

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

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

PETITION FOR RULEMAKING

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June 19, 2017

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Pursuant to Section 1.401(a) of the Commission’s rules,^{1/} T-Mobile USA, Inc. (“T-Mobile”)^{2/} petitions the Commission to initiate a rulemaking proceeding to modify the rules governing the 3550-3700 MHz band (“3.5 GHz band”) Citizens Broadband Radio Service (“CBRS”) to better facilitate deployment of Fifth Generation (“5G”) technologies. Amending the rules as T-Mobile proposes will promote greater use of the 3.5 GHz band by maximizing the utility of the band for 5G applications and creating additional incentives for investment by Priority Access License (“PAL”) licensees while maintaining ample opportunities to use the band on a licensed-by-rule basis, using the spectrum access system (“SAS”) already being developed.

^{1/} 47 C.F.R. § 1.401(a).

^{2/} T-Mobile USA, Inc. is a wholly-owned subsidiary of T-Mobile US, Inc., a publicly traded company.

I. INTRODUCTION AND SUMMARY

T-Mobile, including the MetroPCS brand, offers nationwide wireless voice, text, and data services to 72.6 million subscribers.^{3/} In the first quarter of 2017, T-Mobile added 1.1 million net customers – marking four straight years of adding more than 1 million every quarter.^{4/} T-Mobile also saw continued growth in postpaid phone customers – with postpaid net additions expected to lead industry for the 5th consecutive quarter^{5/} – and continued success at MetroPCS, the industry’s #1 prepaid brand.^{6/} The footprint for T-Mobile’s 4G Long Term Evolution (“LTE”) network – the fastest 4G LTE network in America for the past 13 consecutive quarters – covers approximately 314 million Americans,^{7/} and T-Mobile plans to increase its 4G LTE coverage to reach 321 million Americans by year-end 2017.^{8/} In addition, T-Mobile has deployed Wideband LTE to 235 million people, and Extended Range LTE, which enhances coverage and in-building performance, is now live in over 530 market areas covering 269 million people. Moreover, T-Mobile is continuing to deploy and expand new technologies. In fact, it has already launched more LTE Advanced technologies than anyone else in the industry.^{9/} All of the above investments benefit T-Mobile consumers, allowing them to stream three times more

^{3/} See T-Mobile News Release, *T-Mobile Celebrates 4 Years as a Public Company with Industry Leading Consumer & Financial Growth and Game-Changing Spectrum Auction Results*, (Apr. 24, 2017), <http://investor.t-mobile.com/file/Index?KeyFile=2000223808> (“T-Mobile April News Release”).

^{4/} See *id.*

^{5/} See *id.*

^{6/} See *id.*

^{7/} See T-Mobile News Release, *Time for a Real Micdrop. More Evidence T-Mobile is Destroying Verizon’s Network Edge* (Feb. 16, 2017), <https://newsroom.t-mobile.com/news-and-blogs/opensignal-2017-part-2.htm> (“T-Mobile February News Release”) (also noting that T-Mobile’s coverage includes “99% of the people Verizon covers.”); see also T-Mobile April News Release.

^{8/} See T-Mobile April News Release

^{9/} See T-Mobile February News Release.

music, watch two times more video, and use 50% more data than any other carrier's customers.^{10/}

The Commission adopted a *Notice of Proposed Rulemaking* in 2012 that proposed to establish the CBRS, making at least 100 megahertz of spectrum available in the 3.5 GHz band that would be shared among federal and non-federal users and facilitate small cell deployment.^{11/} In 2014, the Commission adopted a *Further Notice of Proposed Rulemaking* that proposed to establish a tiered authorization mechanism for incumbents, PAL licensees, and general authorized access (“GAA”) users, which would be managed by a SAS.^{12/} In 2015, the Commission adopted the *Report and Order* establishing the CBRS and a new Part 96 of its rules^{13/} and allocating 150 megahertz in the 3.5 GHz band for commercial use.^{14/} In 2016, the Commission modified aspects of the Part 96 rules adopted in the *Report and Order* and adopted additional rules.^{15/}

T-Mobile has been an active participant in this proceeding and it continues to evaluate how the 3.5 GHz band can be used as part of its network.^{16/} However, in order for T-Mobile and

^{10/} See T-Mobile News Release, *Hello Un-carrier 12 ... R.I.P. Data Plans T-Mobile Goes All In on Unlimited* (Aug. 18, 2016), <https://newsroom.t-mobile.com/news-and-blogs/rip-data-plans.htm>.

^{11/} *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Notice of Proposed Rulemaking and Order, 27 FCC Rcd. 15594 (2012).

^{12/} See *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Further Notice of Proposed Rulemaking and Order, 29 FCC Rcd. 4273 (2014).

^{13/} See 47 C.F.R. §§ 96.1- 96.67.

^{14/} See *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd. 3959, ¶ 63 (2015) (“*Report and Order*”).

^{15/} *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Order on Reconsideration and Second Report and Order, 31 FCC Rcd. 5011 ¶ 45(2016) (“*Order on Reconsideration*”).

^{16/} See Response of T-Mobile USA, Inc., GN Docket No. 12-354 (filed Oct. 19, 2015) (“T-Mobile Petitions for Reconsideration Response”); Comments of T-Mobile USA, Inc., GN Docket No. 12-354 (filed July 14, 2014) (“T-Mobile FNPRM Comments”); Reply Comments of T-Mobile USA, Inc., GN

others to make the 3.5 GHz band a success, the Commission must modify its rules to enhance the utility of the band for 5G licensed services. While making the 3.5 GHz band available on a licensed-by-rule basis will be an important component of 3.5 GHz band use, the viability of the device ecosystem for the band will depend on licensee investment. That investment will be limited unless the Commission maximizes the use of the band for licensed 5G operations. In particular, T-Mobile proposes that the Commission initiate a rulemaking proceeding in order to:

- 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 Partial Economic Areas (“PEAs”) to license PALs.
- Require SAS protection of Citizens Broadband Radio Service Device (“CBSD”) registration information.
- Make minor changes to the technical rules governing the 3.5 GHz band.^{17/}

By making these changes, the Commission will facilitate investment in the 3.5 GHz band and ensure that the United States retains its leadership position in the development of 5G technologies across all spectrum bands.

