the leader in mid-band 5G spectrum policy.

---

<sup>19/</sup> See also Comments of Verizon, GN Dkt. No. 12-354, at 9 (filed July 24, 2017) (“Verizon Comments”) (explaining that if the Commission moves quickly, targeted adjustments to the 3.5 GHz rules can be made without delaying the deployment of CBRS).

<sup>20/</sup> See Commissioner O’Reilly CBRS Remarks at 2.



### **III. THERE IS BROAD AGREEMENT THAT CERTAIN RULES REQUIRE CHANGE IN ORDER TO SPUR INVESTMENT**

#### **A. PAL License Terms Must Be Extended.**

The current PAL license term – limited to three years with no right of renewal – is too short and will result in decreased interest and investment in the band. Network deployment is a multi-year process even in typical circumstances, and as AT&T notes, it “is likely that the equipment development challenges seen in other bands will be magnified in the 3.5 GHz environment (because deployments will be more complex) . . . necessitat[ing] a longer license term.”<sup>21/</sup> Nokia points out that “in contrast to historic, initial roll-outs of new frequency bands that could leverage existing macrocell sites, deployments in the 3.5 GHz band will require new sites with new power and backhaul services that are not shared with equipment operating in earlier frequency bands. Add to that the bureaucratic barriers inherent in many state and local permitting processes, and service providers face a daunting climb to reach widespread deployment of small cells in any band, let alone first deployment of 3.5 GHz-band equipment in the United States.”<sup>22/</sup>

Moreover, the infrastructure investments vital to meeting consumers’ high level of expectations regarding wireless services performance and reliability require the certainty longer PAL license terms and a renewal expectancy provide.<sup>23/</sup> Verizon is correct that “[s]takeholders are not likely to continue to shoulder [the costs related to deployment] if their investments may become stranded upon the premature expiration of a valuable license[.]”<sup>24/</sup> and that “one of the

---

<sup>21/</sup> Comments of AT&T Services Inc., GN Dkt. No. 12-354, RM-11788, RM 11789, at 4-5 (filed July 24, 2017) (“AT&T Comments”).

<sup>22/</sup> Comments of Nokia, GN Dkt. No. 12-354, RM-11788, RM 11789, at 5 (filed July 24, 2017) (“Nokia Comments”).

<sup>23/</sup> See AT&T Comments at 5.

<sup>24/</sup> Verizon Comments at 6.

most effective ways for the Commission to promote deployment is to ensure that wireless providers are not discouraged from making the necessary multi-billion dollar investments due to the risk of losing their licenses only a few years after acquiring them.”<sup>25/</sup> Even parties interested in GAA use – such as NCTA and Charter Communications – agree that the existing license terms are too short.<sup>26/</sup>

Contrary to Starry’s claims, “net total investment from any one or all PAL licensees” will be higher with ten-year terms compared to three consecutive shorter license terms.<sup>27/</sup> As CTIA explained, “[t]he current three-year PAL term with no ongoing right of renewal creates a risk that a PAL licensee will invest in a license at auction . . . and then face stranded investment in just three or six years[,]” which will in turn “diminish the attractiveness of PALs [and] reduce

---

<sup>25/</sup> Verizon Comments at 4. *See also* Comments of 5G Americas, GN Dkt. No. 12-354, RM-11788, RM 11789, at 11 (filed July 24, 2017) (“5G Americas”) (noting that the three-year license term is clearly inadequate when compared to the 25-year terms that European operators have requested to facilitate new broadband technologies); CTIA Petition at 2; Nokia Comments at 4 (“In Nokia’s experience, it generally takes several quarters to standardize a new frequency band, another year to develop infrastructure equipment and certify it, and over a year to deploy a network. As such, it is a barrier to investment if a PAL carries with it uncertainty of termination after only three years (or even six years). Furthermore, large-scale deployment of a new frequency band over much of the United States often costs billions of dollars.”); Comments of QUALCOMM Incorporated, GN Dkt. No. 12-354, RM-11788, RM 11789, at 7 (filed July 24, 2017) (“Qualcomm Comments”) (“FCC should stick with well-established and proven licensing models in this band because mobile operators desperately need to incorporate this spectrum into their networks to continue meeting users’ exponentially increasing data demands.”); Comments of Boingo Wireless Inc., GN Dkt. No. 12-354, RM-11788, RM 11789, at 1 (filed July 24, 2017) (“Boingo Comments”) (“[N]eutral host operators such as Boingo will be negatively affected because carriers will be less willing to invest in networks with shorter than ten-year license terms.”).

