

**Before the  
Federal Communications Commission  
Washington, DC 20554**

In the Matter of	)	
	)	
Promoting Investment in the 3550-3700 MHz	)	GN Docket No. 17-258
Band;	)	
	)	
Petitions for Rulemaking Regarding the	)	RM-11788 (Terminated)
Citizens Broadband Radio Service	)	RM-11789 (Terminated)

To: The Commission

**WIRELESS INTERNET SERVICE PROVIDERS ASSOCIATION**

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## SUMMARY

The overwhelming majority of Comments filed in this proceeding agree with WISPA that the principal changes contemplated in this proceeding – larger Priority Access License (“PAL”) sizes, longer PAL terms and perpetual PAL license durations – would have the effect of excluding significant groups of users from the valuable CBRS band by making the license areas too large for many service providers’ operational needs and driving up the cost to secure protected spectrum, thereby discouraging innovative users from participating. These parties comprise a broad cross-section of stakeholders that desire access to additional mid-band spectrum, from large technology companies to more than 130 wireless ISPs that provide rural fixed broadband service in 41 states. These stakeholders stand ready to deploy new fixed wireless facilities in the 3.5 GHz band soon, if the rules are not fundamentally altered to foreclose their participation from bidding for “right-sized” PALs.

Support for radical and disruptive change comes principally from the major mobile wireless carriers, their equipment suppliers and trade associations. This discrete group myopically trumpets “broad support” for its proposals, but then consistently cross-references only the same small group of wireless-industry-affiliated entities in furtherance of their assertions. They ignore the high likelihood that the current rules, with small PAL areas and short license durations, will mean that a much smaller initial expenditure is necessary to acquire individual licenses for targeted areas of need, significantly reducing upfront spectrum costs and encouraging innovation and rapid deployment of new fixed wireless services to the public. The mobile wireless carriers also ignore the historical failure of secondary markets to provide anything approaching efficient and liquid post-auction distribution of spectrum rights to smaller service providers; most such arrangements actually involve transactions between large carriers,

large carrier acquisitions of spectrum from smaller providers, and “franchise” deals where the larger industry players extend their branded networks.

Despite the history of success by the large mobile carriers in acquiring spectrum over the past two decades for providing mobile broadband service, significant portions of rural America remain unserved or underserved, such that more than 23 million Americans in rural areas lack fixed broadband access at a time when such connectivity has become a basic necessity.

Abandoning short duration, census tract size PALs for CBRS would deprive these citizens of their best opportunity to obtain affordable access to high-quality residential broadband service. At a time when the Administration has made improved rural broadband a national priority, the current CBRS rules that enable access by many to mid-band spectrum represent one of the most potent “viable tools” for addressing the digital divide.

No commenting party has articulated any sound public interest basis for disrupting the current census tract “building block” structure for CBRS. While incumbent mobile carriers speak repeatedly of the salutary effect that the proposed rule modifications would have in promoting investment, their Comments lack any demonstration either that investment has been lacking in technology to support 5G and other services in these bands, or that participation by carriers themselves would be lacking in the event that the Commission leaves the rules largely unchanged. This is not a circumstance where the Commission needs to dramatically refashion its regulatory scheme to encourage use of the band. To the contrary, there is ample evidence of substantial investment already made in pursuit of new service deployments in reliance upon the existing rules, of broad interest in the development of equipment for near-term use of the 3550-3700 MHz band, and of specific intent by many parties to bid for licenses if the current PAL rules are retained.

When it adopted the existing CBRS rules in 2015, the Commission sought to achieve a range of public interest benefits consistent with its obligations under Section 309(j) of the Communications Act of 1934, as amended. The Commission made specific findings that the new Part 96 rules would “promote development of innovative technologies and services,” permit “innovative approaches to shared spectrum use and small cell technology,” “maximize the flexibility and utility of the 3.5 GHz Band,” “provide economic opportunity to a wide variety of applicants,” “encourage efficient use of spectrum resources,” and “promote competition.” The rule changes contemplated in this proceeding would undercut each and every one of the important statutory requirements of Section 309(j) of the Act as well as the critical public policy objectives stated throughout the *CBRS Order* without producing any alternative public interest benefit. Accordingly, the proposals in the *NPRM* that contemplate fundamental changes should be rejected virtually in their entirety, with the limited exceptions of repealing the rule providing for auction of one less PAL in each license area than there are applicants for the spectrum, and modestly relaxing the emissions limit in appropriate circumstances to promote more robust operation on wider channels. In addition, the Commission should retain its requirement that applicants bid only on the rights to dynamically assigned channels in a particular census tract, and not on specific frequencies. If applicants were permitted to bid for specific channels, it would drive up the cost of particular spectrum blocks and substantially complicate a spectrum auction by eliminating the fungible nature of the licenses.

The Commission should retain its current rule requiring disclosure of Citizens Broadband Service Device information. Such data is critical to selecting specific channels and transmitter sites by General Authorized Access users, as well as to making a threshold decision whether to invest in CBRS equipment.

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**REPLY COMMENTS OF  
THE WIRELESS INTERNET SERVICE PROVIDERS ASSOCIATION**

The Wireless Internet Service Providers Association (“WISPA”), pursuant to Sections 1.415 and 1.419 of the Commission’s Rules,<sup>1</sup> hereby replies to the initial comments submitted in response to the Notice of Proposed Rulemaking (“*NPRM*”) in the above-captioned proceeding.<sup>2</sup> In its initial comments, WISPA strongly opposed significant modifications to the Citizens Broadband Radio Service (“CBRS”) rules that were adopted in 2015, particularly those potential changes that would increase the size of Priority Access License (“PAL”) areas, significantly lengthen the term of PAL licenses, and permit PAL licenses to be held in perpetuity.

The overwhelming majority of commenters participating in this proceeding agree with WISPA’s positions opposing the changes contemplated in the *NPRM*. These parties opposing the possible major rule changes consist of a broad cross-section of stakeholders that desire access to additional mid-band spectrum, encompassing large technology companies, such as General Electric, Google, Microsoft, and Motorola; publicly-traded mid-size telecommunications

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<sup>1</sup> 47 C.F.R. §§ 1.415 and 1.419.

<sup>2</sup> *Promoting Investment in the 3550-3700 MHz Band; Petitions for Rulemaking Regarding the Citizens Broadband Radio Service*, Notice of Proposed Rulemaking and Order Terminating Petitions, 32 FCC Rcd 8071 (2017) (“*NPRM*”). *See also* 82 Fed. Reg. 56193 (Nov. 28, 2017).

carriers, such as Frontier Communications, Inc., Windstream Services, LLC, and Consolidated Communications, Inc.; small wireless ISPs, including more than 130 entities that provide rural fixed wireless broadband service in 41 states (*see* Appendix A for a map and list of WISPs that filed Comments );<sup>3</sup> small, innovative service providers like Starry, Inc. and Transit Wireless, Inc.; the most substantial provider of fixed wireless rural broadband service, Rise Broadband, which operates in sixteen states; local governments and their representatives, including the City of New York and Next Century Cities; utility-affiliated communications service providers, such as Southern Linc; public interest organizations, such as Open Technology Institute at New America and Public Knowledge; and multiple trade associations and industry groups, including the American Petroleum Institute, Dynamic Spectrum Alliance, Rural Wireless Association, Utilities Technology Council, and WISPA itself. By contrast, the only support for radical and disruptive change comes from the original proponents, the major mobile wireless carriers (AT&T, T-Mobile, Verizon, U.S. Cellular), their equipment suppliers (Ericsson and Nokia), and insular trade associations and industry groups (CTIA, TIA, and Mobile Future). This discrete group of service providers and associated entities myopically trumpets “broad support” for their

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<sup>3</sup> *See, e.g.*, Comments of Amplex Electric, Inc., GN Docket No. 17-258 (filed Dec. 27, 2017) (“Amplex Comments”), at 2; Comments of Imagine Networks, GN Docket No. 17-258 (filed Dec. 26, 2017) (“Imagine Comments”), at 3; Comments of e-vergent.com, LLC, GN Docket No. 17-258 (filed Dec. 26, 2017) (“e-vergent Comments”), at 2, 3; Comments of Wonderlink Communications, LLC, GN Docket No. 17-258 (filed Dec. 28, 2017) (“Wonderlink Comments”), at 3-6; Comments of Texoma Communications, LLC dba TekWav, GN Docket No. 17-258 (filed Dec. 28, 2017) (“TekWav Comments”), at 1, 2; Comments of Cloud Alliance LLC, GN Docket No. 17-258 (filed Dec. 28, 2017) (“Cloud Alliance Comments”), at 2; Comments of Rural Broadband Network Services dba HighSpeedLink.net, GN Docket No. 17-258 (filed Dec. 27, 2017), at 7-9; Comments of GigaBeam Networks, LLC, GN Docket No. 17-258 (filed Dec. 28, 2017) (“GigaBeam Comments”), at 3, 4; Comments of Joink, LLC, GN Docket No. 17-258 (filed Dec. 27, 2017), at 2; Comments of BDA Wireless, LLC, GN Docket No. 17-258 (filed Dec. 28, 2017) (“BDA Wireless Comments”); and Comments of Express Dial Internet, Inc. dba KWISP Internet, GN Docket No. 17-258 (filed Dec. 28, 2017), at 3.



proposals, but then consistently cross-references only the same small group of wireless-industry-affiliated entities described above in furtherance of their assertions.<sup>4</sup>

The small group of mobile wireless commenters self-reference repeatedly to “the industry standard”<sup>5</sup> and to various regulations applicable to frequency bands earmarked for mobile wireless use as “the norm,”<sup>6</sup> as if they are necessarily guideposts for policymaking for the 3.5 GHz band. But this spectrum has *never* been intended to be used exclusively for provision of mobile services or, for that matter, any particular use case. To the contrary, when it adopted the existing CBRS rules in 2015, the Commission sought to achieve a range of public interest benefits consistent with its obligations under Section 309(j) of the Communications Act of 1934, as amended (the “Act”). The Commission made specific findings that the new Part 96 rules would “promote development of innovative technologies and services,”<sup>7</sup> permit “innovative approaches to shared spectrum use and small cell technology,”<sup>8</sup> “maximize the flexibility and utility of the 3.5 GHz Band,”<sup>9</sup> “provide economic opportunity to a wide variety of applicants,”<sup>10</sup>

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<sup>4</sup> See, e.g., Comments of Verizon, GN Docket No. 17-258 (Dec. 28, 2017) (“Verizon Comments”), at 9 (touting support for larger license areas from “[a] broad group of stakeholders across numerous segments of the wireless industry,” but actually citing only comments by CTIA, AT&T, T-Mobile, U.S. Cellular and Ericsson). To paraphrase Dorothy Parker, this “broad group” of commenters “runs the gamut ... from A to B.”

<sup>5</sup> See, e.g., Verizon Comments at 3 (referencing “the industry standard, ten-year [license] term”); Comments of CTIA, GN Docket No. 17-258 (Dec. 28, 2017) (“CTIA Comments”), at 4 (“The Commission should adopt its proposal to extend the PAL term from three years to a standard 10-year license term”); Comments of T-Mobile USA, Inc., GN Docket No. 17-258 (Dec. 28, 2017) (“T-Mobile Comments”), at 3, 5 & 19.

<sup>6</sup> See Verizon Comments at 4 (“With ten-year or longer license terms as the norm in bands ranging from the 600 MHz band through the 40 GHz band, a ten-year term is also the appropriate choice for the 3.5 GHz band”).

<sup>7</sup> See *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Report and Order and Second Notice of Proposed Rulemaking, 30 FCC Rcd 3959, 3963 (¶ 8) (2015) (“*CBRS Order*”).

<sup>8</sup> *Id.* at 3967 (¶ 25).

<sup>9</sup> *Id.* at 3983 (¶ 72).

<sup>10</sup> *Id.* at 3992 (¶ 100).

“encourage efficient use of spectrum resources,”<sup>11</sup> and “promote competition.”<sup>12</sup> Consistent with these objectives, the Commission should continue to uphold the statutory goals and “incentivize a wide variety of use cases and deployments.”<sup>13</sup>

The rule changes sought by the incumbent wireless carriers would undercut each and every one of the important statutory requirements of Section 309(j) of the Act and the public policy objectives clearly articulated throughout the *CBRS Order* without producing any alternative public interest benefit. The spectrum assignment changes they propose – larger license sizes, longer license terms, perpetual license durations – individually, and particularly in the aggregate, would drive up the costs of initial license procurement, and thereby limit the pool of bidders, forcing out smaller and more innovative spectrum users that do not require large geographic areas to implement their business plans.<sup>14</sup> The carriers wish to make the CBRS rules more like every other auctioned spectrum band in which, not coincidentally, the major wireless carriers have obtained the lion’s share of the licenses.<sup>15</sup> Despite the history of success by these carriers in acquiring spectrum over the past two decades, significant portions of rural America

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<sup>11</sup> *Id.* at 3993 (¶ 102).

<sup>12</sup> *Id.* at 3999 (¶ 121).

<sup>13</sup> *NPRM*, 32 FCC Rcd at 8112, Statement of Commissioner Brendan Carr.

<sup>14</sup> *See, e.g.*, Comments of SJP Network Solutions, LLC, GN Docket No. 17-258 (filed Dec. 28, 2017) (“These proposals [to increase the size of PALs or lengthen the license term] create economic barriers for small companies to afford bids on PALs and would allow the national mobile carriers to almost exclusively contain all the PALs”); Comments of Roller Network LLC, GN Docket No. 17-258 (filed Dec. 28, 2017), at 2 (“Moving to PEAs with 10 year PALs will increase the cost to obtain a PAL, likely beyond what Roller Network could afford. Forcing us to consider PEAs that include areas outside of our covered areas will increase costs”); Comments of Alsat Wireless, GN Docket No. 17-258 (filed Dec. 21, 2017); GigaBeam Comments at 2; Comments of New Lisbon Telephone Company, Inc., GN Docket No. 17-258 (filed Dec. 22, 2017), at 2; Comments of On-Ramp Indiana, Inc., GN Docket No. 17-258 (filed Dec. 26, 2017), at 1; Wonderlink Comments at 1; and Comments of Broadband Corp., GN Docket No. 17-258 (filed Dec. 28, 2017).

<sup>15</sup> For example, in the recent Broadcast Incentive Auction, 2,295 out of 2,776 licenses auctioned (82.7%) were won by just five bidders – T-Mobile, DISH Network, Comcast, AT&T, and U.S. Cellular. *See* Comments of The General Electric Company, GN Docket No. 17-258 (filed Dec. 28, 2017) (“GE Comments”), at 22 (*citing* Public Notice, *Incentive Auction Closing and Channel Reassignment Public Notice*, 32 FCC Rcd 2786, at Appendix B (2017)).

remain unserved or underserved, such that more than 23 million Americans in rural areas lack broadband access at a time when broadband has become a basic necessity.<sup>16</sup> Abandoning short duration, census tract size PALs would deprive these citizens of their best opportunity to obtain affordable access to non-line-of-sight mid-band spectrum for high-quality residential broadband service. The mobile industry's proposals regarding build-out obligations reveal their clear objective to deploy small cells in high-density urban areas and leave rural Americans behind.