Docket No. 12-354 (filed Dec. 20, 2013) (“T-Mobile Public Notice Reply Comments”); Comments of T-Mobile USA, Inc., GN Docket No. 12-354 (filed Dec. 5, 2013) (“T-Mobile Public Notice Comments”); Reply Comments of T-Mobile USA, Inc., GN Docket No. 12-354 (filed Apr. 5, 2013) (“T-Mobile NPRM Reply Comments”); Comments of T-Mobile USA, Inc., GN Docket No. 12-354 (filed Feb. 20, 2013) (“T-Mobile NPRM Comments”). T-Mobile has also filed several *ex parte* notices in this rulemaking. *See, e.g.*, Letter from Steve B. Sharkey, T-Mobile to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-354 (filed Apr. 9, 2015); Letter from Russell H. Fox to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-354 (filed Apr. 16, 2014); Letter from Kathleen O’Brien Ham, T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-354 et al. (filed June 5, 2013).

^{17/} On June 16, 2017, CTIA submitted a Petition for Rulemaking seeking several of these same rule changes (extension of license term and renewal expectancy, use of PEAs and required protection by a SAS of CBSD registration information). *See* CTIA Petition for Rulemaking, GN Docket No. 12-354 (filed June 16, 2017). T-Mobile supports CTIA’s Petition but believes, in order make the 3.5 GHz band a more useful mid-band spectrum home for 5G operations, the Commission should go farther, as proposed here.

II. ENHANCING THE PAL FRAMEWORK WILL FACILITATE U.S. GLOBAL LEADERSHIP IN THE TRANSITION FROM 4G TO 5G

In the next three years, over 30 billion connected devices are expected to be deployed.^{18/} 5G technologies, which will have faster data speeds and lower latency than current technologies, will be essential to the successful growth and functioning of this Internet of Things future. Providing consumers with a seamless 5G experience cannot, however, be accomplished with high-band spectrum alone. Rather, wireless providers will need a combination of low-, mid-, and high-band spectrum. As the Commission has recognized, spectrum in different bands has very different characteristics that impact the coverage, capacity, and service potential of the spectrum.^{19/} Mid-band spectrum in particular provides coverage and capacity benefits, especially in dense urban/suburban markets, that are vital in facilitating the transition to 5G and in meeting consumers' data demands – demands that will only increase in the coming years.^{20/} Notably, spectrum in the 3.5 GHz band is the *only* mid-band spectrum available for 5G in the U.S. spectrum pipeline.

Technology companies, equipment manufacturers, and wireless providers are increasingly looking at the 3.5 GHz band for 5G, with an expanding focus in just the past few

^{18/} See, e.g., SAM LUCERO, IHS TECHNOLOGY, IOT PLATFORMS: ENABLING THE INTERNET OF THINGS 5 (2016) (“IHS forecasts that the IoT market will grow from an installed base of 15.4 billion devices in 2015 to 30.7 billion devices in 2020 and 75.4 billion in 2025[.]”).

^{19/} See, e.g., *Policies Regarding Mobile Spectrum Holdings*, Report and Order, 29 FCC Rcd. 6133, ¶ 283 (2014) (“*Mobile Holdings Order*”) (noting that “certain frequencies possess distinct characteristics for the provision of mobile wireless services”) (internal citations omitted).

^{20/} See CISCO, CISCO VISUAL NETWORKING INDEX: GLOBAL MOBILE DATA TRAFFIC FORECAST UPDATE, 2016–2021 WHITE PAPER, at 22 (2017), <http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.pdf> (“Because mobile video content has much higher bit rates than other mobile content types, mobile video will generate much of the mobile traffic growth through 2021.”).

months on 3 GHz frequencies for 5G.^{21/} Moreover, 5G in the 3 GHz band is a global race. Other regions and countries have already begun to act to make spectrum in the 3 GHz band, including the 3.5 GHz band, available for 5G operations:

- The Radio Spectrum Policy Group (“RSPG”), a high-level advisory group that assists the European Commission in the development of radio spectrum policy, released an analysis of 5G alternatives and concluded in part that it considers the 3400-3800 MHz band “to be the primary band suitable for the introduction of 5G-based services in Europe even before 2020, noting that this band is already harmonised for mobile networks, and consists of up to 400 MHz of continuous spectrum enabling wide channel bandwidth.”^{22/} The RSPG further stated that the 3400-3800 MHz band “has the possibility to put Europe at the forefront of the 5G deployment.”^{23/}
- The United Kingdom has initiated procedures to auction parts of the 3 GHz band and has begun a rulemaking proceeding that proposes making 3.6 to 3.8 GHz available for future mobile services including 5G, which would include eventually auctioning it for mobile use.^{24/}
- Ireland is auctioning parts of the 3 GHz band, including the 3475-3800 MHz band, observing (with respect to the 3 GHz band generally) that “compared to the other bands, this band has the most spectrum available for release, making it particularly suitable for