<sup>26/</sup> *See* Comments of Charter Communications, Inc., GN Dkt. No. 12-354, RM-11788, RM 11789, at 3 (filed July 24, 2017) (“Charter Comments”) (supporting a six-year term with an expectation of renewal); Comments of NCTA - The Internet & Television Association, GN Dkt. No. 12-354, RM-11788, RM 11789, at 11 (filed July 24, 2017) (“NCTA Comments”) (“NCTA agrees that the current three-year license terms, even with a six-year initial term, are insufficient to obtain adequate return on investment.”).

<sup>27/</sup> Comments of Starry, Inc., GN Dkt. No. 12-354, RM-11788, RM 11789, at 5 (filed July 24, 2017) (“Starry Comments”).

investment and innovation in the band[.]”<sup>28/</sup> Ten-year terms, however, will provide licensees with the certainty needed for investment.

Commenters expressing concern that an increased license term and a renewal expectancy could drive the cost of PALs up beyond what smaller commercial entities can afford<sup>29/</sup> fail to explain why a smaller entity would invest in building its own wireless networks given the risk that this investment could be stranded only a few short years later by loss of the PAL. Notably, even smaller wireless service providers such as American Wireless, Inc. and New Wave Net Corp. agree that the current PAL term should be lengthened.<sup>30/</sup> And, Google’s contention that three-year license terms and PAL re-auctions will help ensure that spectrum is allocated efficiently over time<sup>31/</sup> incorrectly assumes that entities will invest heavily in spectrum that they are at risk of losing at a re-auction in the near future. Rather than resulting in the most efficient uses of spectrum, periodic re-auctioning of short-term licenses will result in a cycle of reoccurring inefficient spectrum allocations. Moreover, reassignment of spectrum is better achieved using secondary market rules, and spectrum-use criteria may be imposed to ensure that licensees merit a renewal expectancy. As T-Mobile has stated in the past, as a consequence of

---

<sup>28/</sup> CTIA Petition at 6; *see also* T-Mobile Petition at 12 (“T-Mobile does not believe there is a business case to invest in the development of a network without adequate regulatory assurance that the basic element of the network – the underlying spectrum assets – will continue to be available to it.”).

<sup>29/</sup> *See, e.g.*, Southern Linc Comments at 6; Google Comments at 18-19; Comments of Open Technology Institute at New America and Public Knowledge, GN Dkt. No. 12-354, RM-11788, RM 11789, at 25-27 (filed July 24, 2017) (“OTI/PK Comments”).

<sup>30/</sup> *See* Comments of American Wireless, GN Dkt. No. 12-354, at 1 (filed July 21, 2017) (supporting a ten-year term with an expectation of renewal); Comments of New Wave Net Corp, GN Dkt. No. 12-354, at 2 (filed July 24, 2017) (supporting a five-year term).

<sup>31/</sup> Google Comments at 19-20.

issuing licenses with a renewal expectancy, it is appropriate for the Commission to require licensees to put spectrum to use.<sup>32/</sup>

**B. Census Tract Are Too Small for Licensing.**

Numerous parties agree that licensing PALs on a census tract basis will result in an unmanageable licensing scheme, impose unnecessary burdens on licensees and the Commission, and will depress interest in the 3.5 GHz band. As Verizon states, “licensing PALs on a census tract basis will result in as many as 74,000 license areas and as many as 518,000 PALs” and “complexity of a licensing scheme that must accommodate 518,000 potential licenses is unprecedented in the history of spectrum licensing.”<sup>33/</sup> PEA-based licenses, on the other hand, “allow flexible and targeted networks, and their increased size reduces border areas and accompanying risks for interference as well as administrative burdens for the Commission, SAS Administrators, and licensees alike.”<sup>34/</sup> In addition, Qualcomm correctly notes that “the new 600 MHz band and the millimeter wave bands which are all licensed on a PEA basis” and “[i]ntegration of this [3.5 GHz] band into provider networks can occur seamlessly where the licensing terms for [low-band, mid-band, and high-band spectrum] bands are similar, which includes larger area PEA licenses[.]”<sup>35/</sup> And Ericsson observes that modifying the PAL license area to PEAs will accomplish “[t]he Commission’s stated goal in crafting geographic license

---

<sup>32/</sup> See T-Mobile Petition at 13 n.48; Reply Comments of T-Mobile USA, Inc., GN Docket No. 12-354, at 6 (filed Dec. 20, 2013); Comments of T-Mobile USA, Inc., GN Docket No. 12-354, at 5-6 (filed Dec. 5, 2013).

