

In the Matter of)
)
Spectrum Pipeline Act of 2015) GN Docket Nos. 14-177, 15-319, 17-183,
 and 17-258

To: Chief, Wireless Telecommunications Bureau
Chief, Office of Engineering and Technology

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Summary

In response to the Commission’s request for an analysis of the results of the rules changes relating to the 3550-3650 MHz band, the Wireless Internet Service Providers Association (“WISPA”) provides its comments showing that, to date, those results have failed to meet the expectations of WISPA’s members and rural Americans that continue to lack access to fixed broadband service.

When the Commission adopted rules for the Citizens Broadband Radio Service (“CBRS”) in 2015, WISPA and others reasonably believed that commercial deployments would be well underway by now. Not only has that not yet occurred, but potential rule changes could foreclose small providers – those best positioned to deploy service quickly to rural, unserved and underserved areas – from participating in auctions for Priority Access Licenses (“PALs”). WISPA members have already made substantial investments and deployed service using equipment purchase in reliance on the 2015 rules, and the threat that those rules may be substantially modified has already forced providers to curtail their investments.

WISPA and other stakeholders – indeed, all stakeholders except for the large mobile wireless carriers – have opposed efforts to enlarge the geographic size of PAL license areas from census tracts to areas as large as Partial Economic Areas and Cellular Market Areas. This would require rural broadband providers, industrial Internet of Things, and neutral host network operators to bid for areas much larger than the targeted areas they desire to serve – essentially, forcing them to bid for a shopping mall when they only want to operate a small kiosk. The Commission would, through the rule changes, be picking winners and losers, declaring “5G” to be the sole winner and every other use case to be a loser. By contrast, the rules adopted in 2015

would enable all use cases to be winners such that areas with “no G” would not be consigned to existing spectrum options ad infinitum.

WISPA hopes that the Commission will fairly consider the record in the ongoing proceeding instead of adopting the “command and control” spectrum model that has left rural Americans behind. Access to interference-protected mid-band spectrum that rural providers can access quickly is essential to accelerating efforts to bridge the digital divide.

Notwithstanding the obstacles that have hindered investment and deployment, industry and the Federal government continue to make slow and steady progress towards commercial launch of General Authorized Access (“GAA”) in the CBRS band. The Wireless Innovation Forum has achieved many of the objectives required for commercial launch, and the Commission has recently solicited applications for Initial Commercial Deployments to test the Spectrum Access system. Commercial GAA deployment appears to be imminent.

In sum, WISPA is displeased that the rules adopted in 2015 could be severely undermined by rules proposed in 2018 that could strand investments, foreclose small companies from acquiring PAL spectrum and decelerate deployment of broadband to those Americans who lack choice.

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The Wireless Internet Service Providers Association (“WISPA”), pursuant to Sections 1.415 and 1.419 of the Commission’s Rules, hereby responds to the *Public Notice*¹ seeking comment to inform the Commission’s report to Congress required by the Spectrum Pipeline Act of 2015.²

¹ See *Public Notice*, “Wireless Telecommunications Bureau and Office of Engineering and Technology Seek Comment Pursuant to the Spectrum Pipeline Act of 2015,” DA 18-841 (rel. Aug. 10, 2018) (“*Public Notice*”).

² See Spectrum Pipeline Act of 2015, Pub. L. No. 114-74, § 1008, 129 Stat. 621, 625 (2015), as amended by the Ray Baum’s Act of 2018, Pub. L. 115-141, § 614, 132 Stat. 1080, 1109 (2018). The Commission’s report, to be submitted no later than November 2, 2018, must contain: (1) an analysis of the results of the rules changes relating to the frequencies between 3550 megahertz and 3650 megahertz; and (2) an analysis of proposals to promote and identify additional spectrum bands that can be shared between incumbent uses and new licensed, and unlicensed services under such rules and identification of at least 1 gigahertz between 6 GHz and 57 GHz for such use. WISPA’s initial Comments address only those aspects of the Commission’s report concerning the 3550-3650 MHz band. WISPA may, in Reply Comments, discuss the bands between 6 GHz and 57 GHz.

³ See *Promoting Investment in the 3550-3700 MHz Band*, Notice of Proposed Rulemaking and Order Terminating Petitions, 32 FCC Rcd 8071 (2017) (“2017 NPRM”).

harmful effects its ongoing rulemaking proceeding is having on small broadband providers and on rural and unserved or underserved consumers that continue to wait for the benefits that mid-band spectrum can bring to their homes, farms, and businesses. The results can improve, however, if the Commission preserves “right-sized” licenses that remain available for rural broadband providers to acquire through competitive bidding.

Background

WISPA actively participated in the proceedings leading to adoption of the *CBRS Order*⁴ and the *2017 NPRM*.⁵ Even before the initial docket opened in 2012 and before the President’s Council of Advisors on Science and Technology issued its influential spectrum-sharing report,⁶ WISPA urged the Commission to propose rules for the 3550-3650 MHz band that would permit sharing among federal and commercial fixed wireless users.⁷ WISPA’s advocacy focused on

⁴ See *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, 30 FCC Rcd 3959 (2015) (“*CBRS Order*”); *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, 31 FCC Rcd 5011 (2016) (“*CBRS Recon Order*”).

⁵ See Comments of WISPA, GN Docket No. 12-354 (filed July 24, 2017) (“WISPA 2017 Comments”); Reply Comments of WISPA, GN Docket No. 12-354 (filed Aug. 8, 2017); Letter from Stephen E. Coran, Counsel to WISPA, to Marlene H. Dortch, GN Docket Nos. 17-258 and 17-183 (filed Oct. 19, 2017) (summarizing ex parte presentation with Commissioner O’Rielly); Letter from Stephen E. Coran, Counsel to WISPA, to Marlene H. Dortch, GN Docket No. 17-258 (filed Oct. 17, 2017) (summarizing ex parte presentation with Commissioner Clyburn’s legal advisor); Letter from Stephen E. Coran, Counsel to WISPA, to Marlene H. Dortch, GN Docket No. 17-258 (filed Dec. 6, 2017) (summarizing ex parte presentation with Chairman Pai).

⁶ See President’s Council of Advisors on Science and Technology, Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth (rel. July 20, 2012), available at http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf.