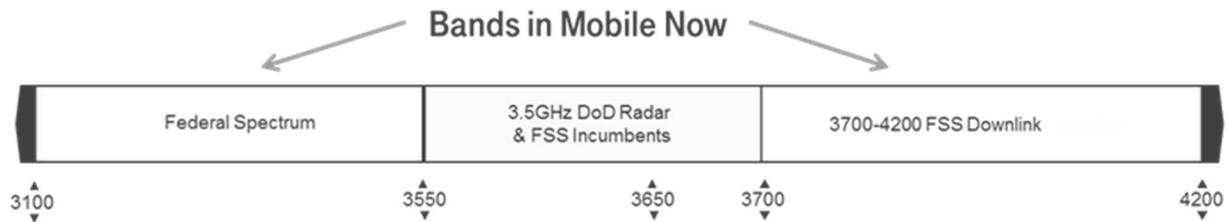
^{21/} See, e.g., *GE, Nokia and Qualcomm Unveil First Private LTE-based Trial Network Customized for Industrial IoT*, PR NEWSWIRE (Feb. 22, 2017), <http://www.prnewswire.com/news-releases/ge-nokia-and-qualcomm-unveil-first-private-lte-based-trial-network-customized-for-industrial-iot-300411402.html>, (announcing that GE Digital, Nokia and Qualcomm Technologies, Inc have successfully demonstrated a private LTE network for the Industrial Internet of Things market using LTE-TDD in the 3.5 GHz band); T-Mobile USA, Inc. Request for Part 5 Experimental License, ELS File No. 0230-EX-CN-2017 (filed Apr. 4, 2017) (requesting an experimental license to evaluate the technical performance of certain pre-commercial equipment in the 3.5 GHz band); *CBRS Alliance Drives Continued Momentum With Addition of Nation's Four Largest Mobile Operators and Other Key Industry Leaders*, Press Release, CBRS ALLIANCE (Feb. 27, 2017) (announcing the addition of the United States’ four leading mobile operators and Samsung Electronics America, Inc. to the CBRS Alliance, a coalition of organizations dedicated to developing, marketing and promoting LTE-based solutions in the 3.5 GHz band); *Verizon aims to deploy small cells in 3.5 GHz when practical*, FIERCEWIRELESS (Mar. 10, 2017), <http://www.fiercewireless.com/tech/verizon-aims-to-deploy-small-cells-3-5-ghz-when-practical> (“Verizon plans to use 3.5 GHz spectrum ‘as soon as practically possible,’ according to Adam Koeppel, vice president of Network Technology Planning for Verizon.”).

^{22/} 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.

^{23/} *Id.*

^{24/} See *Awards in progress: 2.3 and 3.4 GHz auction*, OFCOM (Nov. 21, 2016), <https://www.ofcom.org.uk/spectrum/spectrum-management/spectrum-awards/awards-in-progress>; 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.

the feasibility of allowing commercial wireless services in the 3700-4200 MHz band.^{30/} As shown below, facilitating commercial 5G use of 3.5 GHz band would potentially enable 1100 megahertz of spectrum for 5G commercial wireless use.



Improving the use of the 3.5 GHz band for licensed use, which can be integrated into existing networks to support 5G operations, is the best way to encourage investment in the spectrum. While T-Mobile appreciates that the current rules provide for 3.5 GHz spectrum to be available on a licensed-by-rule basis, exclusive licensed spectrum models offer a superior user experience due to predictable service quality.^{31/} Accordingly, securing access to 3.5 GHz spectrum on a licensed basis will make the band more attractive for T-Mobile and others.

Facilitating licensed wireless use of the 3.5 GHz band will have a dramatic positive impact on U.S. economic growth. Licensed spectrum is vital to the American economy because it creates jobs in the wireless industry and other sectors, and boosts other industries.^{32/} Future deployment of 5G wireless networks is projected to produce an additional \$500 billion of economic growth and create \$160 billion in benefits and savings through smart city solutions.^{33/}

^{30/} See *id.*

^{31/} Comments of the Telecommunications Industry Association, GN Docket No. 12-354, at 5 (filed Feb. 20, 2013).

^{32/} See *INFOGRAPHIC: Licensed Spectrum – A Vital Resource for the American Economy*, CTIA, <https://www.ctia.org/industry-data/facts-and-infographics-details/fact-and-infographics/infographic-licensed-spectrum---a-vital-resource-for-the-american-economy> (last visited Apr. 20, 2017).

^{33/} *Smart Cities: How 5G Can Help Municipalities Become Vibrant Smart Cities*, ACCENTURE STRATEGY, at 1 (2017), https://newsroom.accenture.com/content/1101/files/Accenture_5G-Municipalities-Become-Smart-Cities.pdf.

Wireless operators are expected to invest an estimated \$275 billion over the next decade to deploy 5G across America, and that investment is predicted to create 3 million new jobs.^{34/}

III. THE ENTIRE 3.5 GHZ BAND SHOULD BE DESIGNATED FOR PAL USE

New and innovative 5G technologies are expected to operate using 40-50 megahertz channels. The Commission's rules, however, currently limit PALs to 70 megahertz per market^{35/} – a structure that will likely only support a single licensed provider offering 5G in each market and will, as a result, limit incentives to invest and inhibit technological growth. In order to optimize the 3.5 GHz band for 5G, there must be an opportunity for multiple carriers to aggregate larger bandwidths. The Commission should therefore better promote 5G use of the 3.5 GHz band and encourage investment in the band by designating the entire 3.5 GHz band – 150 megahertz – for PAL use.