As the Administration emphasized earlier this month in adopting Executive Orders intended to promote rural broadband implementation, lack of broadband access is “particularly acute in rural America, and it hinders the ability of rural American communities to increase economic prosperity; attract new businesses; enhance job growth; extend the reach of affordable, high-quality healthcare; enrich student learning with digital tools; and facilitate access to the digital marketplace.”<sup>17</sup> Accordingly, it is the “policy of the executive branch to use *all viable tools* to accelerate the deployment and adoption of affordable, reliable, modern high-speed broadband connectivity in rural America.”<sup>18</sup> The CBRS, the *Citizens* Broadband Radio Service, appropriately reflects the Commission's objective of accommodating a diverse array of potential service applications that would promote the public interest.<sup>19</sup> Under the current, carefully-crafted Part 96 rules, CBRS is one of the most potent viable tools for addressing the digital divide, and the *only* mid-band spectrum available for commercial use in the near term. The

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<sup>16</sup> See Brad Smith & Carol Ann Browne, *Today In Technology: The Top 10 Tech Issues For 2018*, at 6 (2018), available at <https://ncmedia.azureedge.net/ncmedia/2018/01/TopTen2018.pdf>.

<sup>17</sup> Executive Order 13821, “Streamlining and Expediting Requests to Locate Broadband Facilities in Rural America,” 83 Fed. Reg. 1507 (Jan. 8, 2018).

<sup>18</sup> *Id.* (emphasis added).

<sup>19</sup> See, e.g., Joint Comments of the Telecommunications Subcommittee of the American Petroleum Institute and the Regulatory and Technology Committee of the Energy Telecommunications and Electrical Association, GN Docket No. 17-258 (filed Dec. 21, 2017), at 2 (“[T]he acronym adopted by the Commission confirms that the rules were not focused on providing additional spectrum to large telecommunications carriers, but focused on ‘Citizens.’”).

Commission should not improvidently ignore the critical national policy objectives recently described by the President in favor of the zero-sum rule changes self-servingly advocated by the wireless carriers.<sup>20</sup>

The incumbent carriers speak repeatedly of the salutary effect that the proposed rule modifications would have in promoting investment, but their comments lack any demonstration either that investment has been lacking in technology to support 5G and other services in these bands, or that participation by carriers would be lacking in the event that the Commission leaves the rules unchanged. To the contrary, there is ample evidence of substantial investment already made in pursuit of new service deployments in reliance upon the existing rules, of broad interest in the for near-term commercial deployment in and use of the 3550-3700 MHz band, and of specific intent by many parties to bid for PALs if the current rules are retained.<sup>21</sup> Accordingly, the proposals in the *NPRM* that contemplate fundamental changes should be rejected virtually in their entirety, with only limited exceptions as outlined below.

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<sup>20</sup> See, e.g., William Lehr, *Analysis of Proposed Modifications to CBRS PAL Framework*, GN Docket No. 17-258 (filed Dec. 28, 2017) (“Lehr Analysis”), at 5. See also Comments of Open Technology Institute at New America and Public Knowledge, GN Docket No. 17-258 (filed Dec. 28, 2017) (“OTI/PK Comments”), at 3 (adopting the rule changes advocated by the mobile wireless carriers would “amount to an industrial policy that would tailor licensing rules to closely fit the mobile carriers’ wide-area business model and needlessly foreclose localized, innovative and potentially competing new users and uses by a broad range of enterprise, industrial and public sector users”).

<sup>21</sup> See, e.g., Comments of the Rural Wireless Association, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017) (“RWA Comments”), at 5 (*citing* Comments of Indigo Wireless, Inc., GN Docket No. 12-354 (July 24, 2017) (referencing “upwards of \$1 million in network improvements” by rural broadband provider Indigo Wireless made in reliance upon the existing CBRS rules)); Verizon Comments at 7-8 (“Verizon has already expended a substantial amount of capital in its efforts to accelerate the availability of the 3.5 GHz band and to prepare for a rapid deployment of new 3.5 GHz technologies”); Comments of Kentucky Wimax, GN Docket No. 17-258 (filed Dec. 26, 2017), at 1; Comments of Skywave Wireless, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017), at 1; and Comments of New Wave Net Corp., GN Docket No. 17-258 (filed Dec. 28, 2017) (“New Wave Comments”), at 2.

## Discussion

### I. THE OVERWHELMING WEIGHT OF THE RECORD SHOULD COMPEL THE COMMISSION TO RETAIN ITS EXISTING CBRS LICENSING STRUCTURE

#### A. The Record Strongly Supports Retaining Census Tracts As The Geographic Area For Priority Access Licenses

In the *NPRM*, the Commission sought comment “on the potential effects” of enlarging PAL geographic areas “on investment in and use of the 3.5 GHz Band [and] whether a larger license area would provide additional flexibility to facilitate the deployment of a wide variety of technologies, *including 5G*.”<sup>22</sup> The short answer is that these recycled rule proposals concerning this critical aspect of the CBRS license assignment plan would change the entire character of the 3.5 GHz band, stranding existing investment, impeding new investment, and dramatically curtailing flexible and innovative uses. For these reasons, the vast majority of commenters participating in this proceeding – many of whom have *already* curtailed investment based on the threat of significant rule changes – strongly support retaining census tracts as the basis for PAL licensing.<sup>23</sup>

It is emphatically *not* the case, as the mobile carriers seem to have incorrectly presumed, that the CBRS band is allocated principally for mobile wireless network expansion. CBRS, and

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<sup>22</sup> *NPRM*, 32 FCC Rcd at 8080 (¶ 23) (emphasis added).

<sup>23</sup> See, e.g., Comments of Google LLC, GN Docket No. 17-258 (filed Dec. 28, 2017) (“Google Comments”), at 5-6; GE Comments, at 22-23; Comments of Microsoft Corporation, GN Docket No. 17-258 (filed Dec. 28, 2017) (“Microsoft Comments”), at 4-5; Comments of the Dynamic Spectrum Alliance, GN Docket No. 17-258 (filed Dec. 28, 2017) (“DSA Comments”), at 13-16; Comments of the Wireless Internet Service Providers Association, GN Docket No. 17-258 (filed Dec. 28, 2017) (“WISPA Comments”), at 24-25; OTI/PK Comments at 20-22; Comments of NTCA–The Rural Broadband Association, GN Docket No. 17-258 (filed Dec. 28, 2017) (“NTCA Comments”), at 4-5; Comments of the City of New York, GN Docket No. 17-258 (filed Dec. 28, 2017) (“City of New York Comments”), at 2-3; RWA Comments at 2-3; Comments of JAB Wireless, Inc. dba Rise Broadband, GN Docket No. 17-258 (filed Dec. 27, 2017) (“Rise Comments”), at 2; Amplex Comments at 2; Comments of Starry, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017) (“Starry Comments”), at 2; and Comments of Ruckus Networks, a company of Arris U.S. Holdings, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017) (“Ruckus Comments”), at 9.

5G technology in general, embraces applications and services that include fixed connections and extend well beyond just commercial mobile device connectivity, encompassing a diverse range of potential service providers and other users that can be expected to swell the pool of bidders interested in the ability to make novel use of mid-band spectrum. Yet the narrow, mobile-centric mindset of the major wireless carriers is palpable in virtually every set of comments promoting changes to the CBRS rules. For example, Verizon opines that “a ten-year license term is consistent with the license terms adopted *for most other licensed mobile bands* and has proven to be a successful model throughout the entire history of *the mobile industry*,” evidently assuming that this is just another licensed mobile band for the mobile industry’s use.<sup>24</sup> Mobile Future states that “[t]he rule changes supported herein will create greater certainty for *wireless carrier* investment,” totally ignoring other potential types of users that are already investing in 3.5 GHz.<sup>25</sup> T-Mobile asserts that “census tracts do not reflect economic and geographic boundaries that correspond with *actual market* needs,” conveniently leaving out that they reflect much more closely than Partial Economic Areas (“PEAs”)—the market boundaries sought to be served by the majority of participants in these proceedings.<sup>26</sup> Acquiescence to these false assertions of entitlement to exploit the 3.5 GHz band would not just undermine the Commission’s historic emphasis on maintaining technology neutrality, but would make a mockery of it by establishing licensing parameters for newly available spectrum to favor the most dominant and well-heeled players in the current marketplace at the exclusion of others.<sup>27</sup>

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<sup>24</sup> Verizon Comments at 4 (emphases added).

<sup>25</sup> Comments of Mobile Future, GN Docket No. 17-258 (filed Dec. 28, 2018) (“Mobile Future Comments”), at 3 (emphasis added).

<sup>26</sup> T-Mobile Comments at 9 (emphasis added).

<sup>27</sup> See, e.g., OTI/PK Comments at 7 (“the Commission would be wise to retain the industry- and technology-neutral framework of CBRS and reject changes that hobble smaller, rural ISPs and non-cellular providers and services”).

As detailed below, the record demonstrates that the impact of larger PAL license areas would be entirely negative, and would dramatically reduce flexibility, leading to deployment of a much less diverse range of services and diminished technological innovation in the band.<sup>28</sup> This is not a circumstance where the Commission needs to fashion its regulatory scheme to encourage the mobile wireless carriers to make use of the band. The band is available to them if they seek to use it to expand network capacity, and there is every reason to expect that they will do so, especially in high-density urban areas, if the CBRS rules remain largely as adopted in 2015. Just recently a representative of T-Mobile reportedly acknowledged that the company “would look to use [the 3.5 GHz] spectrum *in whatever form it is available*,” leaving little doubt that the mobile carriers will seek opportunities to use both PAL and General Authorized Access (“GAA”) spectrum regardless of the licensing architecture that ultimately applies.<sup>29</sup> Changing the rules to “attract” participation from the mobile wireless carriers would be “solving” a problem that does not exist.

**1. Adopting License Areas Larger Than Census Tracts Would Dramatically Limit the Number and Types of Companies Able To Use The Band To Provide Innovative Services**

In the *CBRS Order*, the Commission appropriately crafted the structure for CBRS licensing, identifying the need for some potential bidders to acquire PALs for very small geographic areas, and concluding that an assignment plan facilitating such use would promote

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<sup>28</sup> See, e.g., Comments of NCTA—The Internet and Television Association, GN Docket No. 17-258 (filed Dec. 28, 2017) (“NCTA Comments”), at 8 (“PEA-sized license areas are much larger than most of these users need for the business models contemplated, reducing both their incentive and ability to compete at auction for PALs, even where interference-protected spectrum would be critical or beneficial for serving certain customers”).

<sup>29</sup> See Mike Dano, *Charter, Federated tout CBRS momentum, but T-Mobile worries over 5G suitability*, FIERCE TELECOM, Nov. 30, 2017 (emphasis added), available at <https://www.fiercewireless.com/wireless/charter-federated-tout-cbrs-momentum-but-t-mobile-worries-over-5g-suitability>.



innovation, investment, and deployment, as well as the dissemination of licenses among a wide variety of users, consistent with Section 309(j) of the Act. As the Commission stated in 2015:

Census tracts are sufficiently granular to promote intensive use of the band and are large enough, either on their own or in aggregate, to support a variety of use cases, including small cell base stations and backhaul. ... Moreover, by defining license areas in a granular fashion and allowing geographic aggregation, operators should be able to acquire enough PALs to cover their desired network footprint without having to over-acquire licenses.<sup>30</sup>

In other words, the Commission by analogy recognized that a company should not have to compete in an auction to procure a regional shopping mall when it needs less than 1,000 square feet of exclusive retail kiosk space.<sup>31</sup>

The Commission also recognized that businesses requiring CBRS spectrum could combine census tract PALs to create larger spectrum footprints, facilitating use by entities requiring access to broader geographic expanses.<sup>32</sup> No commenting party has articulated any sound basis for disrupting this “building block” structure for the CBRS. This assignment mechanism allows many potential bidders to seek spectrum exactly where it is required, allowing market forces to dictate the distribution of PALs at the outset rather than establishing arbitrary license area designations, and relying upon the post-auction benevolence of large corporate entities to allow secondary market transactions to create smaller service areas necessary for other types of providers to serve.

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<sup>30</sup> *CBRS Order*, 30 FCC Rcd at 3993 (¶101).

<sup>31</sup> Over the past few decades, retail kiosk operators have turned what were once vacant dead spaces in large shopping malls into very successful business locations. See John Grossman, *Tiny Mall Kiosks Make a Surprisingly Big Impact*, NEW YORK TIMES (May 22, 2013), at B7 (“Typically bound by short-term leases ... and run by first-time entrepreneurs with limited capital, shopping mall carts and kiosks have long been considered an unsophisticated small-business underclass. More recently, however, these small-footprint retailers have come to be seen as possessing surprising potential”), available at <http://www.nytimes.com/2013/05/23/business/smallbusiness/hidden-in-plain-sight-tiny-mall-kiosks-make-a-surprisingly-big-impact.html>.

<sup>32</sup> See, e.g., DSA Comments at 17 (census tract licensing “enables PAL holders to aggregate census tracts as needed to expand their deployments”).



Numerous rural fixed wireless access providers have illustrated the problem by including maps submitted with their Comments, showing how use of PEA license boundaries would effectively foreclose their participation from a PAL auction.<sup>33</sup> (*See* Appendix B hereto, which includes maps submitted by BDA Wireless, LLC, New Wave Net Corp., Texoma Communications, LLC dba TekWav, and Wonderlink Communications, LLC illustrating how PEA-sized PALs, and even county-sized PALs, would cause WISPs to over-purchase license area.) This is so because PEAs are naturally centered on cities and large towns with both greater population and greater density, and rural providers typically operate outside these areas, often with service areas that overlap multiple PEAs. In order to expand service over their entire network footprint, these providers would need to procure PAL licenses in multiple PEAs, but as a practical matter would have a very difficult time securing even one such license due to intense competition for those authorizations from the larger group of entities that operate within the scope of a PEA. Returning to the analogy, the rule changes sought by the large mobile carriers would effectively require a company to buy multiple PEA shopping malls when it only needs limited kiosk space in one. As these maps also show, such providers would have a much greater chance of securing multiple census tract licenses because the footprints of these areas closely

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<sup>33</sup> *See, e.g.*, Amplex Comments at 1, 2 (“Amplex is interested in purchasing PAL’s in 4 census tracts inside the Cleveland PEA to serve our existing customer base. Purchasing the other ~7,500 square miles of the Cleveland PEA is cost prohibitive and makes sense only for a large mobile carrier seeking to restrict competition or as an investment vehicle”); Comments of Airlink Internet Services, GN Docket No. 17-258 (filed Dec. 27, 2017), at 1 (“[b]ecause the PEAs are so large and our coverage area includes 5 different PEAs, it wouldn’t be financially possible to participate in the auction”); e-vergent Comments at 2, 3 (“[S]ome of the [coverage] area is within PEA 3 (Chicago) and the adjacent PEA 224. PEA 224 touches the Chicago suburbs and Iowa, which is a huge land area to cover for us... We would only deploy a network in a handful of the rural census tracts of each PEA making it much too costly for us.”); and Comments of Softcom Internet Communications, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017), at 1 (“For example, in our specific case, the PEA for a large portion of our completely rural service area of northern San Joaquin County is clumped in with the San Francisco Bay Area (see attached map.) It doesn’t require a lot of thought to know that obtaining a PAL using this PEA will be incredibly expensive and effectively lock us out of the market”).

match key portions of their largely rural service areas,<sup>34</sup> and are less likely to attract intense bidding competition from the small number of nationwide mobile service providers focused on other, more densely populated areas.