<sup>33/</sup> Verizon Comments at 7; *see also* AT&T Comments at 7 (“This high number of licenses makes for an incredibly complex auction process with few attendant benefits.”).

<sup>34/</sup> CTIA Petition at 10; *see also* Qualcomm Comments at 5 (“Qualcomm agrees . . . that the FCC should license the 3.5 GHz PALs on a Partial Economic Area (‘PEA’) basis for it will enable flexible network deployments and result in less interference problems and less administrative issues. PEA licensing of PALs will allow licenses to deploy networks in targeted areas and readily expand those deployments as needed.”); *cf.* Verizon Comments at 7 (“Verizon has expressed concern over interference at census tract borders for several years.”).

<sup>35/</sup> Qualcomm Comments at 6.

areas in the 3.5 GHz band . . . to promote ‘intensive and efficient use of the spectrum,’ while ‘also allowing easy aggregation to accommodate a larger network footprint.’”<sup>36/</sup> Other parties – including Charter, NCTA, and Boingo – also make clear that modest changes to the license area would promote investment, simplify network deployment and operation, and enable efficiencies.<sup>37/</sup>

Further, despite arguments to the contrary,<sup>38/</sup> small license areas are not necessary to achieve intensive, flexible, and efficient spectrum use in the 3.5 GHz band. In those areas in which PAL spectrum is not in use by licensees, the spectrum will be available for GAA users to put to use. Nor would PEA-based licensing “effectively [make] PALs unavailable to any user of the CBRS band seeking to serve a smaller geographic area[.]”<sup>39/</sup> “force [new CBRS operators] to pay for areas that they do not need, and thus probably prevent the desired diversity of PAL operations[.]”<sup>40/</sup> or “drive build-out efforts away from rural areas.”<sup>41/</sup> By allowing partitioning and disaggregation, the Commission can enable those seeking to serve small or rural geographic areas to gain access on the secondary market to spectrum rights in those areas in which a licensee

---

<sup>36/</sup> Comments of Ericsson, GN Dkt. No. 12-354, RM-11788, RM 11789, at 7 (filed July 24, 2017) (“Ericsson Comments”) (quoting *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, 30 FCC Rcd. 3959, ¶ 96 (2015)); see also Comments of United States Cellular Corporation, GN Dkt. No. 12-354, at 4 (filed July 24, 2017) (“USCC Comments”) (stating that PEAs would better fulfil the goals of the proceeding).

<sup>37/</sup> Boingo Comments at 1 (arguing for larger license areas than census tracts); (Charter Comments at 2 (suggesting county-based licensing); NCTA Comments at 8-10 (suggesting county-based licensing).

<sup>38/</sup> See, e.g., PK/OTI Comments at 22-23.

<sup>39/</sup> Southern Linc Comments at 7; see also Comments of Baicells Technologies North America, Inc., GN Dkt. No. 12-354, at 2 (filed July 24, 2017); Comments of Motorola Solutions, Inc., GN Dkt. No. 12-354, RM-11788, RM 11789, at 3 (filed July 24, 2017) (“Motorola Comments”); PK/OTI Comments at 20; Comments of Wireless Internet Service Providers Association, GN Dkt. No. 12-354, RM-11788, RM 11789, at 23 (filed July 24, 2017) (“WISPA Comments”).

<sup>40/</sup> Google Comments at 24; see also Starry Comments at 4-5.

<sup>41/</sup> Charter Comments at 3; see also NCTA Comments at 10; PK/OTI Comments at 20; WISPA Comments at 25; Comments of Vivint Wireless Inc., GN Dkt. No. 12-354, RM-11788, RM 11789, at 5 (filed July 24, 2017) (“Vivint Comments”).

is not deploying service itself. Despite claims to the contrary,<sup>42/</sup> there is no evidence in the record that secondary market transaction costs are a barrier to entry. There is a well-developed body of transactional documents and Commission records on which small and rural entities can rely to engage in those transactions. Concerns that licensees will not have incentives to disaggregate or partition a license due to the lack of build-out obligations<sup>43/</sup> can be remedied by adoption of reasonable performance requirements associated with renewal expectations.

Parties also claim that there is no evidence SAS administrators will find it unnecessarily challenging to manage census tract licensing, especially given the number of SAS administrator licenses that have been submitted.<sup>44/</sup> But it is not only the SAS administrators that require relief from potential census tract licensing – it is both the Commission, which will be required to conduct auctions and monitor regulatory compliance for thousands of PALs, and licensees, who will be burdened with that compliance on a license-by-license basis.