⁷ See WISPA Comments, ET Docket No. 10-123 (filed Apr. 22, 2011). Notably, CTIA recommended that the Commission focus on spectrum *below* 3 GHz because spectrum above 3 GHz was not then deemed to be useful for mobile broadband. See Comments of CTIA – The Wireless Association, ET Docket No. 10-123 (filed Apr. 22, 2011), at 13. *No party advocated for a mobile allocation in the 3550-3650 MHz band at that time.* See Comments of AT&T, ET Docket No. 10-123 (filed Apr. 22, 2011), at 7 (because “this band would also likely be allocated over a non-nationwide footprint . . . whether providers of mobile broadband services would be able to effectively offer mobile services in these bands is subject to question. . . . Still, we believe that given the substantial areas covered by exclusion zones, the most likely deployments would be fixed, rather than mobile”); Comments of T-Mobile, ET Docket No. 10-123

three critical objectives to ensure that the 3550-3700 MHz band could be used to provide fixed wireless broadband services: (1) ensuring that 3650-3700 MHz licensees – many of which are WISPA members – can continue to deploy service to consumers, businesses and first responders, (2) providing a meaningful opportunity for WISPs to access CBRS spectrum on both a Priority Access License (“PAL”) and General Authorized Access (“GAA”) basis, and (3) grandfathering interference protection rights for existing 3650-3700 MHz band users and assuring that investment would not be stranded.⁸

The Commission achieved these objectives in the *CBRS Order*. First, at the urging of then-Commissioner Pai, the Commission permitted existing 3650-3700 MHz Service licensees to continue to register locations to deploy expanded service to the public. As then-Commissioner Pai stated, “the *Order* now ensures that existing wireless Internet service providers can continue to deploy broadband to rural consumers rather than freezing them out during the transition to a new 3.5 GHz regime.”⁹ As discussed *infra*, WISPs have invested significant private, at-risk capital deploying in reliance on this decision, and thousands more consumers now are receiving affordable (and unsubsidized) fixed broadband service in their homes and businesses. Second, the Commission adopted census tracts as the geographic unit for PALs, allocated spectrum for GAA on a “license by rule” basis and established three-year PAL terms with opportunistic GAA use when and where PALs are not active, thereby promoting efficient and timely spectrum

(filed Apr. 22, 2011), at 7 (“the spectral location of the 3550-3650 MHz, 4200-4220 MHz and 4380-4400 MHz bands make them less suitable for mobile broadband applications”).

⁸ See, e.g., WISPA Comments, GN Docket No. 12-354 (filed Feb. 20, 2013); WISPA Reply Comments, GN Docket No. 12-354 (filed Apr. 5, 2013); WISPA Comments, GN Docket No. 12-354 (filed Dec. 5, 2013); WISPA Reply Comments, GN Docket No. 12-354 (filed Dec. 20, 2013); WISPA Comments, GN Docket No. 12-354 (filed July 14, 2014); WISPA Reply Comments, GN Docket No. 12-354 (filed Aug. 15, 2014); WISPA Reply Comments, GN Docket No. 12-354 (filed Jan. 12, 2016). WISPA also has submitted approximately 20 ex parte letters and also joined 16 other parties in an ex parte letter submitted on June 1, 2017. See Letter from All Points Broadband *et al.* to The Honorable Ajit Pai *et al.*, GN Docket No. 12-354 (filed June 1, 2017).

⁹ *CBRS Order* at 4142, Statement of Commissioner Ajit Pai Approving in Part and Concurring in Part.

utilization. Third, the Commission established transition and grandfathering procedures that ensure protection of existing facilities that are “in use,” recognizing that consumers would be harmed if existing services were disrupted.¹⁰ Taken together, these policy decisions created a framework that reduces barriers to entry and enables participation by small, rural entities whose business models would not enable them to bid competitively if PALs cover geographic areas that are many times larger than the areas where they would deploy in CBRS spectrum, or if the term of the license (especially if there is an expectation of renewal) is excessively long.

In the three years since the Commission unanimously adopted the *CBRS Order*, stakeholders have worked hard to bring the promise of the CBRS band to commercial fruition. The 100-strong CBRS Alliance, of which WISPA is a member, is focusing on the development of LTE technologies and use cases.¹¹ The Wireless Innovation Forum (“WinnForum”), which includes WISPA as an active member, has made substantial progress in the development of policies and protocols for the Spectrum Access System (“SAS”) and the Environmental Sensing Capability (“ESC”) that will protect military incumbents. Recently, Commission staff initiated a process by which prospective SAS administrators could apply to the Commission for authority to conduct Initial Commercial Deployments as a precursor to final SAS certification.¹² In addition,

¹⁰ See *Public Notice*, “Wireless Telecommunications Bureau and Office of Engineering and Technology Announce Methodology for Determining the Protected Contours for Grandfathered 3650-3700 MHz Band Licensees, GN Docket No. 12-354, DA 16-946 (rel. Aug. 19, 2016); *Public Notice*, “Wireless Telecommunications Bureau Announces Filing Window and Procedures for 3650-3700 MHz Band Licensees to File Supplemental Information Necessary for Creating Grandfathered Wireless Protection Zones,” GN Docket No. 12-354, DA 17-340 (rel. Apr. 7, 2017).

¹¹ WISPA and the CBRS Alliance have entered into an agreement by which they will work together to accelerate the commercialization of the CBRS band. See Press Release, “WISPA and CBRS Alliance Enter Cooperation Agreement to Advance Commercialization of the CBRS ‘Innovation Band,’” available at <http://www.marketwired.com/press-release/wispa-cbrs-alliance-enter-cooperation-agreement-advance-commercialization-35-ghz-2240864.htm> (last visited Dec. 9, 2017).

¹² See *Public Notice*, “Wireless Telecommunications Bureau and Office of Engineering and Technology Establish Procedure and Deadline for Filing Spectrum Access System Initial Commercial Deployment Trials,” DA 18-783 (rel. July 27, 2018). The deadline for submitting proposals to participate in these field trials was September 10, 2018. Press reports indicate that Federated Wireless submitted an

the Commission has granted dozens of experimental licenses that will yield important technical and market information for a wide variety of use cases – rural broadband, neutral host networks, venues and Industrial Internet of Things (“IIoT”), to name but a few.

However, just as technical standards development, investment, and innovation were gaining momentum, CTIA and T-Mobile USA, Inc. filed petitions for rulemaking proposing fundamental changes to the PAL rules.¹³ Notwithstanding vigorous opposition from WISPA,¹⁴ dozens of WISPs¹⁵ and numerous other spectrum-based service providers, equipment manufacturers, and others interested in the development of the band – indeed, *everyone* except the largest mobile wireless carriers, their trade associations, and equipment suppliers – the Commission adopted the *2017 NPRM* over the dissent of Commissioner Rosenworcel¹⁶ and with the concurrence of then-Commissioner Clyburn.¹⁷ In their separate statements, members of the Commission sought to allay concerns about the proposals discussed in the *2017 NPRM*. In offering his perspective, Commissioner Carr aptly stated that “the 3.5 GHz band is about creating something different. . . . We need a new tool in the spectrum tool kit, and the 3.5 GHz band

application proposing initial deployments in 47 states and Washington DC. *See, e.g.*, “Federated Wireless Files with FCC to Start Deploying CBRS in October” (Sept. 10, 2018), *available at* <https://www.multichannel.com/news/federated-wireless-files-with-fcc-to-start-deploying-cbrs> ((last visited Sept. 11, 2018). The Commission’s ECFS database also reflects an application for Initial Commercial Deployment filed by Fairspectrum LLC.