Neither alternative model that has been advocated by small groups of commenters, based on either PEAs or county boundaries, is as advantageous as the census tract model in terms of establishing license sizes that meet the needs of the maximum number of service providers. No advocates of either approach have provided the requested cost/benefit analysis to support a dramatic restructuring of the license assignment rules at this stage,<sup>35</sup> particularly where the policy justifications advanced for adopting larger license footprints are generalized and unconvincing, as detailed below.

At the same time, substantially increasing the size of PAL areas to reflect either PEA or county boundaries would completely undercut the goal of promoting use of the band to support a wide variety of uses and business models, leaving a particular business model, preferred by one small group of large incumbents or another, as the most viable service option for this spectrum, and thus limiting the initial bidding pool.<sup>36</sup> As Motorola observes, “as the size of the [license]

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<sup>34</sup> See, e.g., Imagine Comments at 3 (the corresponding Dayton, Ohio PEA-sized PAL that Imagine would have to purchase to cover its service area is roughly four times the size of the corresponding census tract area, and includes a major city); Wonderlink Comments at 2, 4 (Under the current CBRS rules, Wonderlink “would acquire PAL’s for 41 census tracts with a coverage of ~128 square miles.” With the proposed changes, Wonderlink “would be required to acquire one PEA that covers 9,688 square miles which is 9,560 square miles more than our intended coverage”); TekWav Comments at 1, 2 (“[W]e would need to purchase 4 PEA’s while only needing to purchase 29 Census Tracts that better fit our coverage area. Buying just the main PEA of our coverage area means that I would have the license to cover all of Dallas/Fort Worth and we have no intention at all to provide anywhere near those large cities”); and Cloud Alliance Comments at 2 (“Bound by mountain ranges, our service area comprises less than a dozen census tracts. We cannot compete with larger companies vying for PALs that would serve more than half the state and all of its largest cities and towns”).

<sup>35</sup> See *NPRM*, 32 FCC Rcd at 8077 (¶ 16) & 8080 (¶ 24).

<sup>36</sup> See, e.g., GE Comments at 1-2 (“shift to much larger Partial Economic Area (‘PEA’) licenses ... would leave this licensed spectrum entirely under the control of established wireless carriers, reducing the utility of the CBRS band and squandering a historic opportunity to spur innovation and economic and public safety benefits through widespread scaling of the IIoT”).

area is increased, the number of interested auction participants will decrease.”<sup>37</sup> In effect, the discrete groups promoting both PEA and county-based license areas each seek to skew the current rules, which accommodate a multitude of uses, in favor of their particular operational model.<sup>38</sup> Neither outcome is consistent with the public interest or the Commission’s intent when it adopted the *CBRS Order*, and both are fundamentally at odds with Chairman Pai’s goal to avoid agency action that amounts to “picking winners and losers.”<sup>39</sup>

**a. The Commission Can Implement Census Tract Auctions For Priority Access Licenses Without Undue Complexity**

Several commenters argue that increasing license area and thereby reducing the number of licenses to be auctioned will reduce auction complexity.<sup>40</sup> But this claim is premised on the mere assumption that an auction involving thousands of licenses is inherently more complex. In fact, auction expert Prof. Paul Milgrom has concluded that “for PALs for the 3.5GHz band, simple auctions for tens of thousands of licenses are feasible and reasonable.”<sup>41</sup> This is so because bidders will be competing for multiple licenses in each area, not for specific frequency assignments that, for many bidders, otherwise would need to be matched with other authorizations being sought in adjacent geographic areas. Within each geographic licensing area, the licenses are fungible, and each bidder will have a clear objective entering the auction regarding the specific census tracts or larger geographic areas for which it seeks to obtain one or

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<sup>37</sup> See Comments of Motorola Solutions, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017) (“Motorola Comments”), at 5.

<sup>38</sup> See, e.g., OTI/PK Comments at 22 (“It would be far easier for carriers to assemble larger contiguous areas by acquiring census tracts than it would be for hundreds or thousands of other potential users to either win a PEA or county license at auction”).

<sup>39</sup> *Restoring Internet Freedom*, WC Docket No. 17-108 (Dec. 14, 2017), at 4, Oral Statement of Chairman Ajit Pai (“What I am saying is that the government shouldn’t be in the business of picking winners and losers in the Internet economy”) (emphasis in original).

<sup>40</sup> See, e.g., CTIA Comments at 8-9; Comments of AT&T Services, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017) (“AT&T Comments”), at 5; Comments of United States Cellular Corporation, GN Docket No. 17-258 (filed Dec. 28, 2017) (“U.S. Cellular Comments”), at 4-5; and Mobile Future Comments at 8.

<sup>41</sup> Letter from Paul Milgrom, Auctionomics Inc., to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed Aug. 7, 2017) (“Milgrom Paper”), at 2. See also Starry Comments at 7.

more licenses. Commenters also ignore the fact that the Commission has clear authority to adopt auction procedures that do not employ the simultaneous, multiple-round bidding that the Commission has used in recent years.

Citing T-Mobile, U.S. Cellular complains that with census-tract based licensing, potential PAL licensees “will be required to evaluate each census tract – each of which vary in size – in order to determine which licenses best suit [their] business needs.”<sup>42</sup> This is an odd complaint in that a licensee acquiring a larger service area would nonetheless be expected to provide service across an area that includes multiple census tracts; if a licensee acquires some census tracts that it cannot be bothered to evaluate with respect to its “business needs,” can it be counted on to provide service there? A key aspect of establishing licenses on a granular level is ensuring that the acquiring licensee has made an assessment of need and is committed to providing service or other public benefit within that area. Logically, this due diligence is more easily accomplished at the smaller, census tract level than across a larger geographic area.

As several commenters observe, the Commission recently completed the broadcast incentive auction, which is universally regarded as the most complex spectrum auction in history.<sup>43</sup> Accordingly, as GE indicates, “[c]oncerns regarding auction complexity should not weigh against CBRS census-tract licensing ... [because] [t]he Commission has the technical expertise, experience, and incentive to conduct an auction of census-tract PALs.”<sup>44</sup> Even Verizon appears to concede that the Commission is fully capable of managing an auction of large numbers of census tract licenses, noting that even if “challenges can be overcome through auction design,” ... “[t]he Commission’s *licensing databases* are far less robust than its auction

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<sup>42</sup> U.S. Cellular Comments at 4-5, (*citing* Petition for Rulemaking, T-Mobile USA, Inc., GN Docket No. 12-354, (filed June 19, 2017), at 16).

<sup>43</sup> See GE Comments at 7 & 35-36; and WISPA Comments at 38.

<sup>44</sup> GE Comments at 7.

systems,”<sup>45</sup> thus switching emphasis to another area of FCC management (addressed in the following section).

**b. PAL Management Should Not Impose A Disproportionate Burden Upon Either The Commission Or Licensees**

Verizon goes on to argue, along with a few other commenters, that making fewer, larger-size licenses available would significantly simplify license management burdens for the Commission and for licensees as well.<sup>46</sup> Again, however, there is no evidence that successful license management by either the Commission or individual licensees requires such “simplification.” To the contrary, without any construction or “substantial service” obligations or renewal deadlines and applications to file, managing licenses should require nothing more than maintaining an internal database listing the call signs. The addition of new PAL authorizations to the current FCC licensing databases is a mere incremental change, as the Commission already has outstanding well over two million spectrum licenses across a wide variety of services, with different license terms, technical characteristics, geographic coverage and service obligations. Moreover, the licensees advancing these arguments are themselves among the largest holders of Commission-issued spectrum licenses. AT&T, Verizon Wireless and T-Mobile currently hold more than 10,000 spectrum licenses apiece.<sup>47</sup> If on an individual basis the burdens of holding PALs are too difficult, these companies – and any company – can simply use GAA spectrum and not have to worry about managing PALs.<sup>48</sup>

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<sup>45</sup> Verizon Comments at 12.

<sup>46</sup> See Verizon Comments at 12; AT&T Comments at 5-6; and T-Mobile Comments at 9.

<sup>47</sup> See *License View API*, FEDERAL COMMUNICATIONS COMMISSION, <https://www.fcc.gov/reports-research/developers/license-view-api> (last visited Jan. 24, 2018). See also *FCC License View*, FEDERAL COMMUNICATIONS COMMISSION, <http://reboot.fcc.gov/license-view/> (last visited Jan. 24, 2018) (former website before 2011 redesign).

<sup>48</sup> It may also be appropriate to allow licensees holding contiguous census tracts in a single PEA to identify this area under a single call sign for administrative purposes, so long as the individual license areas are again made available for re-auction on a census tract basis at termination.

From an operational management standpoint, as Cantor Telecom Services explains, “[p]otential SAS Administrators such as Google and Sony have repeatedly informed the Commission that the scheme poses ‘no undue burden,’ noting that, in addition to the meaningful advances in technology to support managing licenses across many geographic areas, ‘the size of the PAL license area has essentially no effect on the complexity of PAL protections.’”<sup>49</sup> Properly considered, claims of complexity and the burdens of license management are transparent scare tactics that simply do not withstand scrutiny.

**c. Concerns Regarding Coordination At PAL License Borders Ignore CBRS Technical Rules And Are Otherwise Exaggerated**

Several of the wireless carrier commenters also assert that reducing the total number of licenses would simplify border coordination issues between and among license areas. But this argument is a red herring for two distinct reasons. First, at a fundamental technical level, Citizens Broadband Radio Service Devices (“CBSDs”) deployed under PAL licenses are not protected to the edge of the license area, but are instead protected on an individual basis under Section 96.25(c)(2) by a PAL Protection Area, which is to be determined by the SAS.<sup>50</sup> Thus, it is the location and parameters of the transmitting facilities themselves that dictate protection and coordination boundaries, not the license borders.

Second, at a more practical level, in a band with a number of distinct planned uses, it cannot be assumed that each licensee will deploy CBSDs near the edge of its licensed area. Some will be maximizing coverage at a specific location rather than seeking to cover the entire geographic footprint of a census tract. Other entities, presumably including the mobile wireless carriers, will be seeking to cover much larger geographic areas by acquiring many census-tract

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<sup>49</sup> See Comments of Cantor Telecom Services, L.P., GN Docket No. 17-258 (filed Dec. 28, 2017) (“Cantor Comments”), at 8.

<sup>50</sup> 47 C.F.R. §96.25(c)(2). See also Microsoft Comments at 6.

PALs, thereby effectively absorbing a large number of “borders” within contiguous coverage areas, and obviating much of the need for coordination between or among wide area uses along individual census tract borders.

## **2. PEA Licenses Are Not Appropriate For Spectrum Embracing A Wide Variety of Potential Uses**

The specific justifications offered for adopting PEAs as the standard license size for CBRS are even thinner than the general arguments offered to support adopting license areas larger than census tracts. Moreover, the group supporting this particular licensing approach is also significantly narrower, as the participating equipment manufacturers are not wholly on board with such a shift. Ericsson does not address the issue of license size at all in its Comments, while at the same time it emphasizes the ability of the band to support a variety of use cases.<sup>51</sup> Nokia’s support for larger PAL sizes is somewhat equivocal, and it notes that the Commission must provide opportunities for “smaller-scale licenses for micro-deployments in urban as well as rural areas.”<sup>52</sup>

Shorn of the unfounded “simplification” arguments for moving to larger PAL license areas, the mobile carriers’ only remaining justification for switching to PEAs is the claim that the Commission “should adopt the same tried-and-tested approach to licensing in the 3.5 GHz band” as it recently has in a number of other bands,<sup>53</sup> a rationalization that ignores both the unique characteristics of the 3.5 GHz band (*e.g.*, tiered use, protected incumbents, small cell deployments) and the fact that there is no public interest benefit to be derived from reflexively

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<sup>51</sup> See Comments of Ericsson, GN Docket No. 17-258 (filed Dec. 28, 2017) (“Ericsson Comments”), at 3-5.

<sup>52</sup> Comments of Nokia, GN Docket No. 17-258 (filed Dec. 28, 2017) (“Nokia Comments”), at 1.

<sup>53</sup> AT&T Comments at 7. See also CTIA Comments at 9 (“The Commission has already recognized ‘that PEA-sized licenses are conducive to *mobile broadband offerings*,’”) (emphasis added); T-Mobile Comments at 10-11; U.S. Cellular Comments at 5-6; Verizon Comments at 8-9; Mobile Future Comments at 7-8; and Comments of the Telecommunications Industry Association, GN Docket No. 17-258 (filed Dec. 28, 2017), at 3.



adopting the same spectrum policy choices without regard to other considerations. As Ruckus explains, “the longer time horizon that the Commission has found appropriate for traditional licensed bands has been based on the economics and deployment timelines of wide-area, macro cellular deployments, typically for regional or national-scale networks ... [but] the CBRS band will be utilized for small cell deployments” operating at significantly lower power.<sup>54</sup>

The true objective of these parties is laid bare in CTIA’s assertion, citing the Commission’s rationale in creating rules in the bands above 24 GHz expressly for use by mobile radio services, that “PEAs [are] small enough to permit access to licenses *by smaller carriers* while still large enough to incentivize investment in new technologies.”<sup>55</sup> The argument suggests a desire to divide spectrum resources among a closed universe of mobile carriers to the exclusion of other pro-competitive and innovative uses. Thus, these arguments do more to undermine any potential basis for adopting licensing based on PEA boundaries than they do to support it, as among other things, they emphasize just how many times in recent rulemaking proceedings the Commission has adopted license assignment schemes that cater to the specific mobile carrier business model. While these decisions may have been appropriate in the context of the various proceedings referenced, and in view of the particular utility and circumstances relating to each frequency band addressed therein, they do not justify reversing course in favor of the “command and control” licensing model in *this* proceeding.<sup>56</sup> Indeed, the fact that so much

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<sup>54</sup> Ruckus Comments at 6-7. *See also* GE Comments at 17 (“Licensing by census tract – which the Commission viewed as a “middle ground” between site-specific licenses and larger, traditional license areas – is appropriate in a band where most operations are likely to be small-cell, localized deployments”).