Further, Google’s contention that using PEAs as the boundaries for small-cell systems “is an almost comical mismatch”<sup>45/</sup> ignores the fact that, as AT&T notes, “current spectrum license holders have been deploying small cell technology (the alleged basis for the Commission limiting license areas to census tracts) in their existing spectrum blocks that were authorized in areas even larger than PEAs.”<sup>46/</sup> Given the above, the Commission should issue PALs on a PEA-basis.

---

<sup>42/</sup> See, e.g., Comments of Rural Wireless Association, Inc. and NTCA - The Rural Broadband Association, GN Dkt. No. 12-354, at 5-6 (filed July 24, 2017) (“RWA/NTCA Comments”); Southern Linc Comments at 7-8.

<sup>43/</sup> See, e.g., Southern Linc Comments at 7.

<sup>44/</sup> See, e.g., Google Comments at 25; WISPA Comments at 22.

<sup>45/</sup> Google Comments at 22.

<sup>46/</sup> AT&T Comments at 7-8.

**C. All PALs Should Be Available at Auction.**

Commenters agree that the Commission should make available the total number of PALs applied for per license area. USCC notes that “absent the quality of service guarantees of a PAL, investment in the 3.5 GHz band will suffer” and states that “given the importance of PALs to many service providers, the number of PALs made available in a given license area, whether in the initial or a subsequent auction of PALs, should be equal to the number of PALs for which applicants have applied, up to a maximum of seven PALs.”<sup>47/</sup> Moreover, “there is no reason for the Commission not to offer all PAL licenses for auction. To the extent that there is not demand for all licenses in all markets, the unsold spectrum rights will remain with the FCC and GAA users will still be able to access the unsold PAL frequencies[.]”<sup>48/</sup>

**D. PAL Bidding Should Be Permitted on Specific Blocks.**

Consistent with Commission practice in other bands and in order to facilitate network planning, the Commission should permit potential PAL licensees to bid on particular spectrum blocks. As Ericsson points out, “carriers require access to a stable and predictable spectrum environment to plan network deployments, which is not supported by the current framework.”<sup>49/</sup> And as noted by 5G Americas, “[i]n addition to aligning with Commission policy in the most recent auction for mobile broadband spectrum, in the 600 MHz, such an auction policy would align with other countries that are planning to auction portions of the band.”<sup>50/</sup>

---

<sup>47/</sup> USCC Comments at 8; *see also* 5G Americas Comments at 12 (“The Commission should return to the sound policy that enabled the U.S. to lead the world in 4G deployment, and revise the current Part 96 rules to provide that the total number of PALS in a geographic area for which applicants have applied for renewal be made available.”).

<sup>48/</sup> AT&T Comments at 10-11.

<sup>49/</sup> Ericsson Comments at 8.

<sup>50/</sup> 5G Americas Comments at 12.

Contrary to what some assert, permitting bidding on specific blocks would not eliminate the need for an SAS and ultimately harm PAL licensees when incumbent operations claim use of spectrum.<sup>51/</sup> *First*, even after assigning particular spectrum blocks to PALs, SAS administrators will continue to play an important role, both by limiting PAL use to protect incumbent licensees, if required, and by facilitating GAA access to the band. *Second*, protection of federal incumbent operations in statically assigned spectrum blocks is not uncommon or difficult, as licensed operations in other bands – such as AWS-3 – have shown. Concerns that “an operator could position itself in the middle of the PAL spectrum, thereby preventing other PAL holders from aggregating contiguous blocks”<sup>52/</sup> are also misplaced. Presumably, entities that place high value on contiguous spectrum blocks will bid accordingly at auction. *Finally*, as Commissioner O’Rielly recently recognized, the original purpose of the SAS and ESC mechanism was to introduce new services in the band while protecting incumbents.<sup>53/</sup> Allowing PALs to bid on particular blocks will not contradict that goal. In fact, it will do just the opposite. With an identifiable licensee using particular blocks, incumbents will more easily be able to ascertain any source of interference.

**E. Technical Rules Should Be Revised.**

***Relax the OOB Limits for CBSDs.***

There is widespread agreement that the Commission should revise technical rules relating to OOB and EIRP limits for CBSD operations to optimize deployment. As Qualcomm requested – consistent with T-Mobile’s Petition – the Commission should relax the emission limits that currently apply to CBSDs and end user devices as follows: (i) apply the -25

---

<sup>51/</sup> See WISPA Comments at 30; Google Comments at 27; Vivint Comments at 8; OTI/PK Comments at 30-31.

<sup>52/</sup> Google Comments at 28.