Most of the remaining regulations governing the band would stay the same. For example, the Commission would still auction the spectrum using the 10 megahertz channels for PALs contained in the current rules^{36/} – a channel size that T-Mobile has supported.^{37/} As long as aggregation remains permissible, entities that wish to use 5G technologies will be able to do so by acquiring rights to multiple channel blocks in the same market. However, the Commission should increase the aggregation limit to 50 megahertz. This will permit a minimum of three entities to be licensed for the 3.5 GHz spectrum in a market area. Allowing a provider to obtain one-third of the available spectrum in a band is generally consistent with the Commission's

^{34/} *Id.*; see also *Licensed Spectrum The Key to Continuing America's Wireless Leadership and Growing Our Economy*, CTIA, at 5 (Feb. 2017), available at <http://www.ctia.org/docs/default-source/default-document-library/ctia-white-paper-licensed-spectrum.pdf>

^{35/} See *Report and Order*, ¶ 63; 47 C.F.R. § 96.29.

^{36/} See *Report and Order*, ¶ 91; 47 C.F.R. § 96.13.

^{37/} See *Report and Order*, ¶ 91 (citing to T-Mobile reply comments).

spectrum aggregation policies.^{38/} In addition, consistent with the current rules, licensees in the 3650-3700 MHz spectrum would continue to be required to protect Grandfathered Wireless Broadband Licensees.^{39/}

Designating the entire band for PAL use will not diminish the opportunities for GAA use. Consistent with the current rules, GAA users will still be able to access all 150 megahertz when it is not in use by PAL licensees and will have access to any part of the 3.5 GHz spectrum that is not held by PAL licensees. In fact, designating additional spectrum for PALs will *broaden* the CBRS experiment, allowing for greater testing of an environment with both PAL and GAA operations. Nor will this rulemaking proceeding delay use of the 3.5 GHz band for GAA use. The Commission could continue with the process of establishing a mechanism for GAA access to the band and once these mechanisms are in place, the Commission could permit GAA access. If amending the rules governing PAL use and conducting an auction of PALs takes longer than deploying SAS access for GAA use of the 3.5 GHz band, then PALs can simply be added to the 3.5 GHz band ecosystem later, without delaying implementation of GAA use.^{40/}

Auctioning all 150 megahertz in the 3.5 GHz band will therefore produce several positive outcomes. *First*, it will facilitate greater interest and investment in the band – investments by PAL licensees because more licensed spectrum will be available, with a greater opportunity to use that spectrum for 5G applications. That investment will benefit the licensed-by-rule device

^{38/} See, e.g. *Mobile Holdings Order*, ¶ 176; *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services et al.*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd. 8014, ¶ 187 (2016) (“*Spectrum Frontiers Report and Order*”) (“We conclude that an approach based on limiting an entity’s holding to approximately one-third of the relevant spectrum will help to ensure that multiple providers are able to access a sufficient amount of spectrum to the benefit of consumers.”).

^{39/} See *Report and Order*, ¶¶ 400-409; 47 C.F.R. § 96.21.

^{40/} See 47 C.F.R. § 96.35.

ecosystem. *Second*, it will likely generate additional auction revenue.^{41/} *Third*, it can accomplish both of these goals while still fostering licensed-by-rule access when the licensee is not using the spectrum.

Accordingly, the Commission should:

- ***Increase spectrum available for Priority Access use*** by amending Section 96.11(a)(2)^{42/} to read: “Priority Access Users may operate in the 3550-3700 MHz frequency band.”
- ***Eliminate the limitation on the numbers of PALs per license area*** by striking Section 96.13(a)(1).^{43/}
- ***Adjust the spectrum aggregation limit*** by changing Section 96.31(a) to read “Priority Access Licensees may aggregate up to five PAL channels in any License Area at any given time.”^{44/}

IV. PALS SHOULD BE AUTHORIZED ON STANDARD, TEN-YEAR LICENSE TERMS WITH AN EXPECTATION OF RENEWAL

Current rules will also likely depress interest in the band because they limit PALs to a three-year license term with no right of renewal. Those regulations create a risk that a PAL licensee will face stranded investment, thereby diminishing the attractiveness of PALs, depressing applications for licensed use of the spectrum and threatening the overall potential of the three-tiered CBRS spectrum access regime.

Deploying a network takes several years, including standardizing a new frequency band, developing and certifying equipment, introducing a new band into end-user devices, and

^{41/} While Section 309(j)(7)(A) of the Communications Act states that the Commission cannot make revenue generation the primary basis for deciding auction procedures, the Commission is not foreclosed from taking it into consideration. *See* 47 U.S.C. § 309(j)(7)(A) (2016); *see also In the Matter of Advanced Communications Corporation*, Memorandum Order & Opinion, 18 FCC Rcd. 2926, 2929 (2003) (internal citations omitted) (“While the Commission was aware that substantial sums could be realized . . . the Order does not base its denial of [the] renewal application on the expectation of such revenues.”).

^{42/} 47 C.F.R. § 96.11(a)(2). For each rule change proposed, the Commission should make conforming changes to other sections of the Part 96 rules as appropriate.

^{43/} 47 C.F.R. § 96.13(a)(1).

^{44/} 47 C.F.R. § 96.31(a).

deploying infrastructure. Even an initial six-year license term is not sufficient to ensure that licensees will be able to recover a return on investment in the band. The Commission’s dismissal of these arguments in the *Report and Order* and *Order on Reconsideration*^{45/} do not reflect the conditions that providers have reported experiencing in the real world today, including long delays in obtaining siting approvals and high fees imposed by localities.^{46/}

The Commission’s assertions in the *Report and Order* and *Order on Reconsideration* that the ability to switch between PAL use and the GAA tier will sufficiently incentivize investment^{47/} are unfounded. The existing framework provides no certainty that a PAL licensee that has built out a network but subsequently loses access to its license will be able to operate adequately on a GAA basis. Without the ability to use spectrum reliably on a longer-term basis, including a renewal expectancy, licensees will lack certainty as to whether they will have access to the spectrum they use to serve their customers, which will deter investment and innovation in the band. 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. It expects that other carriers will come to the same conclusion. Therefore, in order to promote meaningful licensed access to the

^{45/} *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Order on Reconsideration and Second Report and Order, 31 FCC Rcd. 5011 ¶45(2016) (*Order on Reconsideration*).