¹³ *See* CTIA Petition for Rulemaking, GN Docket No. 12-354 (filed June 16, 2017) (“CTIA Petition”); T-Mobile Petition for Rulemaking, GN Docket No. 12-354 (filed June 19, 2017) (“T-Mobile Petition”) (collectively, “Petitions”).

¹⁴ *See* n.12, *supra*.

¹⁵ A list of these commenters and a map showing their base of operations is attached hereto as Appendix A. More recently, 182 fixed wireless broadband providers submitted a letter to the Commission urging the Commission to retain census tracts for PAL as “the only way that we can participate in the CBRS band auction.” Letter from Galen Manners, President, Wave Wireless, LLC, et al., to Marlene H. Dortch, FCC Secretary, GN Docket No. 17-258 (filed July 23, 2018). A copy is attached hereto as Appendix B.

¹⁶ *NPRM* at 8113, Statement of Commissioner Jessica Rosenworcel, Dissenting (“Rosenworcel Dissent”) (“this rulemaking seeks to gut what was most visionary about this framework”).

¹⁷ *Id.* at 8108, Concurring Statement of Commissioner Mignon L. Clyburn (“Clyburn Statement”) (“The overwhelming evidence demonstrates that these rules are working”).

presents us with that opportunity.”¹⁸ Commissioner O’Rielly pledged to “keep an open mind,”¹⁹ consistent with his “fervent[] belie[f] that this spectrum should be available for all purposes, and, yes, that includes 5G. What the Commission won’t do here is adopt artificial restrictions through license and auction structure to dissuade some uses while promoting others.”²⁰ Despite these assurances, the Commission is now considering proposals that would effectively undercut the Commission’s long-held vision of making the 3.5 GHz band “hospitable to a wide variety of users, deployment models, and business cases.”²¹

Discussion

I. THE RESULTS INTENDED BY THE 2015 *CBRS ORDER* HAVE BEEN UNDERMINED BY THE 2017 *NPRM*

A. The *CBRS Order* Created Substantial Reliance Interests And Stimulated Significant Investment And Deployment In Rural Areas

In the *CBRS Order*, the Commission made clear that its rules were intended to accommodate a number of different use cases, including rural broadband access:

This regulatory adaptability should make the 3.5 GHz Band hospitable to a wide variety of users, deployment models, and business cases, including some solutions to market needs not adequately served by our conventional licensed or unlicensed rules. Carriers can avail themselves of “success-based” license acquisition, deploying small cells on a GAA basis where they need additional capacity and paying for the surety of license protection only in targeted locations where they find a demonstrable need for more interference protection. Real estate owners can deploy neutral host systems in high-traffic venues, allowing for cost-effective network sharing among multiple wireless providers and their customers. Manufacturers, utilities, and other large industries can construct private wireless broadband networks to automate processes that require some measure of interference protection and yet are not appropriately outsourced to a commercial cellular network. *Smart grid, rural broadband, small cell backhaul, and other*

¹⁸ Carr Statement at 8112.

¹⁹ O’Rielly Statement at 8111.

²⁰ *Id.* at 8110-11.

²¹ *CBRS Order* at 3962.

*point-to-multipoint networks can potentially access three times more bandwidth than was available under our previous 3650-3700 MHz band rules.*²²

The WISP industry's interest in the band is manifest not just in WISPA's long-term advocacy, but in its members' deployments in the adjacent 3650-3700 MHz band and the numerous experimental operations underway in the 3550-3650 MHz band. Based on a recent review of the Commission's Universal Licensing System ("ULS"), since the Commission began accepting applications for nationwide non-exclusive 3650-3700 MHz Service licenses in November 2007, the Commission has granted more than 2,600 regular licenses that remain in active status and has registered more than 69,300 locations. Provided with the opportunity created and, indeed, encouraged by the *CBRS Order* to continue to deploy fixed broadband service to consumers in the 3650-3700 MHz band, WISPs have done exactly that. Since April 18, 2015 – the day after the Commission froze the issuance of new licenses in the band – the Commission has registered more than 25,000 locations, none of which is even eligible for grandfathered interference protection.²³ Licensees include rural WISPs,²⁴ enterprise broadband providers,²⁵ energy companies,²⁶ municipalities and government agencies,²⁷ telecommunications cooperatives,²⁸ private networks²⁹ and resorts.³⁰

²² *Id.* (emphasis added). See also William Lehr, *Analysis of Proposed Modifications to CBRS PAL Framework*, GN Docket No. 17-258 (filed Dec. 28, 2017) ("Lehr Analysis"), at 6 ("[t]his framework recognizes that, unlike in the past, today's wireless marketplace includes a far more diverse set of companies that require access to licensed and unlicensed spectrum to support a far larger number of business operations").

²³ See 47 C.F.R. § 90.1307(b) (prohibiting Commission from granting new licenses or license renewals after April 17, 2015, with limited exceptions).

²⁴ Examples include Sacred Wind Communications, Inc. (Call Sign WQII541) with 763 locations (many that are on or near Tribal lands), Kansas Broadband Internet, Inc. (Call Sign WQHV739) with 36 registered locations, Bug Tussel Wireless LLC (Call Sign WQIB703) with 54 locations, and Softcom Internet Communications, Inc. (Call Sign WQIG223) with 815 locations.

²⁵ For example, BOB, LLC dba Business Only Broadband (Call Sign WQIF263) has 54 registered locations at buildings in the Chicago and Milwaukee areas. KGT, LLC (Call Sign WQHV407) has 17 registered locations and serves businesses in the Phoenix area.

²⁶ Chevron USA Inc. (Call Sign WQHV404) was one of the first licensees in the band. It has registered 616 locations. San Diego Gas & Electric (Call Sign WQJD279) has 49 registered locations. American

This investment and deployment derives primarily from the availability of LTE-based equipment that can be deployed now in the 3650-3700 MHz band and software-upgraded to operate in the 3550-3650 MHz band once the Commission certifies equipment and SAS for the CBRS band. Indeed, the *CBRS Order* accelerated technology innovation and availability of LTE-based equipment for fixed broadband use, and companies such as Telrad Networks and Baicells Technologies have competed vigorously to capture market share with WISPs, utilities, and other industries. In reliance of the Commission's encouragement in the *CBRS Order*, existing licensees have acquired equipment, constructed facilities and served the public, with the expectation that they will have no additional hardware costs to expand into the 3550-3650 MHz band once it is commercially available.