<sup>53/</sup> Commissioner O’Reilly CBRS Remarks at 1.



dBm/MHz emission limit for frequencies more than 20 megahertz outside each channel band edge for 20 megahertz-wide operating channels, and for frequencies more than 40 megahertz outside each channel band edge for 40 megahertz-wide operating channels; and (ii) apply the -13 dBm/MHz limit from the channel edge up until the point where the -25 dBm/MHz limit begins (which will depend on the width of the operating channel).<sup>54/</sup>

As Ericsson highlighted, reevaluation of emission limits is needed “in light of the global shift in thinking towards 5G in the 3.5 GHz band” and “to ensure that innovative 5G solutions are not excluded from the band based on outdated regulatory assumptions.”<sup>55/</sup> The proposed “revisions are consistent with the way in which the emissions mask is defined in 3GPP specifications, which scale with bandwidth and recognize that wider bandwidth channels require a wider roll-off bandwidth.”<sup>56/</sup> Accordingly, these modest changes to the technical rules will not delay or disrupt standards setting processes or the development and deployment of CBSDs devices<sup>57/</sup> – entities are already planning for and developing devices in line with 3GPP standards and expectations for global 5G deployment, and harmonizing these rules will allow for efficiency-producing economies of scale. In addition, arguments that the changes in the

---

<sup>54/</sup> Qualcomm *Ex Parte* at 1-3.

<sup>55/</sup> Ericsson Comments at 9-10; see also NCTA Comments at 16 (“[T]oday’s wireless services—which carry a predominant and growing share of video traffic and support ever-growing numbers of users—require wide-bandwidth channels to deliver optimal user experience. The Commission should expect that 3.5 GHz band users will wish to bond channels and should adopt Qualcomm’s proposal to ensure that users will be able to do so without a power reduction[.]”).

<sup>56/</sup> Qualcomm Comments at 4-5; see also 5G Americas Comments at 4; WISPA Comments at 33 (agreeing that the Commission should modify OOB limits for CBSDs but arguing that “limits should be expressed in proportion to channel sizes to accommodate legacy operations in 3650- 3700 MHz where different channel sizes are used (*e.g.*, 15 MHz, 25 MHz, 30 MHz), rather than as discrete values for 10-, 20- and 40-megahertz channels as proposed”).

<sup>57/</sup> See Google Comments at 30.

technical rules could require a reexamination of sharing arrangements with incumbent users<sup>58/</sup> are entirely speculative.

Contrary to Motorola's claims, the transmit power allowed under the current rules will not sufficiently counteract any Additional Maximum Power Reduction ("A-MPR").<sup>59/</sup> As Qualcomm notes, the current rules "force mobile devices using a 20 MHz channel bandwidth to implement 4 dB Additional-Maximum Power Reduction ('A-MPR') to comply" which "significantly diminishes signal coverage, the quality of service, and the usefulness of the band for mobile operations."<sup>60/</sup> Motorola also claims that "several state-of-the-art technologies (e.g., amplifier pre-distortion and other linearization techniques, judicious scheduling algorithms, etc.) can be utilized to help meet the current spectral mask" and as such "no special transmit mask relaxations are necessary."<sup>61/</sup> Motorola's claims are flawed. The techniques it describes are commonly used in the wireless industry and are likely to be implemented in the 3.5 GHz band in any case. Motorola provides no evidence that those well-known techniques alone will eliminate the need to relax the spectrum mask. In contrast, the thorough analyses presented by Qualcomm and Ericsson in this proceeding and the international efforts underway to develop standards for the 3.5 GHz band support the recommended rule change.

In addition, the Commission should eliminate the -40 dBm/MHz limit below 3530 MHz and above 3720 MHz, as it will likewise force 20 megahertz operations to reduce power levels,

---

<sup>58/</sup> See Google Comments at 30.

<sup>59/</sup> Motorola Comments at 6.

<sup>60/</sup> Qualcomm Comments at 3.

<sup>61/</sup> Motorola Comments at 6.

which – contrary to some parties’ claims<sup>62/</sup> – is unnecessary to protect operations in the adjacent bands.