^{46/} See, e.g., *Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment*, Notice of Proposed Rulemaking and Notice of Inquiry, FCC 17-38 (rel. Apr. 21, 2017) (examining regulatory impediments to wireless infrastructure investment and deployment and seeks comment on measures to help remove or reduce such impediments); *Acceleration of Broadband Deployment by Improving Wireless Facilities Siting Policies*, Report and Order, 29 FCC Rcd. 12865 (2015) (revising the siting and facilities rules in order to “reduce the costs and delays associated with facility siting and construction”); *Report on Siting Wireless Communications Facilities*, FCC Intergovernmental Advisory Committee (July 12, 2016), available at <https://transition.fcc.gov/statelocal/IAC-Report-Wireless-Tower-siting.pdf> (encouraging industry and localities to work together to overcome siting obstacles and find “creative build solutions”).

^{47/} See *Report and Order*, ¶¶ 108-111; *Order on Reconsideration*, ¶ 44.

3.5 GHz band, the Commission must amend its rules to permit longer-term 3.5 GHz spectrum licenses, with a renewal expectancy.^{48/}

A ten-year license term combined with an expectation of renewal would facilitate robust markets, substantial investment, and the development of new technologies in the band and is consistent with the Commission’s approach in many other bands. Therefore, the Commission should:

- ***Amend Section 96.25(b)(3) of its rules*** to read: “Each PAL has a ten-year license term from the date of issuance or renewal. Licensees must file a renewal application in accordance with the provisions of Section 1.949.”

V. THE TOTAL NUMBER OF PALS IN A GEOGRAPHIC AREA FOR WHICH APPLICANTS HAVE APPLIED FOR RENEWAL SHOULD BE MADE AVAILABLE

The Commission’s rules currently state that, in a particular license area for a specific auction, the Commission will make available one fewer PAL than the total number of PALS applied for, up to a maximum of seven.^{49/} If only one application for a PAL is submitted, then the Commission will make no PAL available, and the spectrum will remain accessible solely for GAA use – the only exception to this rule is for certain rural areas, in which the Commission will make a PAL available even when there is only one applicant.^{50/}

Parties have noted that the current rules risk systematically phasing out PALs with each subsequent auction.^{51/} By way of illustration, CTIA previously described a situation in which two

^{48/} As T-Mobile has suggested in the past, as a consequence of issuing licenses for a longer term with a renewal expectancy, it is appropriate for the Commission to impose performance requirements on PAL holders. *See* T-Mobile Public Notice Reply Comments at 6; T-Mobile Public Notice Comments at 5-6.

^{49/} *See Report and Order* ¶ 133; 47 C.F.R. § 96.29.

^{50/} *See Order on Reconsideration* ¶ 55; 47 C.F.R. § 96.29.

^{51/} *See, e.g.,* T-Mobile Petitions for Reconsideration Response at 4; Petition for Reconsideration of CTIA – The Wireless Association, GN Docket 12-354, at 4 (filed July 23, 2015) (“CTIA Petition”).

PAL licensees, who collectively hold all seven PAL licenses in a census tract, seek to maintain their licenses in the next auction. In this scenario, the Commission’s rules would mandate that only six licenses be made available for auction, and one of the licensees would be forced to migrate part of its PAL use to GAA use.^{52/} The rules would therefore leave PAL licensees uncertain as to whether they will be able to maintain their operations after the initial license period expires.^{53/} This uncertainty will be exacerbated by the short license terms and lack of renewal expectancy the rules specify. In adopting the competitive bidding rules in the *Report and Order* and *Order on Reconsideration*, the Commission failed to address the impact of this uncertainty and the effect it might have on deployment.^{54/}

The Commission should remedy this by:

- ***Making available the total number of PALs applied for per license area*** by eliminating Section 96.29(d) and amending Section 96.29(c) to read: “When there is only one application for initial Priority Access Licenses in a License Area, that applicant will be granted a PAL if otherwise qualified under the Commission's rules.”^{55/}

^{52/} See CTIA Petition at 4.

^{53/} Of course, if the Commission adopts a renewal expectancy, it would not be necessary to re-auction the licenses at all. Providing a renewal expectancy is the preferred outcome.

^{54/} The Commission, in a footnote, argues that CTIA’s hypothetical “ignores any participation in future auctions by *additional* prospective PAL bidders” – which is by no means a guarantee – and “fails to address the problems for efficient use of spectrum . . . without any assurance of a market mechanism for valuing any of that spectrum.” *Order on Reconsideration*, ¶ 54 n.103. However, as the above makes clear, the short PAL term coupled with a lack of renewal expectancy and an uncertainty concerning whether the license will even be able for purchase in a subsequent auction still depress investment in the band, resulting in inefficient spectrum use and inhibiting the growth of 5G.

^{55/} 47 C.F.R. §§ 96.29(c)-(d).

VI. BIDDING ON SPECIFIC PRIORITY ACCESS LICENSE BLOCKS SHOULD BE PERMITTED

The Commission envisioned that PALs will secure access to an amount of 3.5 GHz band spectrum, but not particular spectrum blocks.^{56/} When PALs seek to use spectrum, SAS administrators will assign the PAL use of the amount of spectrum for which they are licensed.^{57/} Accordingly, PALs may not have access to the same spectrum blocks on a consistent basis. This practice will depress interest and investment in the 3.5 GHz band by potential licensees.

Carriers require a stable and predictable spectrum environment in order to engage in effective network planning and that planning takes into consideration particular frequency assignments a licensee is assigned. The current methodology for assigning spectrum does not support that network planning. Potential PAL licensees should therefore be permitted to bid on particular spectrum blocks, in order to know in advance how the spectrum for which they are the high bidder will be implemented in their network. 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 to facilitate GAA access to the band.