<sup>55</sup> CTIA Comments at 9, (*citing* Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration and Memorandum Opinion and Order, *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et. al.*, FCC 17-152 ¶ 170 (2017)).

<sup>56</sup> WISPA wholeheartedly agrees with Chairman Pai that “the market, not government, is best positioned to drive innovation and investment. What government can and should do is to push spectrum into the commercial marketplace and set rules that encourage the private sector to develop and deploy next-



of the spectrum resource already has been allocated in a manner expressly conducive to mobile wireless carrier operating priorities clearly calls into question whether the Commission should be extending the exclusive hegemony of these carriers to yet another frequency band.<sup>57</sup> This is particularly the case given the unique characteristics of the CBRS spectrum, and the Commission's oft-expressed desire to make this an "innovation band" open to a wide variety of uses.<sup>58</sup>

One size does not fit all when the Commission has a statutory obligation to make spectrum available for a diverse range of potential uses. As NCTA notes, "[a]doption of a PEA-based licensing scheme would ... call into question whether the statutory mandates are being fulfilled and would result in clear public interest harms, including the elimination of many small businesses and rural carriers from the CBRS auction altogether and delayed deployment of broadband services to rural areas."<sup>59</sup> "In rural and other low-density areas," as OTI/PK explain, "auctioning PALs the size of PEAs, or even the size of counties, would make the licenses unaffordable for rural broadband providers or any wireless service other than a deep-pocketed wide-area cellular provider."<sup>60</sup>

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generation infrastructure." News Release, "Statement of FCC Chairman Ajit Pai on the Future of 5G" (rel. Jan. 29, 2018).

<sup>57</sup> See, e.g., Aalok Mehta and J. Armand Musey, "Overestimating Wireless Demand: Policy and Investment Implications of Upward Bias on Mobile Data Forecasts," COMMLAW CONSPECTUS (June 2015), 300, 307 ("Overestimating the growth of mobile network traffic and focusing on exclusive-use licenses, for example, can crowd out other types of wireless communication by increasing spectrum scarcity").

<sup>58</sup> See, e.g., *CBRS Order*, 30 FCC Rcd at 3961 (¶ 2) & 3995 (¶ 106); and *NPRM*, 32 FCC Rcd at 8072 (¶ 2).

<sup>59</sup> NTCA Comments at 5.

<sup>60</sup> OTI/PK Comments at 19. See also NCTA Comments at 7 ("A larger license size means a more expensive license, introducing significant barriers to entry that will disproportionately disadvantage new entrants and innovative business models, ultimately resulting in less choice for consumers,"); GE Comments at 21 ("The greater the square mileage and the larger the population in a license area, the higher the auction price will be for that license").

In this connection, the Commission ought to consider both the ability and the inclination of users that obtain access to a block of spectrum covering a large geographic area to deploy robustly that spectrum in the near term to provide service to the public. While we often think of spectrum value in terms of bandwidth and operating characteristics, one critical measure of its value is *time*. Unlike tangible resources, such as coal or oil, spectrum is fully reusable. Indeed, this is one reason that some commenters self-interestedly argue in favor of substantially longer license terms, because a lengthier period of entitlement to use spectrum makes the license itself more valuable *to the licensee*. By this same logic, however, any time that licensed spectrum lies fallow, and is not being used to provide communications service or other benefits, is a waste of the spectrum resource *for the public*. It is self-evident that a broader group of motivated spectrum users with diverse deployment objectives will make more immediate and intensive use of the spectrum, particularly when they have paid for the opportunity to obtain licenses for particular spectrum rights.<sup>61</sup>

The large mobile carriers implicitly admit that if they acquire spectrum in PEA-sized units, they will warehouse significant portions of it by failing to deploy service in the near term to less-populated areas. Tellingly, T-Mobile finds justification for longer license terms in the result that providers would gain “additional time to fully implement their business plans and reach rural parts of their licensed areas,” essentially admitting that these areas have the lowest priority for the large carriers and would have their service needs addressed last.<sup>62</sup> Due to these mobile carrier priorities, adopting large license areas could pose a significant barrier to deployment by combining urban/suburban and exurban/rural areas in outsized geographic license

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<sup>61</sup> See, e.g., City of New York Comments at 1 (“Competition, resulting in greater coverage and speed, as well as lower prices for consumers, will be better fostered by a licensing regime that enables all actors, including smaller providers and new types of operators, to take part in building 5G networks...”).

<sup>62</sup> T-Mobile Comments at 5.

areas in which the winning bidders are likely to focus primarily on densifying their networks in high-population areas, while build-out to less populated areas continues to lag.<sup>63</sup>

Similarly, when addressing the issue of possible performance standards for longer term, renewable licenses, T-Mobile advocates a 40 percent *population* coverage metric,<sup>64</sup> an extraordinarily weak requirement that carriers could reach in many PEAs by providing geographic coverage to well under 10 percent of the total PEA land area, thus leaving exurban and rural areas completely unserved. For example, in the most populous PEAs, 40 percent of the population can be reached by covering as little as 1.12 percent (in PEA2, Los Angeles) or 1.63 percent (in PEA1, New York) of the PEA's total land area. Even in much less urban PEAs, a 40 percent population coverage can be achieved by providing service to as little as two percent of the land area (in PEA278, Bartlesville, OK). These statistics dovetail with the U.S. Census Bureau's finding in 2016 that "[r]ural areas cover 97 percent of the nation's land but contain 19.3 percent of the population (about 60 million people)."<sup>65</sup> Thus, if the large mobile wireless carriers aim to cover just 40 percent of the population (which would be just *half* the population categorized as urban and suburban by the Census Bureau), they will leave broad swaths of territory and tens of millions of American citizens unserved for years and years – unless WISPs and other small service providers are afforded the opportunities created by the current rules to deploy mid-band spectrum capable of expeditiously filling this yawning gap.

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<sup>63</sup> See, e.g., News Release, "Statement of Commissioner Michael O'Rielly on Any Plan to 'Nationalize' 5G," (rel. Jan. 29, 2018) ("I plan to do everything in my power to provide the necessary resources, including allocating additional spectrum and preempting barriers to deployment, to allow this private sector success to continue"). WISPA agrees.

<sup>64</sup> *Id.* at 7-8.

<sup>65</sup> U.S. Census Bureau News Release Number: CB16-210, "New Census Data Show Differences Between Urban and Rural Populations" (December 8, 2016), *available at* <https://www.census.gov/newsroom/press-releases/2016/cb16-210.html>.

Stripped of rhetoric, the motives of the mobile wireless carriers amount to a weakly-reasoned, transparent attempt to limit competition for PALs to the existing oligopoly so they can increase spectrum capacity to serve small, urban areas, and warehouse valuable mid-band spectrum in vast rural and exurban areas of the country where coverage from other spectrum bands cannot be achieved. In these areas, demand will go unmet. By contrast, preserving census tracts will not preclude classes of prospective bidders and use cases, but will enable more robust bidding and coexistence among fixed, mobile and other innovative uses. The Commission cannot, by making PALs inaccessible to small providers, turn its back on 23 million unserved Americans that can receive the benefits of non-line-of-sight mid-band spectrum to expeditiously meet those needs.

### **3. County-Based Licenses Do Not Provide A Reasonable Alternative To The Existing Rules**

A very small group of commenters – cable companies and their principal trade association – support the assignment of PALs on a county basis.<sup>66</sup> It is no coincidence, of course, that cable providers business operations are typically organized on a county-wide basis, and they would uniquely benefit from such a switch. These advocates, however, provide no cost/benefit analysis or other public interest justification to support switching from census tracts to county-sized licenses.<sup>67</sup> To the extent that their rationales differ from those of the PEA advocates, they are based almost entirely on arguments that counties are to be preferred over PEAs because of their smaller size, and not on concrete reasons that counties should be preferred

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<sup>66</sup> See, NCTA Comments at 2, 3-5; Comments of Comcast Corporation, GN Docket No. 17-258 (filed Dec. 28, 2017) (“Comcast Comments”), at 2 & 4; and Comments of Charter Communications, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017) (“Charter Comments”), at 1-3. A few other commenters express some interest in county-wide licensing, but in the context of a compromise or hybrid solution, as discussed below.

<sup>67</sup> *NPRM*, 32 FCC Rcd at 8077 (¶ 16) & 8080 (¶ 24).

over even smaller census tracts.<sup>68</sup> Any entity seeking to acquire CBRS spectrum on a county-wide basis can reasonably achieve the same result by aggregating a manageable number of census tract PALs, which can be assembled to cover the exact borders of any county.

Comcast asserts that “the fact that counties vary in size, population, and demographics can be ‘advantageous’ for licensing purposes, because these types of variations enable opportunities both for providers who seek to serve smaller areas and those who wish to serve larger areas.”<sup>69</sup> This statement misses the reality that service providers seeking opportunities to deploy new spectrum in service to their customers and to expand service to new areas do not have the luxury of picking from a menu of “smaller areas” and “larger areas,” or those that are lightly populated as opposed to densely populated; they need access to new capacity *in and near the communities they actually serve*, and not to random spectrum “opportunities” that may be objectively obtainable elsewhere. In the real world, if a service provider is seeking the ability to provide new or improved service to several small towns straddling the borders of two or more larger counties, and each county contains a relatively large city, it will be unlikely to obtain *any* county-wide license in competition with entities seeking to add capacity to serve urban core populations in any of these counties.

As a result, county-sized licenses have the same defects from a diversity of use standpoint as PEAs, as they are also too large for localized deployments such as those intended by colleges, industrial parks, manufacturing plants, sports arenas and other similar users. For example, as Motorola explains, census tract-based PALs are more effective to deploy industrial, utility, oil, and gas enterprises’ private wireless broadband networks for automation purposes

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<sup>68</sup> See, e.g., Comcast Comments at 8-10.

<sup>69</sup> Comcast Comments at 6; Charter Comments at 2-3; and NCTA Comments at 5-9.

that are not outsourced to a commercial cellular network.<sup>70</sup> In many cases, any license area larger than an individual census tract would effectively preclude such operations. As WISPA has previously noted, counties vary greatly in size, and many cover thousands of square miles,<sup>71</sup> with wide disparities in population and terrain (some counties even have non-contiguous areas). For these reasons, as echoed by many other commenters, counties are not an acceptable geographic unit for PALs.<sup>72</sup> County-based licensing, like PEA licensing, would put too much spectrum covering unserved and underserved areas in the hands of entities with no intention of serving – in the near term, if ever – these types of areas, those that are most in need of new connectivity to the Internet economy.

In sum, using the analogy above, while the would-be kiosk operator would not have to purchase a shopping mall, it would still need to acquire a neighborhood shopping center, a result

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<sup>70</sup> See Motorola Comments at 2, 4-5. See also Joint Comments of Cambium Networks, Ltd., the Regulatory and Technology Committee of the Energy Telecommunications and Electrical Association, and the Utilities Technology Council, GN Docket No. 17-258 (filed Dec. 28, 2017) (“Joint Utility Comments”), at 6 (Census tract-based PALs provide “opportunities for private network operators, like cities, counties, electric utilities, water utilities, rail, and oil and gas operators, to deploy locally targeted, high-capacity networks to support their operations”).

<sup>71</sup> All of the 100 largest U.S. counties in area span at least 4,000 square miles. See *American FactFinder County Area Table U.S. Census 2010*, UNITED STATES CENSUS BUREAU, <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk> (last visited Aug. 2, 2017).

<sup>72</sup> See, e.g., Comments of Cal.net, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017) (“Cal.net Comments”), at 4 (“Sacramento County has a population of 1,501,335, and is anchored by the City of Sacramento and its suburbs (including Elk Grove). However, large portions of the county along the eastern and southern flanks are very rural. Under the county-size PAL concept, it would cost us 247 times (!) as much to acquire the desired PALs to service our coverage area than it would cost with tract-sized PALs”); Comments of Southern Internet, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017), at 2 (“Our service area falls within the PEA that covers the Atlanta metropolitan area and that of one of two counties that comprise the City of Atlanta. If we bid on a County or PEA basis, we would bid on spectrum that covers hundreds of thousands of Americans, when we seek to serve only 3,000”); Comments of NewarkNet, GN Docket No. 17-258 (filed Dec. 28, 2017), at 1 (“Being able to gain access to the CBRs band in smaller census tract increments and not having to bid on larger county level blocks would be extremely useful to us and really allow us to push higher speed offering to customers, especially those with less than ideal line-of-sight,”); and TekWav Comments at 2 (“Using Census Tracts is a much more economical and financial method for WISPs to acquire PALs. We strongly OPPOSE the proposals to increase the size of PALs to the size of a PEA or even a county or to lengthen the term of Licenses”).

that also is illogical from both practical and economic standpoints. The Commission should reject the county-based approach.

#### **4. The Commission Also Should Reject The Hybrid Licensing Approaches Proposed by a Few Commenters**

Several parties attempt to fashion a compromise by advocating for hybrid approaches. There is no consensus among these parties and their alternative approaches suggest a wide variety of metrics for license sizes, from partial reliance on census tracts and counties for all areas, to exclusive use of Metropolitan Statistical Areas for licensing in urban locales.<sup>73</sup> Alaska Communications advocates reliance on “Game Management Units” as appropriate for assignments in Alaska.<sup>74</sup> Several commenters discussing possible hybrid solutions nonetheless make plain their preference for retaining some census tract licensing.<sup>75</sup>

The proposals included in initial Comments should be rejected because they do not preserve the fundamental benefits of the CBRS rules, which were intended to enable protected deployments in all census tracts throughout the country, whether rural or urban, large or small. If these hybrid models are adopted, they would still put broad swaths of spectrum out of reach

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<sup>73</sup> See, e.g., Nokia Comments at 4 (supports a hybrid approach with PEAs in urban areas and census tracts in rural areas, but says that this distinction would fail to address some large enterprise uses, such as healthcare facilities, stadiums, and shipping ports); Joint Comments of National Rural Telecommunications Cooperative and the National Rural Electric Cooperative Association, GN Docket 17-258 (filed Dec. 28, 2017) (“NRTC/NRECA Comments”), at 3-4 (proposing that two PAL blocks be licensed by census tract and five PAL blocks be licensed by county); NTCA Comments at 7-9 (proposal similar to NRTC/NRECA); and Comments of Transit Wireless, LLC, GN Docket No. 17-258 (filed Dec. 29, 2017) (“Transit Wireless Comments”), at 3 (suggesting that PALs should be allocated in two tiers, with a “small PAL” of at least 40 MHz allocated at the census tract size and the “large PAL” of at least 30 MHz allocated at either the PEA or census metropolitan area sizes).

<sup>74</sup> See Comments of Alaska Communications, GN Docket 17-258 (filed Dec. 28, 2017) (“Alaska Communications Comments”), at 7 (explaining that GMU’s are smaller than PEAs and larger than census tracts, but are relatively uniform in size).