***Raise EIRP Limits for Outdoor CBSDs.***

The maximum EIRP adopted in the 3.5 GHz band for outdoor operations should be increased. The power limit for Category A CBSDs should be raised by 6 dB while the non-rural and rural Category B CBSD limits should be raised by 2 dB and 9 dB, respectively, to accommodate transmitter variations with respect to outdoor applications. USCC points out that “limited coverage resulting from the current power limits will drive up network costs” and that “higher power levels are necessary for deployments in the 3.5 GHz band to be economically feasible.”<sup>63/</sup> Moreover, the “proposed power increases simply would better reflect real-world deployments, as well as better align with the power requirements for other authorized services.”<sup>64/</sup> Concerns about the impact of higher EIRP limits on Exclusion Zones<sup>65/</sup> are easily remedied – as USCC suggests, the “SAS could restrict CBSD operations within a specified distance of the existing Exclusion Zones to the current power limits.”<sup>66/</sup> Should that not be possible, T-Mobile agrees that “expanded Exclusion Zones are preferable to restricting the power level of every CBSD to a level that would make deployments uneconomical and undermine the potential of the new 3.5 GHz CBR Service.”<sup>67/</sup>

---

<sup>62/</sup> See, e.g., NCTA Comments at 17.

<sup>63/</sup> USCC Comments at 14.

<sup>64/</sup> *Id.*; see also Charter Comments at 4 (“Charter believes modest changes to the technical rules for Citizens Broadband Radio Service Devices (‘CBSDs’) are warranted.”).

<sup>65/</sup> See WISPA Comments at 31-32.

<sup>66/</sup> USCC Comments at 15.

<sup>67/</sup> *Id.*

Vivint argues that “[a]ny increase in EIRP levels would facilitate the use of large, traditional macro base stations for 3.5 GHz band operations but would result in increased ambient energy that would hinder the ability of innovative new entrants to reuse the spectrum in dense next generation network deployments.”<sup>68/</sup> While many entities expect that 3.5 GHz will support smaller cell operations, there is no reason for the Commission to adopt technical rules that will limit the band to a particular network architecture. The rules should be sufficiently flexible so that licensees – who are in the best position to determine the most efficient way to use spectrum – can flexibly design their systems. Prescriptive rules that anticipate a particular regulatory outcome is precisely why the rules governing the 3.5 GHz band require re-assessment. The Commission should not repeat that outcome by creating rules for one network design.

Moreover, the proposed increase in EIRP would still not result in authorization of “traditional macro base stations.” T-Mobile proposed an increase of 2 dB for non-rural CBSDs to 49 dBm/10 MHz and 9 dB increase for rural CBSDs to 56 dBm/10 MHz. These limits are still 23 dB and 19 dB less than the “traditional” limits of 72 dBm/10 MHz and 75 dBm/10 MHz for non-rural and rural areas, respectively.

***Limit Commercial Weather Radar Deployments.***

The WinnForum observes that the Commission has grandfathered existing high-power non-federal weather radar operations in the 3550-3650 MHz band but otherwise eliminated the 3550-3650 MHz allocation for these systems in order to protect CBRS use of the band.<sup>69/</sup> However, WinnForum notes that those systems are still permitted on a secondary basis below 3550 MHz and that these adjacent band systems may cause harmful interference to CBRS

---

<sup>68/</sup> Vivint Comments at 10.

<sup>69/</sup> Comments of the Wireless Innovation Forum, GN Dkt. No. 12-354, at 3, n.5 (filed July 24, 2017).

stations. T-Mobile agrees that these high-power weather radars may, among other effects, cause improper operation of the ESC and consequently, harmful interference to military radars in the 3550-3650 MHz band.<sup>70/</sup> It therefore supports the WinnForum suggestion that this issue be addressed in the upcoming rulemaking proceeding. However, T-Mobile notes that WinnForum suggests that weather radars be “licensed” below 3540 MHz. Restricting weather radar operations below 3540 MHz is an appropriate limitation, but any permission to continue to use 3 GHz spectrum should be on a secondary, non-interfering basis only. As noted above, the 3 GHz band is under consideration by other administrations for 5G operations and weather radar operations in this band should not limit the Commission’s flexibility in the future if it considers other uses of this spectrum.

**F. CBSD Information Should Be Preserved.**

Numerous parties agree that SAS administrators should not be permitted to make CBSD registration information public. SAS administrators will be required to collect a significant amount of data concerning users’ network configuration, uses, and technical parameters. As CTIA states, “[p]roduction of such information could provide a bad actor the ability to identify actual users or greater precision to commit a malicious act against a particular network deployment” and “[w]hen combined with the results of PAL auctions, which are expected to be public, this information is likely to raise both competitive and personal privacy concerns.”<sup>71/</sup>

The critical infrastructure data at issue is not available to “any person with access to the Internet[.]”<sup>72/</sup> And, as AT&T correctly notes, “the Commission has offered no persuasive case

---

<sup>70/</sup> *Id.* at 4.