In December of 2017, to inform its comments filed in response to the 2017 *NPRM*, WISPA surveyed its operator members to better quantify the extent of the industry's investments and deployments made in reliance on the rules adopted in the *CBRS Order*. Nearly two-thirds of the respondents to that survey – 63 percent – reported that they had purchased transmission equipment in reliance on the rules adopted in the *CBRS Order* and the same percentage indicated that they were using the adjacent 3650-3700 MHz band to provide broadband service to paying

Electric Power Service Corporation (WQKM631) has 313 registered locations. Xcel Energy Services, Inc. (WQUI767) has 203 registered locations. ConocoPhillips Communications Inc. (Call Sign WQJC317) has two registered locations. RigNet Satcom, Inc. (Call Sign WQIQ622) has 13 registered locations and provides services to oil rigs in the Gulf of Mexico.

²⁷ Examples include the City of Houston, Texas (Call Sign WQJC308) with 1707 registered locations and the Utah Department of Transportation (Call Sign WQKL878) with 12 registered locations.

²⁸ Examples include Farmers Telecommunications Cooperative, Inc. (Call Sign WQID246), a rural cooperative based in Rainsville, Alabama, with registered 15 locations, Red River Telephone Association (Call Sign WQII527), based in Abercrombie, North Dakota, with 28 locations and Gardonville Cooperative Telephone Association (Call Sign WQID890), based in Brandon, Minnesota, with 33 registered locations.

²⁹ For example, NASCAR (Call Sign WQJJ961) has 30 registered locations at race tracks around the country.

³⁰ Resort Broadband, Inc. (Call Sign WQHV745) has registered 67 locations in the Steamboat Springs, Colorado area. ResortNet, LLC (Call Sign WQJC428) has four registered locations at Keystone and Breckenridge, Colorado.

customers in reliance on those rules.³¹ Several respondents reported that they had made considerable capital investments to procure and deploy equipment in this band. One operator reported that it had spent two million dollars in equipment costs and a number of others reported capital expenditures of several hundred thousand dollars. For small WISPs (most WISPs have 10 employees or fewer) that serve mostly small, rural communities, these investments represent a significant percentage of their overall budgets.³²

The statistics derived from the survey do not tell the whole story. Highspeedlink.net, a WISP in rural Virginia, explained that “[t]his band has been part of our long term planning to continue to cost effectively serve our community as well as grow our business. Access to this spectrum both in the GAA form as well as PAL will allow us to not only grow our investments even more so but will allow us to move into a more secure spectrum space that will allow our company to offer more services.”³³ Kentucky-based WISP Fastnet Wireless reported that “[o]nce CBRS is complete we plan on making a huge overlay of our existing network to give even more speeds to existing customers and enhancing coverage to leave nobody unserved.”³⁴

³¹ See Appendix C at C-1.

³² Such investments are very important, as many small providers reduced overall investment given the uncertainties presented by Title II regulation.

³³ Letter from Alex Phillips, CEO, Rural Broadband Network Service LLC dba Highspeedlink.net, to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 21, 2017) at 1. See also Letter from Jay Domingue, Business Development, Gonthier, Inc. dba REACH4 Communications, to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 18, 2017) (“Reach4 Letter”) (“REACH4 Communications is eager to access additional spectrum in the CBRS band. Because there is more spectrum, we will be able to increase data capacity and offer even higher speeds to our customers. This means more investment in equipment and the ability to reach even more potential customers that still do not have broadband speeds”); Letter from James Bouse, Owner, Brazos WiFi, to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 24, 2017) (“All of our new tower sites are being outfitted with LTE systems with the expectation that the CBRS band will allow us to better service those folks which are hard to reach”); Letter from TecInfo Communications, LLC, GN Docket No. 12-354 (filed July 24, 2017), at 3 (“Additional investment has been made, testing equipment operating at 3.65-3700MHZ utilizing the CBRS band. TecInfo Communications, along with many industry peers are prepared to continue investing into network expansion, reaching many more unserved rural Americans”).

³⁴ Letter from Mike Calvin, Fastnet Wireless LLC, to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 24, 2017), at 1. See also Letter from Mike Boley, President and CEO, Wabash

Similar to other submissions in the record, Joink, LLC, stated that “many small operators, like Joink, have already invested in and deployed equipment capable of utilizing the CBRS band... Approximately half of Joink’s 2017 wireless investment has gone towards CBRS capable equipment and a larger portion is currently planned for Q4 2017 and all of 2018.”³⁵ Another WISP, BDA Wireless, LLC, a start-up provider in rural Alabama, explained that “[o]ur company has invested thousands in 3650-3700 equipment that is designed to work within all current requirements of CBRS.”³⁶ Rise Broadband, the country’s largest WISP, reported that it has “spent millions of dollars deploying base stations in the band” and “had every expectation that the rules adopted in 2015 would remain in place.”³⁷ Rise Broadband explained that some of its investment and deployment is supporting build-out of rural broadband experiments that are funded with millions of dollars of Commission support to deploy broadband service to unserved rural Americans.³⁸

Communications, Inc., to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 24, 2017) (“Wabash Letter”), at 2 (“As a small fixed wireless provider in rural Ohio we have invested heavily in equipment operating in the 3650-3700 GHz and are currently adding equipment upgrades to provide faster rural internet service”); Reach4 Letter (“In the last 3 years, REACH4 Communications has invested heavily in 3650-3700Mhz radio equipment to upgrade legacy 900Mhz, 2.4GHz, and 5GHz equipment... Because of the 3650-3700MHz band, we can now offer speeds up to 12 Mbps down and 4 Mbps up on our fixed wireless broadband service”).

³⁵ Letter from Brian Gray, Connectivity Manager, Joink, LLC, to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 24, 2017). *See also* Letter from Roland Houin, President, Fourway Computer Products, Inc., GN Docket No. 12-354 (filed July 20, 2017); Letter from Joseph Monroe, Owner, Plains Internet, LLC, GN Docket No. 12-354 (filed July 24, 2017); Letter from Michael Clemons, President, GigaBeam Networks, LLC, to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 24, 2017) (“Our current investment in this technology [in the 3650 band] will exceed \$450,000 in this year alone and we have plans to invest up to an additional \$500,000 over the next two years”); Letter from Robert Sullivan, CEO and President, Virginia Broadband, LLC, to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 24, 2017) (“Virginia Broadband has also invested heavily in the future of CBRS technology - changing the rules mid-course will have a detrimental impact on our business and our customers”).

³⁶ Comments of BDA Wireless, LLC, GN Docket No. 12-354 (filed July 24, 2017).

³⁷ Letter from Jeff Kohler, Co-Founder and Chief Development Officer, Rise Broadband, to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 24, 2017), at 1.