<sup>75</sup> See Comments of Frontier Communications Corporation, Windstream Services, LLC, and Consolidated Communications, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017) (“Frontier/Windstream/Consolidated Comments”), at 6-7 (support retaining “smaller license sizes” for rural areas if the FCC adopts “larger license sizes” for urban areas); Motorola Comments at 5-6 (suggests an alternative hybrid approach of auctioning four 10 MHz county-sized licenses and three 10 MHz census tract-sized licenses); and RWA Comments at 4.



for smaller service providers poised to offer near-term service. Lower-density tracts are particularly ill-suited for small cell use and already occupy relatively large land areas. Whereas larger service footprints can be assembled by aggregating small spectrum licenses, there is no need to pre-assemble combined license areas. As Professor Milgrom notes, “the twin goals of promoting economic efficiency and increasing auction revenues both favor allowing local and wide area uses to coexist and compete for incremental spectrum access in congested areas.”<sup>76</sup>

**5. License Areas Larger Than Census Tracts Would Both Strand Current Investment And Inhibit Future Investment Generally**

One argument that permeates the advocacy pieces submitted by both the mobile carrier and cable interests is the unelaborated notion that smaller license sizes (as well as shorter terms and re-auction) will impede investment in the band, and implicitly the development of an equipment market for 3.5 GHz CBSDs. But the available evidence strongly contradicts these contentions. The initial comments include a multitude of evidence that the current rules have fueled investment in the band by a variety of service providers, both large and small.<sup>77</sup> WISPA reported survey results showing that 63 percent of respondents had invested and deployed based on the rules adopted in 2015, and 60 percent had reduced investment from the threat of changes to the PAL licensing rules.<sup>78</sup> Equipment manufacturers also noted the increased investment and

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<sup>76</sup> Milgrom Paper at 4. *See also* Transit Wireless Comments at 1 (detailing plans to use CBRS census tract PALs to expand its neutral host network that operates within the New York City subway system).

<sup>77</sup> *See, e.g.*, Rise Comments at 1 (invested \$10 million in the CBRS band); Comments of Rapid Systems, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017), at 1 (invested “millions of dollars” in CBRS band hardware); GigaBeam Comments at 1 (“Our current investment in this band exceeds \$200,000 and we have plans to purchase and expand our service with an additional two million dollar investment over the next 2-3 years,”); and Comments of DMCI Broadband, LLC, GN Docket No. 17-258 (filed Dec. 27, 2017) (“DMCI Comments”) (“During the last 2 years, we have invested over \$700k in LTE products that operate in the 3650-3700 with the expectation of additional spectrum from the CBRS decision outlined in 2015”). *See also* Google Comments at 15 (“Entities *including but not limited to* major mobile operators have already made significant investments in 3.5 GHz technology and are committed to investing more”); and Comments of Next Century Cities, GN Docket No. 17-258 (filed Dec. 28, 2017), at 3-5.

<sup>78</sup> *See* WISPA Comments at 16-18.



competition for business that was engendered, as intended, by the *CBRS Order*.<sup>79</sup> And, as UTC comments, “changing the rules at this late stage could strand [this] investment rather than promote it, and could delay the timeframe in which the band could be made available to smaller entities that are eagerly interested in using it.”<sup>80</sup> The record not only demonstrates how much WISPs, in particular, and others have already invested in this band, but it also illustrates their future plans to make additional investments if the CBRS rules remain intact.<sup>81</sup>

Moreover, as OTI/PK observe, “a diverse and intensive use of PAL and GAA spectrum would likely fuel a mass market for off-the-shelf access points and other gear – much as Wi-Fi did on the unlicensed bands,” but “a market geared initially and primarily to serve the proprietary needs of a few large mobile carriers would likely leave that potential mass market underdeveloped, if not dead in the water.”<sup>82</sup> This latter point is so because the mobile wireless industry, in particular, has made clear that their use of the spectrum is still subject to ongoing development of 5G standards, and therefore remains on the horizon rather than immediate.<sup>83</sup>

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<sup>79</sup> Comments of Baicells Technologies North America, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017), at 3; Joint Utility Comments at 7-8; and Ruckus Comments at 2.

<sup>80</sup> Comments of the Utilities Technology Council, GN Docket No. 17-258 (filed Dec. 28, 2017) (“UTC Comments”), at 5. *See also* DSA Comments at 10 (“[I]t is new investment by non-traditional wireless users that is at risk of being sidelined or stranded by changes to the current PAL framework, with large national carriers being the sole beneficiary of such changes,”); and Comments of ATN International, Inc. (“ATN Comments”), GN Docket No. 17-258 (filed Dec. 28, 2017), at 2.

<sup>81</sup> *See* DMCI Comments at 1 (“We have a road map for an additional \$3.5 million in capital expenditures over the next 4 year to deliver higher bandwidth to our growing customer base. Since the PEA announcement we have dramatically slowed our purchases and deployment schedule until this issue is settled,”); Cal.net Comments at 1 (“With the opening of the CBRS band (as defined under current FCC rules), we are embarking upon an aggressive growth path of an additional expected investment of over \$10 million in CBRS-enabled fixed LTE equipment in our rural service areas over the next 30 months,”); and Comments of Resound Networks, LLC, GN Docket No. 17-258 (filed Dec. 28, 2017) (“Resound 2018 investment of \$4 million dollars was modeled with the CBRS rules that were adopted in April 2015”).

<sup>82</sup> OTI/PK Comments at 9.

<sup>83</sup> *See* Reply Comments of CTIA, GN Docket No. 12-354, RM-11788 & RM-11789 (filed Aug. 8, 2017), at 5 (“The shorter license term likewise does not account for the challenges associated with standards development, equipment certification and production, and network deployment, all of which can take multiple years”).

**B. The Record Provides No Basis For The Commission To Extend Priority Access License Terms To As Long Ten Years**

In the *CBRS Order*, the Commission emphasized that “[f]inite-term licensing facilitates evolution of the band and an ever-changing mix of GAA and Priority Access bandwidth over time.”<sup>84</sup> A few commenters whose views regarding license terms were rejected at that time nonetheless continue to assert that substantially longer terms are necessary in order to promote investment in the band. These arguments are rooted in mobile wireless carrier policy preferences, and include little or no new factual underpinning to support their conclusions.<sup>85</sup>

The mobile carriers ignore the fact that short license durations, coupled with small license footprints, will mean that a much smaller initial expenditure is necessary to acquire individual licenses, significantly reducing upfront spectrum costs and encouraging innovation and rapid deployment. Lengthening PAL license terms will make PALs more expensive, potentially driving many smaller bidders away and decreasing competitive bidding for the spectrum. As Google observes, “[e]xtending license terms would significantly increase the cost of licenses and require prospective licensees to acquire spectrum for a longer period than they need, thereby causing potential licensees not to participate in PAL auctions.”<sup>86</sup> At the same time, as noted above, a substantially longer license term allows large portions of a licensee’s geographic area to remain unserved, wasting the spectrum resource and foreclosing users who otherwise could have offered service, and who cannot reasonably rely solely on the opportunity to use GAA spectrum. Enabling spectrum non-use in areas where additional spectrum is needed for coverage would be

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<sup>84</sup> *CBRS Order*, 30 FCC Rcd at 3962 (¶ 5).

<sup>85</sup> See DSA Comments at 9 (“Supporters of longer terms have “not provided any evidence on the record to justify changes to the current three-year PAL term with no renewal expectancy. Rather, they have simply restated their previously rejected positions”).

<sup>86</sup> Google Comments at 14. See also Microsoft Comments at 3 (“A ten-year license term is far too long. It will impair broad investment in the 3.5 GHz Band, particularly in less densely populated areas, by unduly raising the price for licenses at auction”).

a missed opportunity for rural Americans that lack access to broadband and thereby contravene Administration and Congressional objectives.

WISPA has indicated a willingness to consider a slight modification in the length of the PAL license term, perhaps to as long as five years with the ability to renew for one additional five-year term, but has also cautioned that any change in the existing license term must not be coupled with any change in the size of the PAL geographic auction area. Any further changes would position PALs far beyond the financial reach of innovators and operators that desire to use the band in harmony with each other and, if they are so inclined, the proponents of 5G services.

**C. The Record Demonstrates that Establishing An Unrestricted Renewal Expectancy For Priority Access Licenses Would Undermine The Substantial Benefits Of The Commission's Innovative Licensing Approach**

As the Commission has made clear, “[n]on-renewable, short-term licenses are an essential component of [the CBRs] framework [and] allow operators to obtain PALs when and where Priority Access to the band is needed while permitting periodic, market-based reassignment of these rights in response to changes in local conditions and operator needs.”<sup>87</sup> The approach appropriately treats the radiofrequency spectrum as a public resource rather than as a mere asset to be acquired and monetized by private actors.

As Amplex aptly states, extending the license term and allowing for perpetual renewal of PALs would result in a “one-time high stakes auction” and transforms the CBRs band into a “financial investment rather than a form of infrastructure serving the public interest.”<sup>88</sup> WISPs have expressed concern that longer license terms and renewal expectancy would effectively

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<sup>87</sup> *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration and Memorandum Opinion and Order, 31 FCC Rcd 5011, 5022 (¶ 44) (2016)).

<sup>88</sup> See Amplex Comments, at 2-3; and Comments of Bernhardt Communications Company, GN Docket No.17-258 (filed Dec. 26, 2017) (“Bernhardt Comments”), at 2 (“The model does not work if PALs are simply considered assets and not maximized”).

block all small providers from bidding on CBRS band spectrum.<sup>89</sup> As DSA explains, “[h]aving frequent auctions, on the other hand, lowers barriers to entry, promotes deployment of new technology and innovation, and ensures that the users who value the spectrum the most are able to obtain PALs and use them.”<sup>90</sup>

Shorter license terms with periodic re-licensing by auction creates a “pay-as-you-go” model that makes spectrum resources more accessible to smaller entities that can, in effect, finance their PAL acquisitions over time. In addition, business models change, so that a PAL holder may ultimately decide that it does not wish to continue to hold PALs; in such an instance, lower upfront costs for spectrum will mean that the licensee will not have overspent by purchasing perpetual licenses at significant upfront cost that may not be recoverable.

There is some support voiced by commenters for establishing performance requirements as a means of promoting timely buildout in the event that longer term, renewable licenses are adopted.<sup>91</sup> Comcast, for example, maintains that “any expectation for renewal must be accompanied by meaningful performance requirements that will motivate licensees to either use their spectrum, return it to the Commission, or make it available to others through secondary market transactions.”<sup>92</sup> Of course, even this weak sauce has too sharp a bite for some in the mobile wireless industry.<sup>93</sup> The problem is that there are almost no recommendations for build-out requirements that might facilitate this goal, let alone even a glimmer of consensus. In a band that is intended to accommodate a variety of novel deployments, there is no single standard that

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<sup>89</sup> See Comments of Q-Wireless, LLC, GN Docket No. 17-258 (filed Dec. 27, 2017); Comments of Verso Networks, GN Docket No. 17-258 (filed Dec. 27, 2017); and Bernhardt Comments at 3.

<sup>90</sup> DSA Comments at 12.

<sup>91</sup> See, e.g., City of New York Comments at 3-4.

<sup>92</sup> Comcast Comments at 20. See also Charter Comments at 5.

<sup>93</sup> See AT&T Comments at 14 (“AT&T urges the Commission to refrain from adding another layer of uncertainty by adopting any new, rigorous performance requirements, potentially inhibiting participation in the auction and reducing investment in the band,”); Verizon Comments at 6-8; and Ericsson Comments at 5-6.

can capture what constitutes efficient and beneficial spectrum use. Population coverage requirements such as the miniscule 40 percent floor suggested by T-Mobile<sup>94</sup> often can be satisfied with narrow deployments in urban areas, as discussed above, while both minimum population targets and geographic scope benchmarks<sup>95</sup> may be wholly unsuitable for applications seeking coverage of specific industrial sites, or underserved areas. Any implementation of arbitrary build-out requirements is inferior to the existing short-term “use-it-or-share-it” licensing model, as such particularized requirements can be manipulated by nominal deployments that block GAA uses, an outcome the existing rules are designed to avoid,<sup>96</sup> and which do not incentivize service to rural areas.

Economic incentives are a much better means of preventing spectrum underutilization than abstract performance requirements. As DSA comments, “the market-based approach of having shorter terms, more auctions, and wider access to the band is far more preferable than the type of regulatory oversight of build-out that would be required in moving to 10-year PALs.”<sup>97</sup> The most effective impetus for licensees to construct facilities and provide service is the imperative to make profitable use of the spectrum resource. The best measure of whether a licensee is providing meaningful service is its willingness to make an additional monetary outlay to retain spectrum access for a new license term. As Google notes, “[i]nitial licensees in fact would have an inherent advantage in subsequent PAL auctions; they generally would have lower

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<sup>94</sup> See, e.g., T-Mobile Comments at 6-8.

<sup>95</sup> See, e.g., Comments of California Internet, L.P. dba Geolinks, GN Docket No. 17-258 (filed Dec. 28, 2017) (“Geolinks Comments”), at 4.

<sup>96</sup> See, e.g., OTI/PK Comments at 20 (“Even if there were build-out requirements, if they are based on population, mobile carriers would satisfy them (a decade hence) by building out almost solely in high-density and/or high-ARPU areas where the economic returns justify putting the spectrum to work”).

<sup>97</sup> DSA Comments at 11.

costs for the successive license term due to their use of the spectrum in the initial term.”<sup>98</sup>

Further, “where a licensee does not prevail in a subsequent PAL auction, this would indicate that the licensee was not deriving the greatest possible revenue from that spectrum, meaning that an additional PAL term would only prolong a misallocation of scarce spectrum resources.”<sup>99</sup>

Accordingly, the best means for allowing the market to decide what use is the highest and best use of CBRS spectrum is requiring licensees to rebid for their spectrum access at set intervals, and not reliance on any “performance-based” renewal expectancy. Such an approach also provides a continuing financial return to the U.S. Treasury for the commercial exploitation of a very valuable public resource, and one which is much more likely over the long term to be commensurate with the spectrum’s intrinsic value. By contrast, grant of an effectively perpetual license ultimately provides a licensee with significantly more long-term economic return than can plausibly be recovered through a single winning auction bid, providing significant economic windfalls to licensees that end up controlling large swaths of spectrum. In effect, large-scope, perpetual licenses operate as a double-edge sword of inefficiency, promoting large up-front costs that limit the potential bidding pool for spectrum licenses, while affording deep-pocketed auction winners with outsized long-term economic benefits that are not in the public interest.

Requiring licensees to continue to invest in spectrum as resource procurement is a better approach to preventing spectrum warehousing and ensuring the availability of spectrum for new technologies and services than imposing subjective performance obligations. Citing Dr. Lehr’s report, Google observes that “[t]he inability to repurpose spectrum resources that were originally

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<sup>98</sup> Google Comments at 16. *See also* Microsoft Comments at 3 (“if the business case warrants it, existing PAL holders will be highly motivated bidders for the new PALs in that geographic licensing area”).