Assigning PAL licensees spectrum rights but not specific frequency blocks is inconsistent with Commission practice in other bands and other auctions. In fact, in the recently concluded incentive auction, bidders engaged in a two phase process – first they bid on an amount of spectrum in a market in general, and then they were permitted to bid on particular channel blocks in that market.^{58/} The Commission should not deviate from its usual practice in the 3.5 GHz band.

^{56/} See *Report and Order*, ¶91.

^{57/} See 47 C.F.R. § 96.25.

^{58/} See, e.g., *Incentive Auction Closing and Channel Reassignment Public Notice*, Public Notice, GN Docket No. 12-268, DA 17-314 (rel. Apr. 13, 2017).

Therefore, the Commission should:

- ***Allow entities to bid on particular spectrum blocks*** within the 3550-3700 MHz band by amending Section 96.25(b)(2)^{59/} so that it reads “Channels: Each PAL consists of a 10 megahertz channel within the frequency range set forth in § 96.11 to be assigned in accordance with § 96.29.”
- ***Make additional changes to the Part 96 rules as necessary*** to amend the scope of authority for the SAS in accordance with the above.

VII. PALS SHOULD BE ASSIGNED ON A PARTIAL ECONOMIC AREA BASIS

Current rules require the Commission to issue licenses on a census tract basis. However, census tract licensing will result in an unmanageable licensing scheme, depressing interest in the 3.5 GHz band. Such a large number of market areas – 74,000 census tracts^{60/} – will result in a complicated licensing scheme that outweighs any perceived benefits. A census tract licensing scheme will be difficult for the SAS to administer and manage, and will be burdensome for licensees.^{61/} For example, under the adopted census tract licensing regime, carriers will be required to evaluate each census tract – each of which vary in size – in order to determine which licenses best suit the entity’s business needs. This will involve significant and unnecessary time and resources, will create instability, and ultimately will be unattractive to licensees.^{62/} The three-tiered spectrum access regime that the Commission adopted^{63/} is already novel enough without introducing a licensing framework comprised of 74,000 license areas.

Instead, PALs should be authorized using areas larger than census tracts. A licensing mechanism authorizing PALs on a Partial Economic Area (“PEA”) basis, of which there are 416

^{59/} 47 C.F.R. § 96.25(b)(2).

^{60/} See 2010 Census Tallies of Census Tracts, Block Groups & Blocks, <https://www.census.gov/geo/maps-data/data/tallies/tractblock.html> (last visited Apr. 21, 2017).

^{61/} See Comments of CTIA-The Wireless Association, GN Docket No. 12-354, at 7 (filed July 14, 2014).

^{62/} See T-Mobile FNPRM Comments at 9; see also T-Mobile Public Notice Comments at 6.

^{63/} See *Report and Order*, ¶54 (adopting a three-tier authorization model under Part 96 and reserving the 3650-3700 MHz band for GAA users and grandfathered wireless broadband licensees).

in the United States,^{64/} is more suitable for the 3.5 GHz band. PEAs are based on Cellular Market Areas and ensure that some licenses include populous areas while other PEAs consist of smaller population centers.^{65/} Licensing spectrum according to PEAs provides “the benefits of smaller geographic licenses, including promoting participation by a broader array of carriers, while employing geographic units that are capable of nesting into larger [Economic Areas (“EAs”)].”^{66/} Further, PEAs are small enough to provide flexible and targeted networks, but large enough to reduce border areas and therefore minimize the risk of interference. Moreover, a PEA licensing regime in the 3.5 GHz band will have more public benefits than census tract licensing, because it will result in fewer administrative burdens for the Commission, SAS administrators, and licensees, alike.

Indeed, PEAs offer sufficient licensing flexibility and will provide a more practical “middle ground” compromise and the benefits that the Commission seeks.^{67/} The Commission has long-since championed the benefits of PEA licensing schemes in other bands. In the *Incentive Auction Report and Order*, for example, the Commission explained that PEAs “will promote participation by both larger and smaller wireless providers, including rural providers, and encourage new entrants.”^{68/} The Commission also noted that a PEA licensing approach “will encourage entry by providers that contemplate offering wireless broadband service on a localized

^{64/} See *Wireless Telecommunications Bureau Provides Details About Partial Economic Areas*, Public Notice, 29 FCC Rcd. 6491, App’x A (June 2, 2014).

^{65/} *Ex Parte* Letter from Rebecca M. Thompson, General Counsel, CCA, to Marlene H. Dortch, Secretary, FCC, GN Docket 12-268, at 2 (filed Nov. 27, 2013).

^{66/} *Id.*

^{67/} See *Report and Order*, ¶96. As T-Mobile explained previously, using a census tract licensing scheme may be advantageous for GAA users, but it is not useful for other users, particularly licensed users. As such, a census tract licensing scheme does not represent a “middle ground” compromise despite claims to the contrary. See Comments of T-Mobile, GN Docket No. 12-354, at 9 (filed July 14, 2014).