³⁸ *See id.* *See also* Comments of Google Inc. and Alphabet Access in Response to Petitions for Reconsideration, GN Docket No. 12-354, RM-11788 & RM-11789 (filed July 24, 2017), at 8; Comments

What is driving this rapidly increasing use of the 3650-3700 MHz band, as well as the level of investment already made in anticipation of licensed access to the 3550-3650 MHz band? First, consumer demand, particularly in otherwise unserved and underserved rural markets, is fueling deployment by fixed wireless broadband providers. In many locations, wireline technologies are simply not cost-efficient to deploy, leaving fixed wireless as the only affordable low-latency solution. Second, as described above, licensees are deploying LTE-based and other equipment that can be software updated to incorporate operations in the 3550-3650 MHz band in conjunction with the developing SAS and the ESC. This innovative equipment enables WISPs to increase spectrum capacity from small channels in 3650-3700 MHz to wider channels in 3550-3700 MHz on either a PAL or GAA basis *without purchasing or changing out transmission or end user equipment*. In comments it filed in July 2017, Baicells Technologies reported that “over 1,550 ‘CBRS ready’ LTE base stations have ALREADY been deployed by over 200 predominantly rural broadband operators serving thousands of citizens residing in underserved communities across the USA and we are barely out of the trials stage.”³⁹ These “CBRS-ready” access points can operate in the 3550-3650 MHz band with a firmware upgrade that avoids the need for new hardware and truck rolls.⁴⁰

Third, the superior propagation characteristics of the 3.5 GHz band – well-known to those providers that use the adjacent 3650-3700 MHz band – mean that less vertical infrastructure needs to be deployed to cover sparsely populated areas. Unlike small cells and other applications that require lower power or many access points for network densification and

of Open Technology Institute at New America and Public Knowledge, GN Docket No. 12-354 (filed July 24, 2017), at 13-14.

³⁹ Comments of Baicells Technologies, GN Docket No. 12-354 (filed July 20, 2017), at 1. Baicells is a member of the MuLTEfire Alliance.

⁴⁰ See Letter from Stephen E. Coran, Counsel to Rise Broadband and Baicells Technologies, to Marlene H. Dortch, GN Docket No. 12-354 (filed July 28, 2017), at 2.

capacity, rural broadband providers can deploy on mid-band spectrum to efficiently cover a community from a limited number of access points, reducing capital expenses and ongoing tower lease payments and utility charges. These cost savings are critically important for WISPs, the vast majority of which invest their own private, at-risk capital and do not rely on federal subsidies. Fourth, competition among equipment manufacturers is reducing equipment costs and promoting innovation, for the benefit of licensees and the consumers and applications they serve.

In addition, and as both Commissioners Clyburn⁴¹ and Rosenworcel⁴² observed, many entities have applied for and obtained Part 5 experimental licenses to conduct technical and market trials in the 3550-3650 MHz band. The examples listed and summarized in Appendix D hereto illustrate that “significant effort and investment has already occurred for the CBRS band by companies across the communications sector based on the current rules.”⁴³ As just one example demonstrating the innovation stemming from the 2015 rules, equipment manufacturer Telrad Networks and rural WISP Skywerx Industries used a trial in the 3.5 GHz band to successfully upgrade to a dual sector/dual carrier feature that doubled performance and attained speeds of up to 200 Mbps per sector.”⁴⁴

As is readily apparent, operators and equipment manufacturers have responded to the “regulatory adaptability” the Commission established in the 2015 *CBRS Order* as a linchpin of

⁴¹ See Clyburn Statement at 8108 (noting that “[a]t least a dozen firms have obtained experimental authorizations to trial equipment and technology in the band. They are developing private networks to support an open architecture operating system for the Industrial Internet as well as smart grid, rural broadband, small cell backhaul, and other point-to-multipoint networks”).

⁴² See Rosenworcel Dissent at 8114 (“More than 200 experimental authorizations have been granted”). See also O’Rielly Statement at 8111 (“Equipment is being developed, trials are being conducted, and work on the databases continue”).

⁴³ See Letter from Kalpak Gude, Dynamic Spectrum Alliance President, to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 17, 2017).

⁴⁴ Press Release, *Skywerx Industries First ISP to Launch Telrad Dual Carrier LTE Solution*, Dec. 6, 2017, available at <http://www.telrad.com/skywerx-industries-first-isp-launch-telrad-dual-carrier-lte-solution/> (last visited Dec. 10, 2017).

the CBRS band. Ongoing operations in the 3650-3700 MHz band can be easily transitioned for use across the entire 150 megahertz of spectrum for rural broadband deployment, consistent with the Commission’s encouragement for “Grandfathered Wireless Broadband Licensees to procure equipment with an eye toward complying with the Part 96 technical rules once the transition is completed.”⁴⁵ Significant innovation has occurred and significant investments have been made in reliance on the CBRS rules adopted in 2015 as broadband providers prepare to expand their networks and increase throughput by incorporating the 3550-3650 MHz band into their spectrum tool kits. Technology and market trials demonstrate significant investment and innovation for private networks, venues, neutral hosts and a large variety of other use cases.

While it may be true that, “[s]ometimes, too much experimentation can harm and ultimately delay successful deployment of new services”⁴⁶ the above discussion makes clear that reliance on the *CBRS Order* has resulted in ongoing experimentation, innovation, investment, deployment, and competition.

B. The 2017 NPRM Curtailed Investment And Threatens To Permanently Strand It

The record leading up to the Commission’s adoption of the 2017 *NPRM* reflected a disturbing trend – broadband providers are *already* reducing their deployment and investment based on the threat presented in the Petitions and now under consideration as potential rules that will, if adopted, make PALs effectively unavailable to small broadband providers. According to Amplex, a WISP in rural Northwest Ohio:

Amplex uses the 3.65 band to provide service to over 1600 customers which will be convert[ed] to CBRS equipment once the ecosystem is available. Amplex has every intention of bidding on PAL’s in our service area and greatly expanding our use of the CBRS band. *Yet over the last several months we have scaled back our investment due to uncertainty over the future of this band.* The current licenses in

⁴⁵ *CBRS Order* at 4079.

⁴⁶ *Id.* at 4144, Statement of Commissioner Michael O’Rielly Approving in Part and Concurring in Part.

3650 expire in less than 4 years, yet the FCC continues to change rules and delay the PAL auctions. Continued investment in a band that we may lose is extremely risky.⁴⁷

Another WISP, Broadband Corp. based in rural Minnesota, explained that “[b]ecause of the potential for the CBRS band to be modified from it [sic] current proposal we now have stopped any further investment in this band until we can be reasonably certain that the CBRS band will be a viable vehicle for our future growth.”⁴⁸ For these companies, it is already “after the fact” and the adverse impact is already being felt.⁴⁹

WISPA’s December 2017 survey puts these statements in a statistical context. *Sixty percent* of the survey respondents indicated that they had reduced investment and/or curtailed deployment in the 3650-3700 MHz band in response to the threat of changes to the PAL licensing rules. That translates to millions of dollars of sidelined investment and thousands of consumers without fixed broadband access because many WISPA members are deeply concerned that they cannot effectuate business plans without PAL spectrum.

The discussion above demonstrates that, in reliance on the 2015 rules that offer low barriers to license acquisition and “facilitate faster deployment of service and allow providers to

⁴⁷ See Letter from Mark Radabaugh, President, Amplex Electric, Inc., to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 24, 2017), at 1 (emphasis added).