<sup>99</sup> Google Comments at 16-17.

allocated with long, effectively perpetual, licenses has been one of the major reasons that spectrum has been under-utilized and used inefficiently in so many bands for so long.”<sup>100</sup>

To the extent that parties express concern about the potential to lose licenses and at least some portion of the benefit of their initial investment, there are mechanisms that could be used to provide initial licensees interested in retaining spectrum with a modest preference in follow-on auctions. One possible technique suggested by Professor Milgrom is the creation of a significant bidding credit for incumbent licensees in future PAL auctions.<sup>101</sup> This would further improve existing licensees’ ability to compete in future PAL auctions without restricting the market so severely that would-be licensees cannot participate.

**D. The Record Strongly Indicates That Secondary Market Transactions Will Not Provide An Adequate Substitute For The Benefits Conferred By The Existing Rules**

In response to the *NPRM*’s proposal to permit partitioning and disaggregation of PALs licenses, a few commenters assert broadly both that such transactions should be permitted and that the development of a secondary market for spectrum rights could be an effective means for small entities to obtain spectrum for targeted, local deployments. CTIA, for example, asserts that “it is likely that PAL licensees will prefer to enter into such partitioning and disaggregation arrangements *where market interest exists* and to derive some benefit to their licensed spectrum.”<sup>102</sup> These comments, however, are largely limited to the obvious conclusion that secondary markets are a good thing in theory, quoting prior favorable Commission statements, without providing any demonstration that “market interest” actually does exist,<sup>103</sup> such that these mechanisms could feasibly put usable spectrum in the hands of small and rural service providers.

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<sup>100</sup> *Id.* at 17 (*citing* Lehr Analysis at 13).

<sup>101</sup> *See* Milgrom Paper at 6.

<sup>102</sup> CTIA Comments at 10 (emphasis added).

<sup>103</sup> *See, e.g.,* T-Mobile Comments at 12; U.S. Cellular Comments at 7-8; and Nokia Comments at 4-5.

In practice, however, the record shows that there is no functional secondary market for spectrum that allows the opportunity for spectrum to flow easily to smaller providers, and a substantial majority of commenters accordingly urge the Commission to reject this concept as a potential alternative to census tract licensing.<sup>104</sup> WISPA agrees.

The inescapable fact is that secondary market transactions are entirely voluntary, with no legal mandate for licensees of large geographic areas to lease, partition, or disaggregate their spectrum at all.<sup>105</sup> AT&T appears inadvertently to highlight this problem by referencing comments that Verizon filed at an earlier stage of this proceeding, in which it observed “that partitioning and disaggregation ‘would allow market participants to decide when and if smaller license areas are desirable.’”<sup>106</sup> Of course, it requires no explanation that the market participants with the power “to decide when and if smaller license areas are desirable” are primarily the major wireless carriers themselves, and the answers tend to be on the order of “perhaps,” “maybe later,” and “NO.” As WISPA showed in its initial Comments, its recent survey of its members revealed that fewer than ten percent of respondents indicated that they were able to obtain spectrum in the secondary market due to the unwillingness of the large wireless carriers to even engage in discussions regarding such transactions.<sup>107</sup> As GE notes, “[i]n many cases, large

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<sup>104</sup> See, e.g., Frontier/Windstream/Consolidated Comments at 8; DSA Comments at 19; Amplex Comments at 2; Comments of Vivint Wireless, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017) (“Vivint Wireless Comments”) at 5; Comments of Peoples Telephone Cooperative, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017), at 3; Comments of Colorado Valley Communications Inc., Nortex Communications Company and Pathway Com-Tel, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017), at 5; and Cantor Comments at 10.

<sup>105</sup> See, e.g., GE Comments at 23.

<sup>106</sup> AT&T Comments at 8, (*citing* Verizon Comments at 8-9.)

<sup>107</sup> Frontier/Windstream/Consolidated Comments at 8 (“in our experience, whether due to transaction costs, business priorities, spectrum warehousing, technical impediments, legal fees, potential liability, or excessive regulations, among other potential factors, wireless spectrum licensees do not have the incentive or interest to negotiate targeted leases to fixed providers”).



carriers choose to warehouse their frequencies rather than convey spectrum to parties that might use that resource to develop competitive offerings.”<sup>108</sup>

The multiple instances of small provider inability to get even a response from large carriers to expressions of interest in spectrum leasing erases entirely Verizon’s bare claim that “there is no evidence in the record to suggest that” large carriers will not engage in secondary market transactions.<sup>109</sup> Despite having the opportunity to provide its own evidence for the record of actual, successful secondary market transactions, Verizon can only manage the vague statement that it “engages in dozens of spectrum transactions every year, often with small and rural entities.”<sup>110</sup> Verizon fails to provide any details of these “dozens” of transactions, which begs the question how many of them involve Verizon *acquiring* spectrum from smaller providers or entering into “franchise”-type agreements, in which it leases spectrum to a party that operates a mobile network as part of the Verizon Wireless network, rather than making spectrum available to smaller, unaffiliated service providers. Other commenters affirmatively show that there is a much stronger record of large mobile wireless carriers engaging in spectrum transactions among themselves, and of spectrum changing hands from small providers to larger ones through acquisition, than there is of large spectrum holders facilitating the establishment or growth of new service providers through secondary market leasing transactions.<sup>111</sup>

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<sup>108</sup> GE Comments at 23.

<sup>109</sup> Verizon Comments at 15.

<sup>110</sup> *Id.* at 14.

<sup>111</sup> See Comments of Enterprise Wireless Alliance, GN Docket No. 17-258 (filed Dec. 28, 2017), at 4 (“Extensive experience with geographic licensing and its partitioning/disaggregation opportunities has demonstrated one thing: When needed to address their operating requirements, major commercial operators are able to assemble the requisite geography and spectrum through acquisition, while partitioning and/or disaggregation to meet the needs of smaller licensees, both private and commercial, has proven markedly less successful”). See also RWA Comments at 6; Comments of Sacred Wind Communications Inc., GN Docket No. 17-258 (filed Dec. 28, 2017), at 6; Vivint Wireless Comments at 5; and New Wave Comments at 1.

Even if the mobile carriers were more inclined in the first instance to discuss or negotiate such arrangements, as the Commission recognized in the *CBRS Order*, “[d]ivesting large, unwanted swaths through secondary market transactions could impose significant transaction costs.”<sup>112</sup> Indeed, Microsoft notes that there is “no surprise ... that partitioning and disaggregation have largely failed in the real world, because the transaction costs to acquire access to spectrum in small geographic areas in less densely populated areas are higher than the value of the spectrum to be leased or sold.”<sup>113</sup> Thus, even if the Commission were to simplify the administrative filings currently required to report transactions through a “light touch” leasing approach, as advocated by some,<sup>114</sup> such a standalone change would have little impact.

Whether or not the Commission decides to permit partial spectrum assignment, the record is clear that the mere potential for secondary market spectrum acquisition is no substitute for making smaller geographic area licenses available at auction in the first instance. As Dr. Lehr comments, “[i]n the absence of efficient secondary markets, the longer the license term, the lower the opportunity cost of spectrum to an incumbent licensee, and hence the lower the incentive for the licensee to use the spectrum efficiently. Increasing the prospect of renewability further exacerbates the problem.”<sup>115</sup> Accordingly, wide dissemination of licenses among a broad

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<sup>112</sup> *CBRS Order*, 30 FCC Rcd at 3993 (¶ 100).

<sup>113</sup> Microsoft Comments at 7.

<sup>114</sup> See, e.g., Verizon Comments at 15-16.

<sup>115</sup> Lehr Analysis at 14. The Verizon-commissioned academic paper submitted by Professor Daniel Vincent does nothing to put real world substance on the theoretical notion that secondary markets might promote opportunity for those that seek spectrum access to serve smaller geographic areas. See Daniel R. Vincent, *Secondary Markets, License Terms and Priority Access Licenses*, (Dec. 29, 2017) (“Vincent Paper”). The Vincent Paper is pure conjecture, loaded with qualifiers that reflect no actual, first-hand study of how secondary markets for spectrum have actually functioned, and wholly reliant on assumptions that such markets may be “well-functioning and liquid,” “efficient” and “lacking technical hurdles”, while at the same time acknowledging that the incentive to foreclose potential rivals by withholding spectrum from the market also “is a coherent theoretical possibility.” *Id.* at 2-4. The significant record evidence trumps this abstract analysis, demonstrating that withholding spectrum is more than theoretical and that the secondary market mechanism has thus failed in practice to provide spectrum to smaller service providers in underserved areas.

range of service providers in accordance with the Act can be most efficiently achieved through the primary assignment mechanism, and with short-term, non-renewable census tract licenses.

## **II. THE RECORD SUPPORTS ADOPTION OF ONLY A FEW DISCRETE CHANGES TO THE PAL AUCTION RULES AND PROCEDURES**

### **A. The Commission Should Repeal Its Rule Limiting The Number Of Licenses Auctioned To One Less Than The Number Of Applicants**

Aside from the significant contention regarding many of the PAL licensing issues in the *NPRM*, there is one proposal that has garnered virtually across-the-board support – the repeal of the current restriction in Section 96.29(c) limiting the number of PALs auctioned within a license area to one less than the number of applicants, the so-called “N-1” rule. Given the clear record support for this change,<sup>116</sup> the Commission should adopt it.

### **B. The Commission Should Relax The Emission Mask**

The emissions mask data Qualcomm has proposed supports allowing higher out-of-channel emission in order to maintain power levels for emissions on channels that are 20 MHz or greater and not at the edge of the CBRS band.<sup>117</sup> Those opposing these changes express concerns that arise under discrete circumstances that can be addressed by establishing location-based limits to protect incumbents and operators in adjacent bands. UTC’s concern with respect to existing Part 90, Subpart Z licenses will sunset once these licenses expire, mostly in 2020, and it seems unlikely that emissions from the early deployment of CBSDs will pose problems for these incumbents.<sup>118</sup> Such devices are only required to meet out-of-band requirements below 3650 MHz and above 3700 MHz, and do not have band channelization requirements, yet have coexisted in this band to date without issue. The concerns of satellite earth station users operating facilities at C-band arise only when a CBSD is transmitting in the general vicinity of a

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<sup>116</sup> See U.S. Cellular Comments at 13; NCTA Comments at 14-15; and WISPA Comments at 50-51.

<sup>117</sup> Comments of Qualcomm Incorporated, GN Docket No. 17-258 (Dec. 28, 2017), at 4.

<sup>118</sup> UTC Comments at 8-9.

Fixed-Satellite Service licensee on or adjacent to the earth station's operating frequency.<sup>119</sup> The better approach in these circumstances is to allow the SAS to apply lower power limits to devices that are close in both frequency and location to a protected incumbent, rather than limiting power levels applicable to all devices. The special case of protecting incumbents where they operate can be managed without burdening all CBSDs and end-user devices.

### **III. THE RECORD SUPPORTS RETAINING THE REMAINING CBRS RULES**

#### **A. The Commission Should Maintain Its Current PAL Spectrum Aggregation Limit**

In the 2015 *CBRS Order*, the Commission reasonably concluded that “a limit of 40 out of the maximum of 70 megahertz of PALs that may be available in each license area will facilitate competition, innovation, and the efficient use of the 3.5 GHz Band, ensuring that it is assigned in a manner that serves the public interest, convenience, and necessity.”<sup>120</sup> In the *NPRM*, the Commission inquired whether the current 40 megahertz spectrum aggregation limit should either be modified, or removed altogether.<sup>121</sup>

Relatively few commenters have addressed this issue, and only AT&T seeks abandonment of the aggregation limit in its entirety.<sup>122</sup> Indeed, no other entity advocates *any* upward shift in the PAL spectrum cap, with a significant number of commenters opposing any

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<sup>119</sup> See Comments of the National Association of Broadcasters, GN Docket No. 17-258 (Dec. 28, 2017), at 3-5; Comments of the Content Companies, GN Docket No. 17-258 (Dec. 28, 2017), at 6-9; and NCTA Comments at 18-19 (“If the Commission moves forward with changes to the CBSD emissions mask, it must tailor the rules appropriately (at a minimum at the upper band edge) to ensure that CBSDs do not cause harmful interference to adjacent C-band operations”).

<sup>120</sup> *CBRS Order*, 30 FCC Rcd at 3998 (¶ 117).

<sup>121</sup> *NPRM*, 32 FCC Rcd at 8081 (¶ 27).

<sup>122</sup> See AT&T Comments at 8.

increase,<sup>123</sup> and only a couple of commenters suggesting the possibility of a reduction in the spectrum cap to 30 megahertz.<sup>124</sup>

The record plainly contains insufficient justification to make any change in the current 40 megahertz spectrum aggregation limit (*i.e.*, a licensee being limited to a maximum of four out of seven PALs in a given license area). The rules adopted in 2015 struck the right balance between facilitating robust transmission capability and promoting competition, and no compelling arguments have been advanced to change the limit in either direction. AT&T's argument is rooted entirely in the higher bandwidth limits that are applicable to other frequency bands, which lack both the diversity of use possibilities present in the CBRS spectrum, including the GAA option for secondary use, and the limitations imposed by incumbent government spectrum users that will remain in the band. Its argument that 5G deployment requires permitting a single licensee to control more 3.5 GHz spectrum is directly contradicted by T-Mobile's contention that the uniqueness of the spectrum requires *lowering* the cap to permit more competition<sup>125</sup>; the preponderance of comments strongly favor the *status quo*. As Comcast notes, the current "aggregation limit assures a 'minimum degree of diversity' among 3.5 GHz users, consistent with Section 309(j), and will promote innovations that 'may lead to positive spillovers in the development of other spectrum bands in the future.'"<sup>126</sup> WISPA agrees.

Accordingly, the Commission should make no change to this rule.

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<sup>123</sup> See, e.g., WISPA Comments at 51; Comcast Comments at 15-16; Microsoft Comments at 7-8; Motorola Comments at 6; ATN Comments at 8-9; Geolinks Comments at 2; and Comments of Vantage Point Solutions, Inc., GN Docket No. 17-258 (filed Dec. 28, 2017) ("Vantage Point Comments"), at 4-7.

<sup>124</sup> See NRTC/NRECA Comments at 6-7; and T-Mobile Comments at 11-12.

<sup>125</sup> See T-Mobile Comments at 11-12.

<sup>126</sup> Comcast Comments at 15-16. See also Microsoft Comments at 7-8 ("the 40 MHz limit ensures that at least two licensees will be able to obtain enough spectrum to compete effectively with each other. The public interest would not be served by allowing one licensee to hold all 70 MHz of PAL spectrum, thereby relegating all other operators to less desirable, unlicensed GAA spectrum").