^{68/} *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, 29 FCC Rcd. 6567 ¶44 (2014) (“*Incentive Auction Report and Order*”).

basis, yet at the same time will not preclude carriers that plan to provide service on a much larger geographic scale.”^{69/}

Licensing the 3.5 GHz band on a PEA basis would also be consistent with the geographic licensing area that the Commission has already identified as best for 5G operations. In particular, in the *Spectrum Frontiers Report and Order*, the Commission concluded that:

Licensing the 39 GHz band on a PEA basis strikes the appropriate balance between facilitating access to spectrum by both large and small providers and simplifying frequency coordination while incentivizing investment in, and rapid deployment of, new technologies. PEAs also nest into EAs but can be broken down into counties, allowing operators to combine or partition their PEAs into the license areas of their choice. We believe that the size and ability to combine/partition will aid in the rapid deployment of these licenses.^{70/}

The Commission has also proposed to license the additional millimeter wave bands subject to the *Further Notice of Proposed Rulemaking* in the *Spectrum Frontiers* proceeding – except for the 71-76 GHz, and 81-86 GHz bands – with PEAs as the license area size.^{71/} Accordingly, to preserve consistency between 5G operations at 3.5 GHz and 5G operations in other bands, the Commission should issue licenses on a PEA basis.

Finally, the Commission has declined to permit partitioning and disaggregation in the 3.5 GHz band stating that the characteristics of the 3.5 GHz band – a relatively short license term and small license areas – will facilitate faster service deployment and allow providers to target smaller populations, which is a goal of partitioning and disaggregation.^{72/} However, if the Commission permits licensing on a PEA basis, it should consider allowing for partitioning and

^{69/} *Id.*, ¶71.

^{70/} *Spectrum Frontiers Report and Order*, ¶ 82. While the Commission declined to use PEAs as the licensing mechanism for the 28 GHz band in the *Spectrum Frontiers Report and Order*, its decision was based on the fact that licenses in that band are currently issued on a Basic Trading Area basis and cannot be readily reformed into either EAs or PEAs. *Id.*

^{71/} *See id.*, ¶ 375.

^{72/} *See Order on Reconsideration*, ¶229.

disaggregation in secondary market transactions, so that the marketplace can determine the most effective use of spectrum.

Accordingly, the Commission should:

- **Amend the definition of “License area”** in Section 96.3^{73/} to read: “The geographic component of a PAL. Each License Area consists of one Partial Economic Area.”
- **Eliminate the definition of “Census tract”** from Section 96.3.
- **Add a definition for “Partial Economic Area”** to Section 96.3, as is provided in the *Incentive Auction Report and Order*.^{74/} The definition of “Partial Economic Area” should read:

Partial Economic Areas (PEAs). The service areas of PEAs that border the U.S. coastline of the Gulf of Mexico extend 12 nautical miles from the U.S. Gulf coastline. The service area of the Gulf of Mexico PEA that comprises the water area of the Gulf of Mexico extends from 12 nautical miles off the U.S. Gulf coast outward into the Gulf. Maps of the PEAs and the Federal Register notice that established the 416 PEAs are available for public inspection and copying at the Reference Center, Room CY A-257, 445 12th St. SW., Washington, DC 20554.

- **Eliminate the prohibition on partitioning and disaggregation of PALs** at § 96.32(b) and adopt partitioning and disaggregation rules similar to those governing the Upper Microwave Flexible Use Service in Part 30.

VIII. SAS ADMINISTRATORS SHOULD PROTECT CBSD REGISTRATION INFORMATION

SAS administrators should not be required, or permitted, to make CBSD registration information public. In the *Report and Order*, the Commission recognized that while transparency is a key element of the 3.5 GHz band authorization framework, “network owners may not desire release of information related to network deployments and configurations to the public in a manner that could compromise personal privacy or affect competitive interests.”^{75/}

^{73/} 47 C.F.R. § 96.3.

^{74/} See *Incentive Auction Report and Order*; 47 C.F.R. §27.6(l).

^{75/} See *Report and Order*, ¶327.

Nonetheless, the Commission required that SAS administrators make necessary CBSD information available to other SAS administrators and make CBSD registration information available to the general public but “obfuscate the identities of the licensees providing the information” for public disclosure.^{76/}

Disclosing CBSD registration information to the general public does not serve any relevant purpose. SAS administrators already will be required to work with each other to coordinate frequency assignments and avoid interference between CBSDs. The Commission’s decision to obfuscate licensee identities does not adequately address competitive concerns because it is possible for and probable that licensee identities will be uncovered. For instance, the results of PAL auctions are expected to be public, and determining which deployments belong to certain auction winners will be feasible. And, while the Commission provided sufficient reasoning to support its finding to mandate the disclosure of certain information to other SAS administrators in order to effectively coordinate operations between CBSDs,^{77/} the Commission provided no persuasive justification for making CBSD registration information available to the public to counterbalance the potential competitive and security-related harms. SAS administrators must be required to protect CBSD registration information. Therefore, the Commission should:

- ***Eliminate Section 96.55(a)(3)***, which requires SAS administrators to make CBSD registration information available to the general public, from its rules.^{78/}

^{76/} See *id.*, ¶ 328.

^{77/} See *id.*, ¶¶ 327-28.

^{78/} 47 C.F.R. § 96.55(a)(3).

IX. THE TECHNICAL RULES SHOULD BE AMENDED

Modify the Out-Of-Band Emission (“OOBE”) Limits for CBSDs. The rules currently set a -13 dBm/MHz emission limit for frequencies from 0 to 10 megahertz outside the channel edge; a -25 dBm/MHz emission limit for frequencies more than 10 megahertz outside the channel edge, down to 3530 MHz and up to 3720 MHz; and a -40 dBm/MHz emission limit below 3530 and above 3720 MHz.^{79/} The Commission should modify these restrictive out-of-band emission limits.

The Commission acknowledges that these limits are more stringent than those it had originally proposed.^{80/} As T-Mobile and other commenters in the proceeding pointed out, the adopted OOBE limits will inhibit PAL and GAA operations *equally* throughout the 3.5 GHz band.^{81/} CTIA, Qualcomm, Nokia and T-Mobile all noted that the current emission limits will force licensees deploying 20 MHz channels to operate at half-power and engage in power reduction.^{82/} This, in turn, will threaten coverage, diminish the utility of the band, and depress deployments. In response to previously expressed concerns, the Commission asserted that “ten megahertz channels provide a flexible, scalable, and practically deployable bandwidth for high data rate technologies” and that “reducing OOBE limits *solely* to accommodate wider bandwidths would not further the principles of shared access...”^{83/} However, if the 3.5 GHz

^{79/} See *Report and Order*, ¶ 184; 47 C.F.R. § 96.41(e).