⁴⁸ Letter from Anthony Will, Vice President, Broadband Corp, to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 24, 2017). See also Letter from Patrick Parks, President, SmartBurst LLC, to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 24, 2017), at 1 (“We have invested in and deployed equipment and currently provide services to users in this 3650-3700 MHz band and plan to continue to do so *unless the Commission adopts the proposal of the CTIA and T-Mobile due to the uncertainty it proposes*” [emphasis added]); Letter from Richard Bernhardt, Managing Director, Bernhardt Communications Company, to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 24, 2017), at 2 (“These proffered changes [by the Petitions] would devastate opportunities for WISPs and many others smaller and varied entities (than large providers) ability to enter, use and provide services under CBRS”); Letter from Craig Brown, Chief Executive Officer, Blueriver Networking Services, Inc., to Marlene H. Dortch, FCC Secretary, GN Docket No. 12-354 (filed July 24, 2017), at 2 (“To have this investment obsoleted in the short term by adopting the recommendations in the CTIA and T-Mobile petitions would be a devastating financial blow for a company such as ours”); Wabash Letter at 2 (“If adopted, the mobile industry’s proposals would undermine our existing investment in 3650-3700 GHz spectrum and inhibit further investment and deployment in the entire 150 Megahertz of spectrum”).

⁴⁹ O’Rielly Statement at 8111.

target smaller populations, meeting the same goals,”⁵⁰ many small entities have already made investments to deploy service in the 3650-3700 MHz band to unserved and underserved communities.⁵¹ Given that about 63 percent of survey respondents have already invested and deployed based on the 2015 rules and 60 percent of those reported they have *reduced* investment or curtailed deployment simply because of the *threat* of changes to the PAL rules, it is patently obvious that *actually* adopting and implementing the contemplated changes will accelerate the decline in investment and deployment. There can be little doubt that the portion of investment made in reliance on the 2015 rules would be stranded.

The consequences of auction foreclosure extend beyond the obvious problems of license concentration and sidelined business models that will not get off the ground. A number of WISPs were successful winners at the recently concluded Connect America Fund (“CAF”) Phase II reverse auction.⁵² If ultimately approved for funding, these winners will be allocated more than half of the \$1.488 billion in support to provide service to about 40 percent of the subsidized locations in the country. It is believed that many of these auction winners are considering using CBRS spectrum as non-line-of-sight spectrum to meet performance and build-out requirements. While GAA might be usable for some such deployments, PALs provide protection against interference that improves the quality of service for low-latency applications such as voice, the provision of which is a CAF requirement. There is thus an interrelationship between the ability of CAF recipients to deploy broadband service and the availability of PAL spectrum to help

⁵⁰ *CBRS Recon Order* at 5077.

⁵¹ See, e.g., WISPA 2017 Comments; RWA/NTCA Comments.

⁵² See *Public Notice*, “Connect America Fund Phase II Auction (Auction 903) Closes,” AU Docket No. 17-182 and WC Docket No. 10-90, DA 18-887 (rel. Aug. 28, 2018), at Attachment A. Those winning bidders that have deployed broadband over fixed networks include Air Link Rural Broadband, LLC; AMG Technology Investment Group LLC; Benton Ridge Telephone Company; Broadband Corp.; Cal.net, L.P.; California Internet, L.P.; Crystal Automation Systems, Inc.; Declaration Networks Group, Inc.; Inventive Wireless of Nebraska, LLC; Midcontinent Communications; Newmax, LLC dba Intermax Networks; Total Highspeed LLC; and Wisper ISP, Inc. Many of these are members of WISPA.

those recipients to deploy cost-effective service expeditiously and consistent with program requirements.

C. Failing To Preserve Census Tract PALs Will Result In A Missed Opportunity For Rural Americans

The most troubling aspect of the *2017 NPRM* – the one that would inflict the most harm on the intended “results” of the 2015 *CBRS Order* – is the possibility that the Commission may fundamentally alter the basic PAL licensing rules through such changes as: (1) increasing the geographic size of all seven PAL license areas from census tracts to much larger areas, (2) extending PAL license terms to a full ten years, indistinguishable from other Commission-issued wireless licenses, and (3) adopting a *de facto* renewal expectancy for PALs, effectively allowing these licenses to be held permanently by the initial licensee. All of these proposed mutations of the original rules do substantial harm to the innovative and adaptable licensing approach that the Commission crafted three years ago and heralded as “a comprehensive regulatory scheme to promote development of innovative technologies and services.”⁵³ As Dr. Lehr states, “[t]he rule changes under consideration . . . would effectively foreclose economically viable access to the spectrum for large classes of commercial users, denying consumers the benefits of increased competition and innovative new services, including expanded, cost-effective access to rural broadband services.”⁵⁴

1. To Prevent Harmful Results, The Commission Should Preserve Access To PALs On A Census Tract Basis

Notably, the Commission did not expressly propose in the *2017 NPRM* to enlarge PAL areas, but sought public comment “on the potential effects of this change on investment in and use of the 3.5 GHz Band [and] whether a larger license area would provide additional flexibility

⁵³ *CBRS Order* at 3963.

⁵⁴ Lehr Analysis at 3.

to facilitate the deployment of a wide variety of technologies, including 5G.”⁵⁵ More specifically, the Commission asked for comment on increasing the license size to encompass entire PEAs “and how this would affect investment in PALs – both investments currently underway and future PAL investment – and diversity of PAL uses and users.”⁵⁶

As a threshold matter, the current CBRS rules do not prevent mobile carriers, or any industry or use case, from bidding on PALs and acquiring the geographic areas they desire. But the opposite is *not* true – “the willingness-to-pay for protected PAL spectrum is better matched to the available spectrum resources, making it more likely that there will be an efficient allocation if there are multiple users contending for access.”⁵⁷ Based on the record developed in response to the Petitions and to the *2017 NPRM*, the discussion below concerning the value that providers place on PALs and the findings reported in the Lehr Analysis, it is crystal clear that expanding the size of PAL areas will generally preclude all use cases except those favored by mobile carriers from participating in PAL auctions. Contrary to statutory mandate, this outcome would limit flexibility in deploying a “wide variety of technologies,” strand investment by small broadband providers and equipment manufacturers made in reliance on the rules adopted in 2015, curtail future investment, and dramatically limit diversity of uses. These harms will not exist in a vacuum, but will have a profound adverse effect on rural broadband providers and their prospective customers, and the American economy as a whole.⁵⁸ In short, the promise of the CBRS band to help bridge the digital divide would become a bridge to nowhere.

⁵⁵ *NPRM* at 8080 (¶ 23).

⁵⁶ *Id.* (¶ 24).

⁵⁷ Lehr Analysis at 11.