<sup>71/</sup> CTIA Petition at 12; *see also* Verizon Comments at 9 (“By prohibiting the public disclosure of CBSD registration information, the Commission will avoid a potentially harmful cybersecurity risk and protect sensitive deployment information from disclosure to competitors.”)

<sup>72/</sup> Google Comments at 28.

for making this information public.”<sup>73/</sup> Despite claims to the contrary,<sup>74/</sup> the requirement is unnecessary for GAA access and deployment, as “SAS Administrators will already be required to coordinate with each other, and members of the public can therefore work with a SAS to determine where they can deploy CBSDs on a GAA basis.”<sup>75/</sup>

#### **IV. DESIGNATION OF THE ENTIRE 3.5 GHZ BAND IS IN THE PUBLIC INTEREST**

To better promote 5G use of the 3.5 GHz band and encourage investment, the Commission should make the entire 3.5 GHz band available for PAL use. As T-Mobile has explained, designating additional spectrum for PALs will (i) broaden the CBRS experiment, allowing for greater testing of an environment with both PAL and GAA operations; (ii) facilitate greater interest and investment in the band by PAL licensees, which will in turn benefit the licensed-by-rule device ecosystem; and (iii) likely generate additional auction revenue.<sup>76/</sup>

Claims that this proposal “would eviscerate the GAA tier[,]”<sup>77/</sup> “shut out many small and rural providers[,]”<sup>78/</sup> or result in “extremely limited”<sup>79/</sup> GAA use are unfounded. The beneficial goals that T-Mobile seeks to achieve can be realized while maintaining and fostering licensed-by-rule access. Specifically, GAA users will still be able to access the spectrum when it is not in use by PALs, as is provided for in the current rules, and where spectrum is not purchased, it will

---

<sup>73/</sup> AT&T Comments at 12; *see also* Ericsson Comments at 8 (“Disclosing CBSD registration information to the general public will not serve any useful purpose, and the harms outweigh any purported benefits.”).

<sup>74/</sup> *See* WISPA Comments at 31; OTI/PK Comments at 32; Comments of Leidos, Inc., GN Dkt. No. 12-354, at 2-3 (filed July 24, 2017).

<sup>75/</sup> Ericsson Comments at 7-8.

<sup>76/</sup> T-Mobile Petition at 10-11.

<sup>77/</sup> Comments of Federated Wireless Inc., GN Dkt. No. 12-354, RM-11788, RM 11789, at 5 (filed July 24, 2017).

<sup>78/</sup> RWA/NTCA Comments at 6, *see also* Google Comments at 13.

<sup>79/</sup> WISPA Comments at 27.

be available for GAA operations. Nor is the existence of military radar operations in the 3.5 GHz band a reason to limit PAL licensing<sup>80/</sup> – SAS and ESC operators will still be able to limit or adjust PAL operations under the rules to account for government use.

Moreover, current licensees in the 3650-3700 MHz band will not face stranded investment any more than they would under the current rules. Grandfathered licensees may continue to be grandfathered and protected by PAL licensees for the length of time provided for in the rules. After that, as the rules currently envision, they can continue to operate as GAA users. Thus, under current rules, grandfathered licensees have no assured access to spectrum. However, under T-Mobile's proposal, if they desire more certain access to spectrum than GAA status affords, grandfathered licensees can participate at auction to secure the spectrum they currently use. They can also engage in a secondary market transaction with an auction winner to continue to operate on spectrum for which they are currently licensed. Accordingly, under T-Mobile's proposal, grandfathered licensees have *better* options than merely competing for spectrum use against other GAA operations.

T-Mobile appreciates that making additional unlicensed spectrum available is important. In fact, T-Mobile is significant user of unlicensed spectrum and has pioneered approaches to its deployment with licensed networks. However, the Commission must view unlicensed use of the 3.5 GHz band in the broader context of spectrum management, domestic use of adjacent bands, global harmonization and the fact that other spectrum will be made available for unlicensed use in the future. There is already a significant amount of mid-band spectrum targeted on the horizon for unlicensed use. The *Mid-Band NOI* seeks comment on expanded unlicensed

---

<sup>80/</sup> See Google Comments at 15.

operations in the 5.925-6.425 GHz band and the 6.425-7.125 GHz band, among others,<sup>81/</sup> and recently introduced legislation such as the AIRWAVES Act also targets bands for unlicensed use.<sup>82/</sup> The 3.5 GHz band, in contrast, is better suited for licensed operations for the reasons noted above, and accordingly the Commission should make the entire band available for PAL use.<sup>83/</sup>

## V. CONCLUSION

T-Mobile applauds the Commission’s stated plans to revisit the CBRS framework in an upcoming Notice of Proposed Rulemaking. In order to optimize the band for deployment of 5G technologies, the Commission should make the following modest changes:

- Auction all 150 megahertz of spectrum in the 3.5 GHz band as PALs, with GAA use opportunistically throughout the band.
- Authorize PALs on a standard, ten-year license term with renewal expectancy.
- Make all PALs available at auction, regardless of the number of applications received.
- Permit bidding on specific PAL blocks.
- Use PEAs to license PALs.
- Require SAS protection of CBSD registration information.
- Make minor changes to the technical rules governing the 3.5 GHz band.