^{80/} See *Report and Order*, ¶ 184.

^{80/} See *id.*, ¶ 186.

^{81/} See CTIA Petition at 4; see also Response of T-Mobile USA, Inc., GN Docket No. 12-354, at 5-6 (filed Oct. 19, 2015); Comments of Qualcomm Incorporated on Petitions for Reconsideration, GN Docket No. 12-354, at 5-6 (filed Oct. 19, 2015) (“Qualcomm Petition Comments”); Petition for Reconsideration by Nokia Networks (D/B/A/ Nokia Solutions and Networks US LLC), GN Docket 12-354, at 10-12 (filed July 23, 2015) (“Nokia Petition for Reconsideration”).

^{82/} See *supra* note 81.

^{83/} *Order on Reconsideration*, ¶ 93.

band is to be optimized for 5G technologies, as T-Mobile suggests, then the Commission's premise – that 10 megahertz channels will be the predominant use of the band – is inaccurate and the rules should optimize the use of wider channels for 5G use. As Nokia points out, the Commission's actions are inconsistent with specifications adopted by the 3rd Generation Partnership Project.^{84/}

To foster harmonization between U.S. rules and international standards, and better promote 5G, the Commission should modify the OOB limits in Section 96.41(e)^{85/} of its rules as follows:

- **First**, the requirement to meet -25 dBm/MHz should be eliminated, or at a minimum should be at least 20 megahertz from the band edge to allow use of 20 MHz channels without reducing power levels.
- **Second**, the -13dBm/MHz limit should apply from 0-20 MHz outside the channel-edge. This will permit the emissions mask to scale with bandwidth.
- **Finally**, the -40 dBm/MHz limit below 3530 MHz and above 3720 MHz should be eliminated, as it will likewise force 20 MHz operations to reduce power levels, which is unnecessary to protect operations in the adjacent bands.^{86/}
- **If** the Commission nonetheless determines that the -40 dBm/MHz limit below 3530 MHz and above 3720 MHz is necessary to protect adjacent operations, the Commission should increase the transition gap to 40 megahertz so that 20 megahertz channels can operate with less power backoff.

The Permitted Output Power for Outdoor Operations Should Be Increased. The current rules contain the following effective isotropic radiated power (“EIRP”) limits for CBSDs deployed outdoors: 30 dBm/10 MHz for Category A CBSDs and 47 dBm/10 MHz for Category B CBSDs.^{87/} 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-

^{84/} Nokia Petition for Reconsideration at 12.

^{85/} 47 C.F.R. § 96.41(e).

^{86/} See CTIA Petition at 4-6; T-Mobile Petitions for Reconsideration Response at 5-6; Qualcomm Petitions Comments, at 5-6.

^{87/} 47 C.F.R. § 96.41(b).

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.^{88/} While T-Mobile appreciates that the Commission increased on reconsideration the EIRP limits for non-rural Category B CBSDs from the even lower 40 dBm to 47 dBm,^{89/} these EIRP limits are still not sufficiently high for robust deployment of 5G technologies. Rather, the existing power levels will limit the coverage that cell sites can achieve, thereby driving up network costs and risking decreased investment in the band.^{90/}

In order for the Commission's goals for the 3.5 GHz band to be realized, the EIRP limits in Section 96.41(b) must be modified to more accurately reflect real-world deployments.

Specifically, the Commission should:

- ***Amend the maximum EIRP for outdoor operations at Section 96.41(b)*** to increase it to: (1) 36 dBm/10 MHz for Category A CBSDs; (2) 49 dBm/10 MHz for Category B non-rural CBSDs;^{91/} and (3) 56 dBm for Category B rural CBSDs.

As Verizon explained, “[t]here is no evidence that these power levels, which are much lower than traditional macrocell levels, would harm the innovative sharing framework set forth in the [3.5 GHz band].”^{92/}

^{88/} See WINN Forum Petition for Reconsideration, GN Docket 12-354, at 6 (filed July 22, 2015).

^{89/} See *Order on Reconsideration*, ¶ 77. This increase eliminated the rural/non-rural EIRP limit distinction in the rules for Category B CBSDs.

^{90/} See, e.g., Verizon Petition for Reconsideration, GN Docket 12-354, at 4 (filed July 23, 2015) (“Verizon Petition”) (“Without a reasonable increase in the power limits, there is a serious risk that the adopted power limit will impose costs that will slow investment in the new band by substantially driving up the costs of deploying small cell networks.”); T-Mobile Response at 6.

^{91/} Nokia made a similar recommendation in its Petition for Reconsideration. See Nokia Petition for Reconsideration at 7-9 (requesting that the Commission amend the transmit power requirements for Category A and B CBSDs).

^{92/} Verizon Petition at 4.

X. CONCLUSION

The 3.5 GHz band remains an underutilized asset. Since the Commission initiated the proceeding intended to put the band to use, it has recognized the development of 5G technologies and the need to make spectrum available to support networks that will feature the benefits that 5G will offer. The 3.5 GHz band can be better structured to meet those needs, particularly since the only spectrum the Commission has identified so far for 5G operations is in bands above 24 GHz. Because 5G networks will require high-, medium- and low-band spectrum, the Commission should initiate a rulemaking proceeding to maximize the utility of the 3.5 GHz band to meet those needs.

Respectfully submitted,

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June 19, 2017