⁵⁸ *See id.* at 3-4 (“Diminished access to the band by a large class of potential infrastructure investors could easily result in a \$20 billion per year or more reduction in consumer welfare associated with higher pricing for broadband services and, more importantly, resulting from decelerated access to spectrum for fixed wireless broadband deployment in rural areas and delayed or denied realization of the benefits of

In an effort to drive a consensus resolution that would help mitigate the harmful results of larger PAL license areas, the CBRS Coalition submitted a joint proposal to the Commission.⁵⁹ Composed of a large, diverse group of stakeholders from the rural broadband, cable, transportation, critical information, and other industries – indeed, *every industry except the large mobile wireless operators* – the CBRS Coalition stated that “all of these diverse parties are willing to accept some obstacles to their own CBRS opportunities in order to ensure that the largest possible group of stakeholders can derive value from the 3.5 GHz band, which the Commission has indicated is a key goal in this proceeding.”⁶⁰ The CBRS Coalition urged the Commission to preserve two census tract PALs in every area of the country, with the remaining five PALs auctioned in larger geographic areas. The CBRS Coalition explained that

The mix of large-area and small-area licensing under this compromise framework will accommodate the needs of all stakeholders in the 3.5 GHz band. The availability of either five county-based or MSA-based PALs throughout the United States will meet the business and operational requirements of commercial mobile wireless operators, cable companies, and other broadband providers serving rural areas that desire larger areas. At the same time, the availability of two census-tract licenses nationwide will satisfy the minimum spectrum requirements of a wide variety of industrial and critical-infrastructure entities, broadband operators serving rural areas, enterprise solution providers, commercial real estate interests, and other entities planning geographically targeted CBRS deployments.⁶¹

In WISPA’s view, the CBRS Coalition’s proposal represents the best opportunity for some of the results intended by the 2015 *CBRS Order* to be salvaged.

localized wireless networks for IoT-driven innovations that are potentially worth hundreds of billions of dollars to the U.S. economy”).

⁵⁹ See Letter from Marissa Mitrovich, Frontier Communications, et al., to Marlene H. Dortch, FCC Secretary, GN Docket No. 17-258 (filed May 29, 2018). A copy is attached hereto as Appendix E.

⁶⁰ *Id.* at 1.

⁶¹ *Id.* at 2.

2. Adopting License Areas Larger Than Census Tracts Will Foreclose Small Companies From Participating In PAL Auctions

Auctioning PALs for areas larger than census tracts will undoubtedly foreclose small companies from participating, leaving a few large companies to bid among themselves for increases to their rich portfolios of licensed spectrum. Small providers seeking to acquire PALs for small, targeted areas should not be forced to compete for PALs covering large areas such as Cellular Market Areas (“CMAs”) or PEAs. Dr. Lehr explains the problem:

Unfortunately, the contribution that BWA providers have made toward solving the rural broadband deficit and to adding to the competitive landscape for broadband services is put at risk by the proposed changes to the licensing framework. The proposed revisions to the PAL framework would essentially foreclose the ability of potentially all BWA providers from acquiring PAL spectrum. A typical BWA provider would find the coverage of a PEA more than an order of magnitude larger than the BWA’s addressable market.⁶²

Auctioning PALs on the basis of large geographic areas such as CMAs means that a bidder wishing to acquire the benefits of protected 3.5 GHz spectrum to serve a rural community or IIoT installation located in a single census tract would have to acquire an entire CMA at a substantially higher cost, even though the bidder desires only to serve one or a few census tracts where demand for its service exists. Undoubtedly, that bidder’s business model would not justify a bid that, in any event, is likely to be successful. The “order of magnitude” discrepancy cannot be overcome. The result is a foregone conclusion – PALs will be gifted to the few large carriers that can support a business model predicated on large-area PALs; and a wide variety of uses, including rural broadband networks, will be confined to sharing GAA channels made more congested by PAL auction foreclosure.

Licensees holding CMA or similarly large-sized areas are also likely to concentrate their deployments in urbanized areas within each area in order to increase spectrum *capacity*, not

⁶² Lehr Analysis at 19 (footnote omitted). BWA is an acronym for “broadband wireless access.”

spectrum *coverage*. Of the 74,002 total census tracts, 53,910 have a land area of 10 square miles or less. Collectively, these census tracts hold 71.1 percent of the population, yet occupy only 2.9 percent of the land area. These areas are conducive to small cell deployment to densify mobile networks in areas where the population is highly concentrated. By contrast, 97.1 percent of the land area is in census tracts having greater than 10 square miles, but only 28.9 percent of the population lives there.⁶³ These areas are mostly rural areas where there is the greatest need for fixed broadband coverage, which can be enabled via PAL spectrum. In addition, as Dr. Lehr explains, “the national cellular providers’ businesses and networks are not dependent on having contiguous geographic coverage in the CBRS or any other band. *Indeed, having such coverage would likely result in the spectrum being under-utilized in many less-densely populated areas where the national cellular operators do not confront capacity constraints.*”⁶⁴ Conducting PAL auctions on the basis of large geographic areas would effectively consign rural Americans to sharing a limited and declining supply of congested, unlicensed or “license by rule” spectrum, destroying any opportunity for PALs to be available to help meet the broadband access challenge that leaves millions of Americans unconnected.

In the 2017 *NPRM*, the Commission sought comment on alternatives to PEAs, including assigning PALs by counties.⁶⁵ WISPA appreciates efforts to find an alternative approach, but county-sized licenses, especially in coastal states, remain too large for localized deployments that are better suited – and in many cases *only* suited – for census tract deployment. On average, counties hold about 23 times the population of census tracts; many counties cover thousands of

⁶³ See Appendix F hereto. Table 1 shows that population is more concentrated in census tracts with smaller geographic areas. Table 2 in Appendix F demonstrates that, in PEAs with a population of greater than 1 million, a substantial portion of the population lives in census tracts that have a low population density.

⁶⁴ Lehr Analysis at 8 (emphasis added).

⁶⁵ See *NPRM* at 8081 (¶ 25).

square miles⁶⁶ and more than half the population of the United States lives in just 146 counties.⁶⁷

In many states counties vary greatly in size, and may even have non-contiguous areas. For these reasons, counties are not an acceptable substitute for census tract-based PALs.

The digital divide is fundamentally a last-mile problem. Unserved areas are often scattered throughout counties (and CMAs). If the Commission is committed to addressing the digital divide, it needs to allocate spectrum in small, discrete areas, so that operators can target their investment to areas that are unserved.