---

<sup>81/</sup> See *Mid-Band NOI*, ¶¶ 29, 36-37.

<sup>82/</sup> See *Gardner, Hassan Introduce Bipartisan Legislation to Support Wireless Innovation and Close the Urban-Rural Divide*, Press Release (Aug. 1, 2017), <https://www.gardner.senate.gov/newsroom/press-releases/gardner-hassan-introduce-bipartisan-legislation-to-support-wireless-innovation-and-close-the-urban-rural-divide>.

<sup>83/</sup> Southern Linc argues that “strictly commercial services may not necessarily be the best use of the nation’s spectrum resources in *every* case.” Southern Linc Comments at 8 (emphasis added). This may be true, but in this particular case, in light of the broader national and international spectrum environment, the 3.5 GHz band is best suited for commercial licensed 5G operations, and the Commission should adjust its rules accordingly.



Respectfully submitted,

/s/ Steve B. Sharkey

Steve B. Sharkey

John Hunter

Christopher Wieczorek

T-MOBILE USA, INC.

601 Pennsylvania Avenue, N.W.

Suite 800

Washington, DC 20004

(202) 654-5900

August 8, 2017

## CERTIFICATE OF SERVICE

I, Radhika Bhat, hereby certify that on August 8, 2017, a copy of the foregoing Reply Comments of T-Mobile USA, Inc. was served by first-class mail, postage paid, on each of the following:

Michael D. Rosenthal  
Director of Legal and External Affairs  
Southern Linc  
5555 Glenridge Connector, Suite 500  
Atlanta, GA 30342

Stephen E. Coran  
Lerman Senter PLLC  
2001 L Street, NW, Suite 400  
Washington, DC 20036  
*Counsel to the Wireless Internet Service  
Providers Association*

Austin C. Schlick  
Director, Communications Law  
Aparna Sridhar  
Counsel  
Google Inc.  
25 Massachusetts Avenue NW  
Ninth Floor  
Washington, DC 20001

Colleen King  
Vice President, Regulatory Affairs  
Charter Communications, Inc.  
1099 New York Avenue, NW Suite 650  
Washington, DC 20001

Virginia Lam Abrams  
Senior Vice President, Communications &  
Government Relations  
Starry, Inc.  
38 Chauncy Street, 2nd Floor  
Boston, Massachusetts 02111

Rick Chessen  
Danielle J. Piñeres  
NCTA – The Internet & Television  
Association  
25 Massachusetts Avenue, NW – Suite 100  
Washington, DC 20001-1431

Michael Calabrese  
Paul St. Clair  
Wireless Future Program  
New America's Open Technology Institute  
740 15th Street NW, Suite 900  
Washington, D.C. 20005

Harold Feld  
Public Knowledge  
1818 N Street NW, Suite 410  
Washington, D.C. 20036

Patrick Leary  
President  
Baicells Technologies North America, Inc.  
555 Republic Drive  
Plano, TX 75074

Caressa D. Bennet  
General Counsel  
Rural Wireless Association, Inc.  
5185 MacArthur Boulevard, NW Suite 729  
Washington, DC 20016

Chuck Powers  
Director, Engineering and Technology Policy  
Motorola Solutions, Inc.  
1455 Pennsylvania Ave, NW  
Washington DC 20554

Bruce Oberlies  
President & Chair  
Wireless Innovation Forum  
12100 Sunset Hills Rd., Suite 130  
Reston, VA 20190

Tim Bransford  
Danielle Burt  
Morgan, Lewis & Bockius LLP  
1111 Pennsylvania Ave., N.W.  
Washington, D.C. 20004-2541  
*Counsel for Vivint Wireless, Inc.*

Jill Canfield  
Vice President – Legal & Industry, Assistant  
General Counsel  
NTCA - The Rural Broadband Association  
4121 Wilson Boulevard Suite 1000 Arlington,  
VA 22203

/s/ Radhika Bhat