**B. The Commission Cannot Reasonably Allow Bidding On Specific Licenses.**

Only three parties favor permitting applicants for PAL authorizations to bid on specific spectrum channels for PALs.<sup>127</sup> In its argument favoring bidding on specific channel blocks, however, AT&T identifies an important reason to reject yet again this unworkable approach, which DSA correctly identifies as “neither feasible, desirable, or necessary.”<sup>128</sup> AT&T states that “because incumbent services continue to operate in the band, not all channels are created equal.”<sup>129</sup> It is precisely because of this unique characteristic of the CBRS band, however, that the Commission wisely has provided for dynamic channel assignment, which allows the SAS to switch a licensee’s channel in order to avoid harmful interference between PAL holders and incumbents. While the SAS nonetheless must assign multiple channels held by a PAL to contiguous channels “to the extent feasible,”<sup>130</sup> the ability to shift operations when necessary provides essential operational flexibility and protection for all band users. If applicants were permitted to compete at auction for specific channels, it would drive up the cost of particular spectrum blocks and substantially complicate a spectrum auction by eliminating the fungible nature of the licenses, inviting strategic and anti-competitive bidding, and defeating the essential purpose of dynamic assignment mechanism.<sup>131</sup> For this reason, commenters overwhelmingly opposed this proposed change,<sup>132</sup> and it therefore should be rejected.

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<sup>127</sup> See AT&T Comments at 11-12; Ericsson Comments at 7-8; and T-Mobile Comments at 15-17.

<sup>128</sup> DSA Comments at 7. See also Comments of Southern LINC, GN Docket No. 17-258 (filed Dec. 28, 2017) (“Southern LINC Comments”), at 18 (urging the Commission “to reject this proposal as unnecessary, impractical, and potentially anticompetitive”).

<sup>129</sup> AT&T Comments at 11.

<sup>130</sup> *CBRS Order*, 30 FCC Rcd at 3987 (¶ 84).

<sup>131</sup> See, e.g., OTI/PK Comments at 34-35; and Microsoft Comments at 9.

<sup>132</sup> See, e.g., Comcast Comments at 25-26; Microsoft Comments at 8-9; OTI/PK Comments at 34-35; UTC Comments at 7-8; DSA Comments at 7; NCTA Comments at 15-16; Southern LINC Comments at 18; Alaska Communications Comments at 10-11; and WISPA Comments at 51.

### **C. The Commission Should Retain Its Rules Regarding Public Disclosure Of CBSD Registration Information**

WISPA and other commenters opposed the Commission's proposal to eliminate Section 96.55(a)(3).<sup>133</sup> Google explained that "[f]ar more data is available to the public today through crowd-sourced databases and carriers' own websites than would be made available through the disclosures allowed under the current Part 96 rules"<sup>134</sup> and reiterated "the likelihood that base station location data will become publicly available through other means regardless of the confidentiality rules that apply to the SAS, further limiting the real-world benefit of additional restrictions."<sup>135</sup> Like WISPA, Google noted the benefits of transparency in the SAS regarding CBSD deployments for spectrum planning, stating that "GAA operators (and entities in the early stages of considering whether to pursue PAL acquisition) can use anonymized CBRS deployment data to determine which channels are available, in order to plan their networks. The data will support the selection of specific channels and transmitter sites as well as the threshold decision of whether to invest in CBRS equipment in the first place."<sup>136</sup>

Verizon, however, countered that "[i]f such data is, in fact, so easily ascertainable, then Google should be capable of compiling it itself, rather than disclosing data it receives from providers."<sup>137</sup> Verizon views registration information as competitively sensitive. CTIA likewise cites competitive concerns as well as alleging security reasons to oppose the current rules.<sup>138</sup> Ericsson also expressed concern with "indicating the licensee's strategies."<sup>139</sup> They do not, however, address other means by which a potential GAA User would plan a network without

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<sup>133</sup> See, e.g., OTI/PK Comments at 35-38; Google Comments at 22-23; DSA Comments at 22-25; Vantage Point Comments at 8-9; and WISPA Comments at 51-55.

<sup>134</sup> Google Comments at 23.

<sup>135</sup> *Id.*

<sup>136</sup> *Id.* at 22.

<sup>137</sup> Verizon Comments at 17.

<sup>138</sup> See CTIA Comments at 11-12.

<sup>139</sup> Ericsson Comments at 7.

information about existing deployments. Moreover, as WISPA has noted, many radio services have their full details published in ULS, and no real harm comes of it.<sup>140</sup> Such data has proven useful in planning deployments and mitigating interference.

CTIA claims that “SAS Administrators are separately required to work with each other to coordinate frequency assignments and avoid interference between CBSDs.”<sup>141</sup> However, this does not properly characterize GAA, where the burden of coexistence rests with the Users. As Part 96.35(e) states, “General Authorized Access Users operating Category B CBSDs must make every effort to cooperate in the selection and use of available frequencies provided by an SAS to minimize the potential for interference and make the most effective use of the authorized facilities. Such users shall coordinate with an SAS before seeking station authorization...”<sup>142</sup> In other words, the User first coordinates with an SAS but is then the party responsible for making use of that information, along with its own local information (actual observed signals, duty cycles, clutter, and other details not visible to an SAS), to minimize interference. The SAS knows the locations of the CBSDs, but does not know everything, and SAS administrators themselves, “working with each other” (not with Users themselves), cannot always optimize use of the band.

NRTC and NRECA expressed concern that “[p]ublicly releasing CBSD operational details likely will chill investment due to competitive concerns and could in certain instances result in security concerns to critical infrastructure.”<sup>143</sup> They suggest that an SAS could “publish aggregate heat maps, showing the total amount of occupied and available spectrum in a given

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<sup>140</sup> See WISPA Comments at 53.

<sup>141</sup> CTIA Comments at 12.

<sup>142</sup> 47 C.F.R. §96.35(e).

<sup>143</sup> NRTC/NRECA Comments at 8.



area.”<sup>144</sup> In WISPA’s view, a heat map is not adequate because it does not provide information needed for the aiming of directional antennas. WISPA’s members will be using CBSDs both as base stations and as fixed terminal devices. The base stations will usually be sectorized, and the terminals will have highly directional antennas. Heat maps are more appropriate for illustrating areas where general mobile coverage exists, not for coordinating paths when using directional antennas.

The Commission should retain Section 96.55(a)(3) without modification.

### **Conclusion**

The record in this proceeding reflects a clear choice. On one hand, the Commission can strand investment, limit innovation and decelerate efforts to bridge the urban-rural by making the fundamental changes to the PAL rules that favor only densification of spectrum for capacity needs in urban areas. On the other hand, the Commission can promote investment and deployment, continue to stimulate innovation and provide a mid-band spectrum tool to accelerate efforts to bring broadband services to the millions of rural Americans that lack access to broadband today – while at the same time permitting coexistence among all use cases, including 5G.

There is nothing in the record demonstrating that valuable CBRS spectrum should be delegated solely to the mobile carriers so they can have even more spectrum to deploy in non-rural areas. By contrast, commenters have demonstrated substantial reliance interests, investment and deployment in preparation for initiating commercial service – in just a few months – that will help meet demand for fixed broadband service in rural areas.

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<sup>144</sup> *Id.* at 9.

All stakeholders can be winners if the Commission makes the decision that the record firmly supports – retaining census tracts and short-term licenses with limited renewal.

Respectfully submitted,

**WIRELESS INTERNET SERVICE  
PROVIDERS ASSOCIATION**

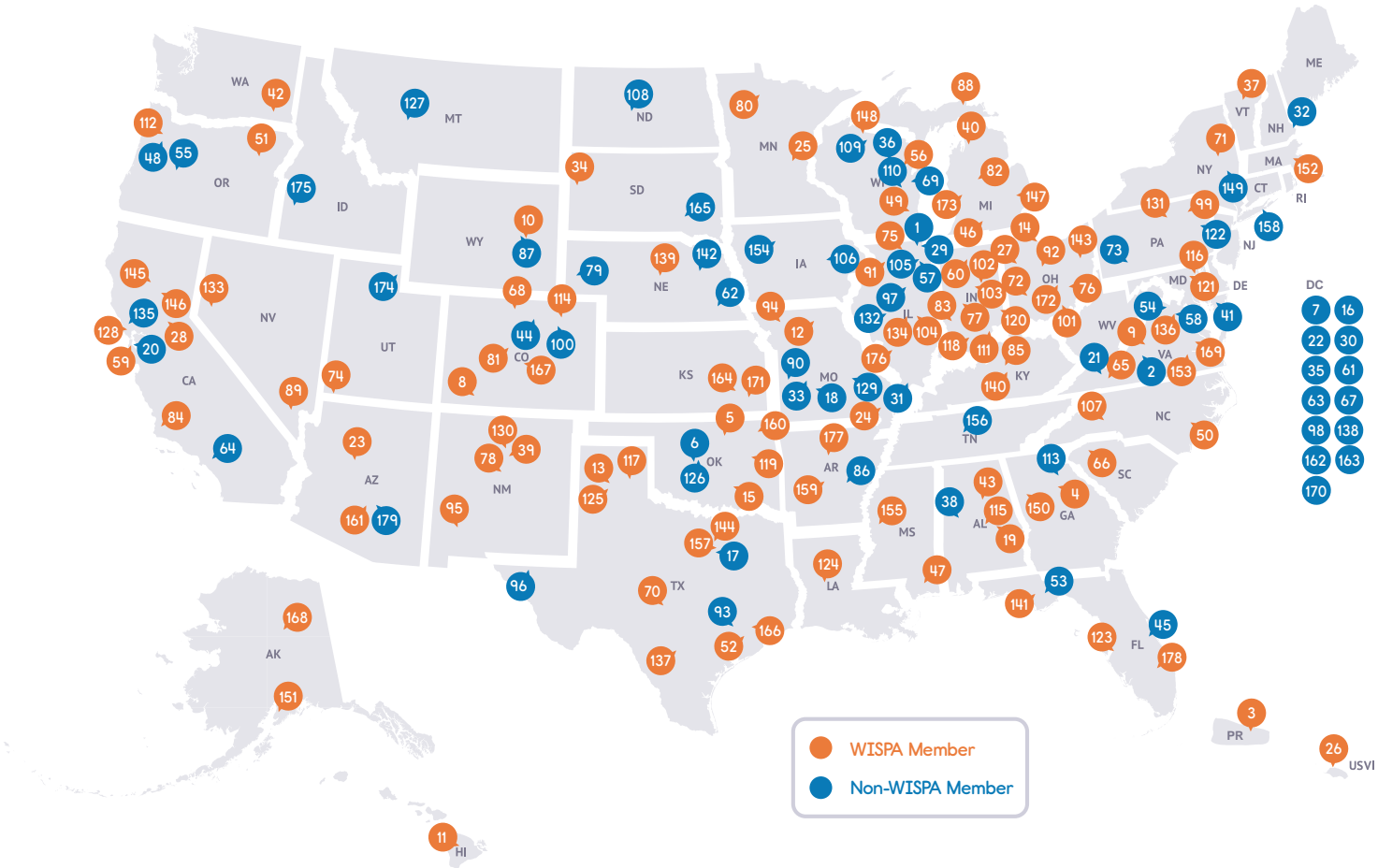
January 29, 2018

By:    /s/ *Chuck Hogg*, Chairman  
          /s/ *Mark Radabaugh*, FCC Committee Chair  
          /s/ *Fred Goldstein*, Technical Consultant

Stephen E. Coran  
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Washington, DC 20036  
(202) 429-8970  
*Counsel to the Wireless Internet Service Providers Association*

## **APPENDIX A**

# FCC CBRS FILINGS



\*See Reverse for Corresponding list of Wireless Internet Service Providers (WISPs)

## FCC Filings by Company



WISPA Member



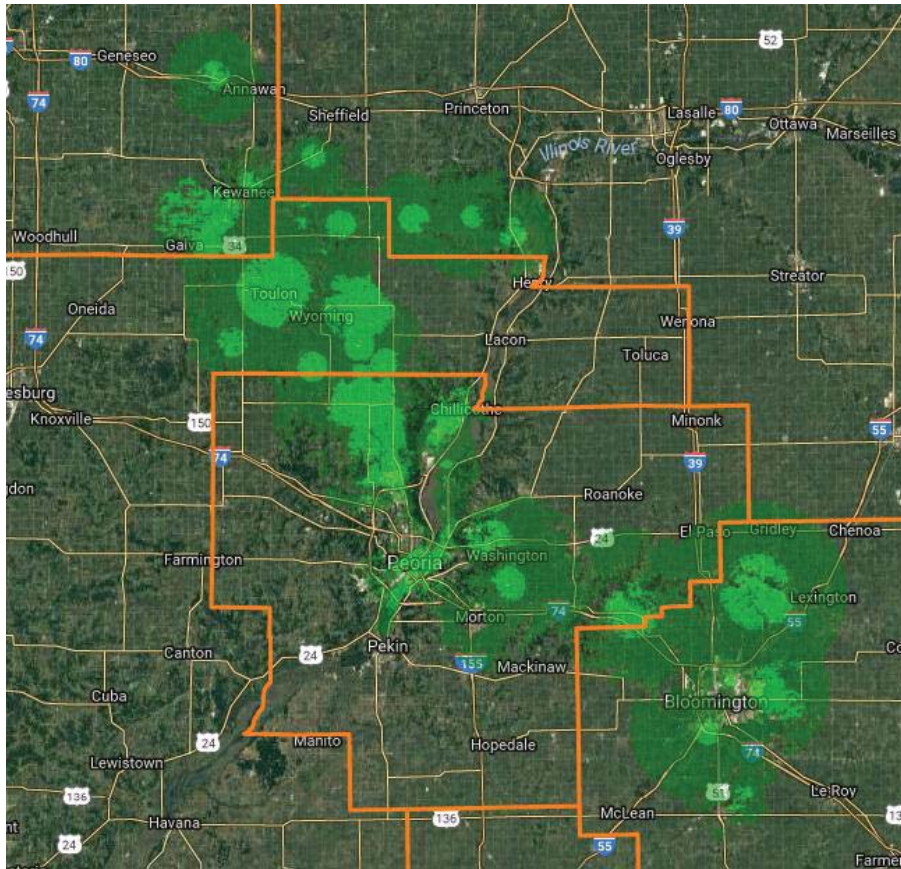
Non-WISPA Member

WifiForward

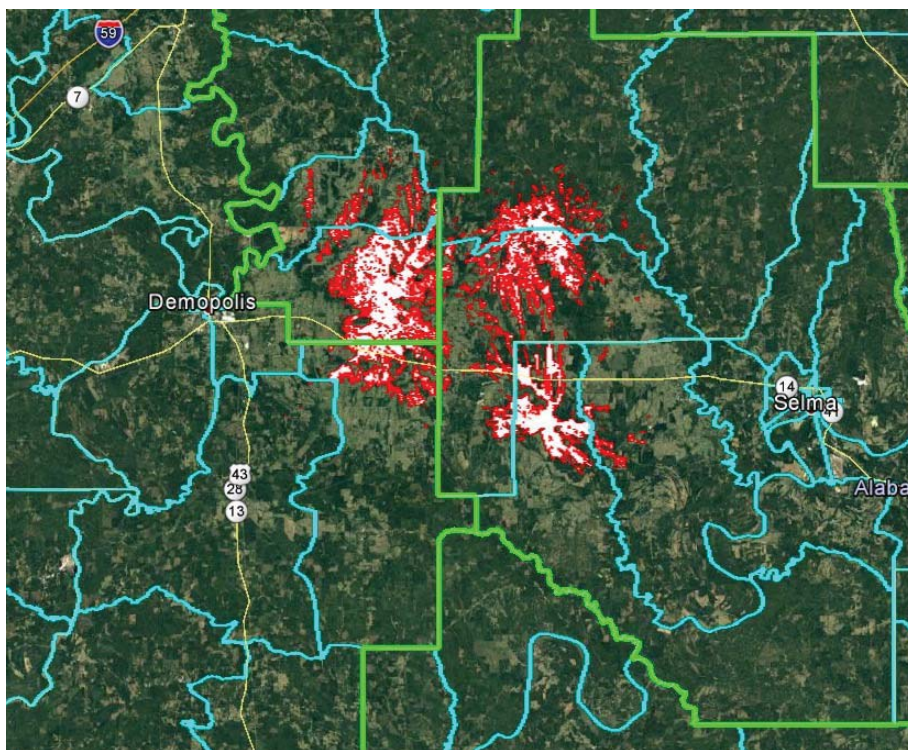
1 4SIWI, LLC	46 DMCI Broadband, LLC	88 Lighthouse.Net	133 Roller Network, LLC
2 AcelaNet, LLC	47 DSLbyAir, Inc.	89 LTD Broadband	134 Royell Communications, Inc.
3 Aeronet Wireless Broadband, LLC	48 Dynamic Spectrum Alliance	90 Matthew Thomas, Cameron Rose	135 Ruckus Wireless
4 AirFi, Inc.	49 E-Vergent.Com, LLC	91 Medianet Wireless	136 Rural Broadband Network Services dba HighSpeedLink.Net
5 AirLink Internet Services	50 Eastern Carolina Broadband	92 MetaLINK Technologies	137 Rural Texas Broadband
6 Airosurf Communications, Inc.	51 Eastern Oregon Net, Inc.	93 Michael Polk	138 Sacred Wind Communications, Inc.
7 Alaska Communications	52 EBTX Wireless, LLC, Stephen Gertson	94 Mid-States Services, LLC	139 Sandhills Wireless, LLC
8 AlignTec Incorporated	53 Emerald Harbor Communications	95 Mimbres Communications	140 Shelby Broadband
9 All Points Broadband	54 Enterprise Wireless Alliance	96 Mission Valley Communications, LLC	141 SJP Network Solutions, LLC
10 Alluretech	55 Eric Ozrelic, Webformix Company	97 MitoTec, LLC	142 Skywave Wireless, Inc.
11 Aloha Broadband, Inc.	56 Excel.Net, Inc.	98 Motorola Solutions, Inc.	143 Smart Way Communications, LLC
12 Alsat Wireless	57 Express Dial Internet, Inc. dba KWISP Internet	99 NCN Data, LLC	144 SmartBurst
13 Amarillo Wireless	58 Federated Wireless	100 NETEO High Speed Internet	145 SmarterBroadband, Inc.
14 Amplex Electric	59 Fire2Wire	101 New Era Broadband, LLC	146 Softcom Internet Communications, Inc.
15 Arbuckle Communications	60 Fourway Computer Products, Inc.	102 New Lisbon Broadband and Communications, Steven Barnes	147 Solvaris, Inc.
16 ATN International, Inc.	61 Frontier, Windstream, and Consolidated	103 New Lisbon Telephone Company, Inc.	148 SonicNet, Inc.
17 Baicells Technologies North America, Inc.	62 Future Wireless Technologies of Nebraska	104 New Wave Net Corp	149 Sony
18 Bays-ET Highspeed Internet Service	63 General Electric Company	105 NewarkNet	150 Southern Internet, Inc.
19 BDA Wireless, LLC	64 GeoLinks	106 Night Owl Wireless, LLC	151 SpitwSpots, Inc.
20 Bernhardt Communications Company	65 Gigabeam Networks, LLC	107 North Carolina Wireless, LLC	152 Starry, Inc.
21 Bland County, Virginia	66 GlobalVision	108 Northern Skies Wireless	153 StraightUpNet, LLC
22 Blooston Rural Carriers	67 Google, LLC	109 Northwest Communications	154 STT Rural Net
23 Bolt Internet	68 Grand County Internet Services, Inc.	110 Nsighttel Wireless, LLC	155 TecInfo Communications
24 BPS Networks	69 Hexas, LLC	111 On-Ramp Indiana, Inc.	156 Tennessee Wireless, LLC
25 Broadband Corp	70 HomeSmart Internet by Satellite Station Fire & Security	112 OnlineNW	157 Texoma Communications, LLC
26 Broadband VI	71 Hudson Valley Wireless	113 Paladin Wireless, LLC	158 The City of New York
27 Byhalia.Net, LLC	72 Imagine Networks	114 PEAK Internet	159 The Computer Works
28 Cal.Net, Inc.	73 In The Stix Broadband, LLC	115 Pearl Creek Broadband, LLC	160 The Junction Internet
29 Cambium Networks, Ltd., ENTELEC, UTC	74 InfoWest, Inc.	116 Peoples Telephone Cooperative, Inc.	161 Tropic Networks, LLC
30 Cantor Telecom Services, L.P.	75 Intelligent Computing Solutions	117 Plains Internet	162 Union Pacific
31 Cardinal Wireless,Tech Guy, Inc., Josh Ditto	76 Intellwave Broadband	118 Portative Technologies, LLC	163 Utilities Technology Council
32 Casa Systems	77 Internet Communications	119 ProValue.Net	164 Valnet
33 Casey Imgarten, Airlink Rural Broadband	78 Internet Services, LLC dba HigherSpeed Internet	120 Q-Wireless, LLC	165 Vantage Point Solutions, Inc.
34 Celerity Networks	79 Inventive Wireless of Nebraska, LLC dba Vistabeam	121 Quantum Internet and Phone	166 Veopoint Internet
35 Charter Communications	80 InvisiMax, Inc.	122 Rajant Corporation	167 Verso Networks
36 Cirrinity Wireless, LLC	81 JAB Wireless, Inc. dba Rise Broadband	123 Rapid Systems	168 Vertical Broadband, LLC
37 Cloud Alliance, LLC	82 Jeremy Sheets, CMS Internet, LLC	124 REACH4 Communications	169 Virginia Broadband, LLC
38 CnGWireless	83 Joink	125 Resound Networks	170 Vivint Wireless, Inc.
39 CNSP, Inc., dba NMSURF	84 Kcindur Communications, Inc. dba Advanced Wireless	126 RF Design Services	171 Wave Wireless, LLC
40 COLI, Inc., 186networks	85 Kentucky WIMAX	127 Rfwave, LLC, Tom Dunne	172 Wavelinc Communications, LLC
41 Colorado Valley Communications, Inc., Nortex Communications Company, Pathway Com-Tel, Inc.	86 L. Elizabeth Bowles	128 Ridge Wireless	173 West Michigan Wireless ISP
42 Columbia Energy	87 Larry Ash	129 Ridgetop Networks, LLC	174 Wi-Fiber, Inc.
43 Cyber Broadband, Inc.		130 Rio Cities Internet	175 Wilderness Wireless
44 Dan Lubar		131 River Valley Internet	176 Wireless Data Net, LLC
45 Daniel White		132 Rocket Communications Corp., Joshua Powell	177 Wireless Etc.
			178 Wonderlink Communications, LLC
			179 ZipLink Systems, LLC



## APPENDIX B



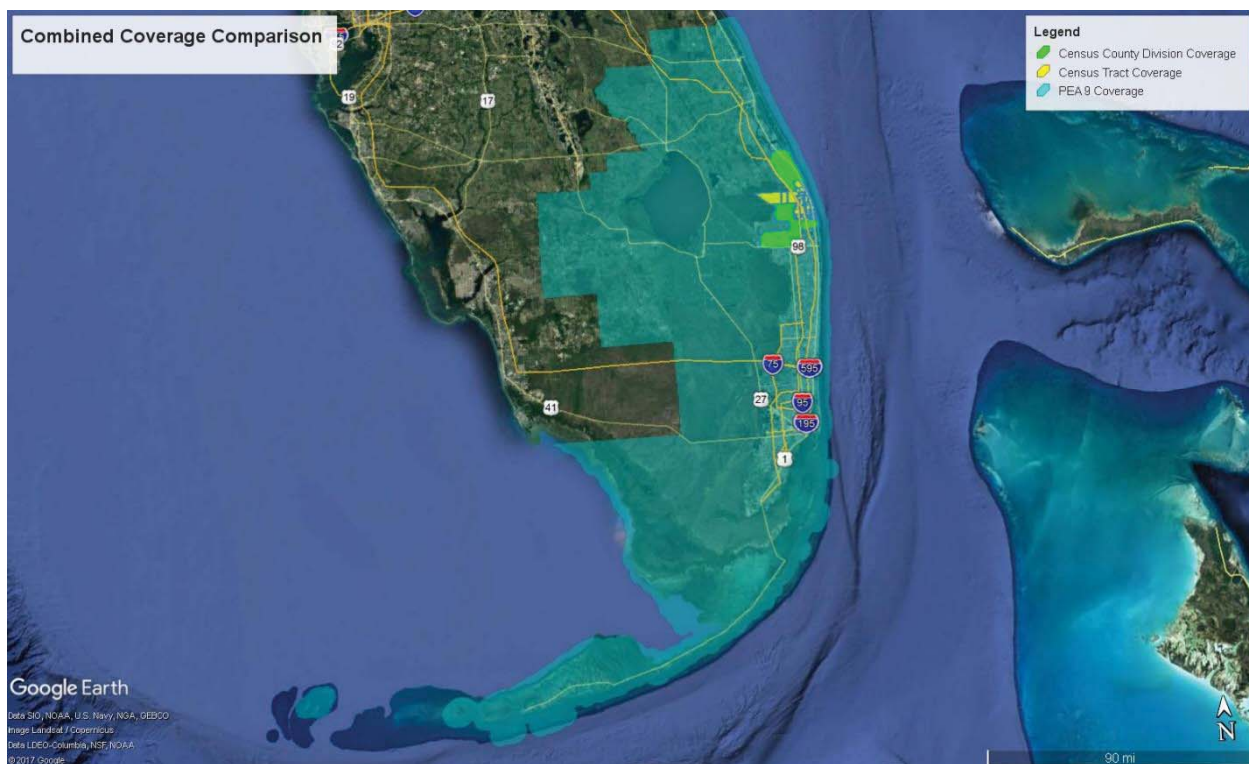
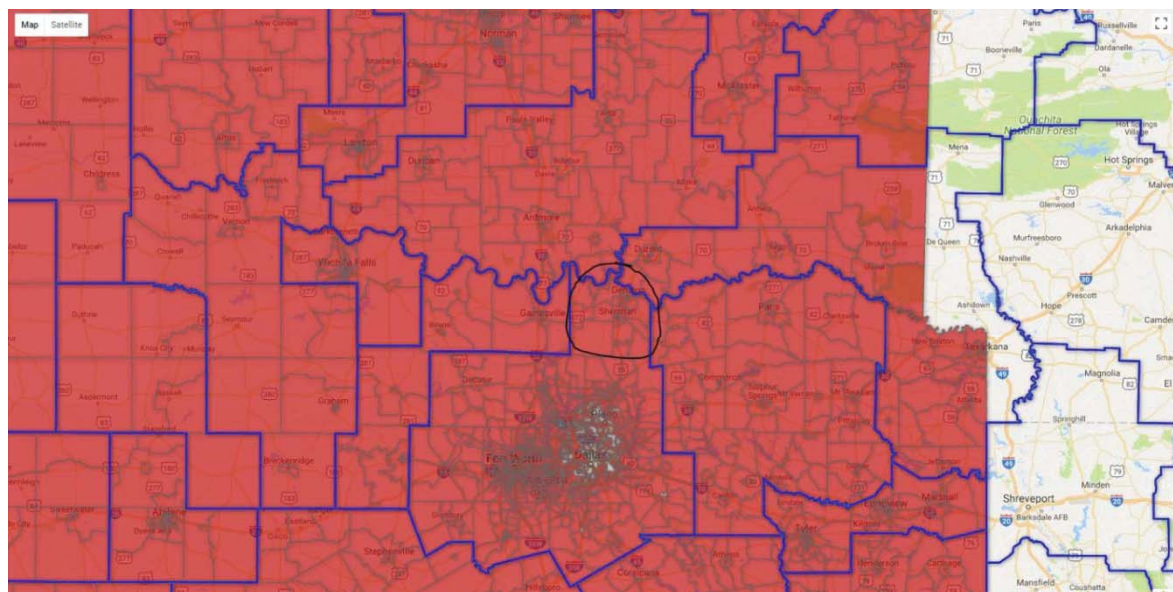
**MAP 1:** The map to the left illustrates the service area of New Wave Net Corp. in green and corresponding PEA boundaries in orange. As demonstrated, New Wave would be forced to purchase five PEA-sized PALs in order to cover its service area, which include “the 5 largest cities closest to our network,” as opposed to purchasing targeted census tract-sized PALs. New Wave Comments at 2-3.



**MAP 2:** The map to the left illustrates the service area of BDA Wireless, LLC in red and white, corresponding PEA boundaries in green, and census tract boundaries in blue. This map demonstrates that BDA Wireless would be forced to purchase three PEA-sized PALs to cover its service area, which results in a PAL that is “95% larger than the area” that BDA Wireless intends to use. BDA Wireless Comments at 2-4. In contrast, BDA Wireless would only need to purchase five census tract-sized PALs to cover its service area. BDA Wireless Comments at 2.



**MAP 3:** The first map below demonstrates the service area of Texoma Communications, LLC dba TekWav, with its service area within the black circle, PEA boundaries in blue, and census tract boundaries in grey. This map demonstrates that TekWav would be required to purchase four PEA-sized PALs in order to cover its service area, as opposed to purchasing only 29 census tract-sized PALs. The proposed rule changes to PEA-sized PALs would also require TekWav to purchase a license for Dallas and Fort Worth, which would be prohibitively expensive. *See* TekWav Comments at 2.



**MAP 4:** The map directly above illustrates Wonderlink Communications, LLC's service area in relation to census tracts in yellow, PEAs in blue, and counties in green. The map demonstrates the disparity between a single PEA-sized PAL for Wonderlink to cover its service area, which equals 9,560 square miles more than Wonderlink's service area. *See* Wonderlink Comments at 2. It also demonstrates that even county subdivision-sized PALs would force Wonderlink to purchase twice the area it would need if the rules were retained at the census tract level. *See id.*