Implicit in a proposal to enlarge PAL areas is the notion that rural Americans should be satisfied with the current inventory of unlicensed and, in some cases, licensed spectrum, or that GAA use will be sufficient to meet the demands of rural Americans. These inferences are entirely false. WISPA's interest in this proceeding since 2012, when the mobile industry expressed little or no interest in the band at all, together with the investment made over the past three years in reliance on the spectrum access model the Commission adopted in 2015, more than illustrates demand for spectrum that enjoys interference protection. Moreover, those rules were specifically adopted to lower barriers to the acquisition of PALs to promote innovation, investment and actual commercial deployment to those that lack access to fixed broadband today. The experiments, investments and deployments made in the intervening years demonstrate that existing spectrum inventory is insufficient and unsustainable, and the decline in

⁶⁶ For instance, San Bernardino County, California has a total area of 20,160 square miles. *See San Bernardino County By the Numbers*, SAN BERNARDINO CNTY., available at <http://wp.sbcounty.gov/cao/countywire/wp-content/uploads/2014/02/County-by-the-Numbers-2-26-141.pdf> (last visited Aug. 2, 2017). All of the 100 largest U.S. counties in area have areas of at least 4,000 square miles. *See American FactFinder County Area Table U.S. Census 2010*, U.S. CENSUS BUREAU, available at <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk> (last visited Aug. 2, 2017).

⁶⁷ *See* Robbie Gonzalez, *Half of the U.S. lives in these 146 counties – is yours one of them?*, Sept. 5, 2013, available at <https://io9.gizmodo.com/half-of-the-u-s-lives-in-these-146-counties-is-yours-1258718775> (last visited Aug. 1, 2017).

investment from the threat of changes to the PAL rules shows that PALs are highly valued by WISPA's members. Continued exclusive reliance on an ever-dwindling supply of unlicensed spectrum is not an option for rural America.

Also implicit is the notion that small companies should not participate in the 5G economy. This, too, is a false premise. Small broadband companies are among the most innovative spectrum users – they've converted Part 15 “junk bands” into successful businesses. Rise Broadband has 160,000 fixed broadband customers in 16 states. WISPs are deploying fixed LTE-based services at a rapid rate, with more than 63 percent of WISPA's survey respondents reporting that they have already invested and deployed in reliance on the rules adopted in the *CBRS Order*. More are looking to use CBRS spectrum to support their successful CAF bids, which will enable hundreds of thousands of unserved rural Americans to gain access to fixed broadband. This trend of innovation by entrepreneurial small businesses will undoubtedly continue so long as barriers to spectrum acquisition are low. Assuming PAL spectrum can be acquired at all, excessive costs will force the Hobson's Choice of either significantly delayed return on investment or higher prices passed through to rural consumers that are statistically less likely to be able to afford it.

Contrary to the theory that the existing PAL rules may stand in the way of “U.S. leadership in the global race for 5G,”⁶⁸ the existing rules will accelerate 5G deployment by allowing a broader and more diverse range of entrepreneurs, innovators and providers.⁶⁹ Many of these will be small companies that are the engine of the U.S. economy and can respond quickly to the need for innovation and demand for service. As a Maravedis report on 5G fixed

⁶⁸ *NPRM* at 8072 (¶ 2).

⁶⁹ *See also* Lehr Analysis at 10 (“If not foreclosed, CBRS spectrum should be attractive to a diverse range of users with business models that would allow them to provision wireless services rather than having no other choice but to purchase from cellular carriers or rely on unprotected spectrum”).

wireless concluded, “[f]or broadband customers, the combination of quick access (no waiting for fiber installations) and reliable, gigabit speeds is an appealing incentive to switch from larger providers, who dominate the market while offering poor service. And for the millions of Americans who have no broadband access at all, 5G [fixed wireless access] is perhaps the best option for providing broadband coverage.”⁷⁰

In sum, the Commission made the correct policy choice in the *CBRS Order*, which acknowledged the need of some bidders to acquire PALs for small geographic areas to promote innovation, investment, and deployment. Unlike CMAs that are an “order of magnitude” larger and thus would effectively foreclose bidding by small entities, census tracts are available to all, and can be combined to create spectrum footprints of virtually any size. There is no reason for the Commission to reverse course, and many reasons to preserve access to PALs on a census tract basis. The above discussion clearly demonstrates that the threat of rule changes that will eliminate census-tract PALs has already affected investment and deployment, deferring the “results” of the 2015 *CBRS Order* and threatening to severely undermine its intended benefits for a large number of diverse stakeholders and the customers and consumers they desire to serve.

II. NOTWITHSTANDING THE INTERVENTION OF THE 2017 NPRM, DEVELOPMENT OF THE SAS AND ESC HAS CONTINUED

When Congress passed the Spectrum Pipeline Act in 2015, it was widely expected that CBRS would be commercially deployed within the following three-year period. However, the process to commercial launch of CBRS has taken longer than expected due to the need to develop complex spectrum management standards and operational procedures and to obtain a series of approvals from several agencies. Despite the massive work and expertise required from

⁷⁰ Maravedis, *5G Fixed Wireless Gigabit Services Today*, at 20, available at <https://go.siklu.com/hubfs/Content/White%20Papers/Maravedis%20Industry%20Overview:%205G%20Fixed%20Wireless%20Gigabit%20Services%20Today.pdf?t=1513866037416> (last visited Dec. 22, 2017).

a diverse group of stakeholders, commercial launch is close. While it is too early to analyze the results consistent with Spectrum Pipeline mandate, significant milestones have been met and WISPA is generally optimistic that commercial use of the CBRS band will commence shortly.

Development of Shared Spectrum through a Collaborative Effort. In perhaps the most complex joint effort in spectrum management history, CBRS has developed into a functional shared spectrum model as contemplated by the *CBRS Order* through direct collaboration of industry stakeholders with very different interests and business models. The Wireless Innovation Forum formed its Shared Spectrum Committee to create an independent set of standards and protocols to meet the purpose and direction of an integrated CBRS ecosystem.

Stakeholders consisting of manufacturers of radio and related technology equipment, network service providers and operators, and commercial coordination function providers have been working directly with each other through WinnForum and alongside the Commission, NTIA, and the Department of Defense. As can be expected when such a complex spectrum management system is being developed for the first time, the process has at times moved slowly. In particular, while WISPA understands the important role that NTIA and the Department of Defense must play in ensuring protection of incumbent operations, these agencies do not always respond to industry's desire for expeditious resolution of technical and protection issues.

WinnForum and the Development of Ten Baseline CBRS Standards. Over the last three years, WinnForum has developed ten baseline standards that address core requirements, protocols, test and certification for the SAS and ESC, and best operational practices for the entire CBRS ecosystem. This intense and unique process was completed in January of 2018 with consensus of over 60 stakeholders. Its purpose is to advance technology development for rapid deployment of the CBRS band with as many potential uses as viable and room for commercial

growth. WinnForum set the guidelines and unified path that can lead to rapid common principled deployment.

CBRS Alliance develops a commercialization regimen for LTE deployment of CBRS known as OnGo. CBRS Alliance, an industry-based organization of approximately 100 stakeholders, was formed to develop a commercialization platform for many uses with a focus on LTE-based technologies that could bolster and evangelize uses in the band, and efficiently work with stakeholders to deploy the band to commercial success. The CBRS Alliance has successfully launched OnGo, its LTE-based commercial standard. OnGo brings together multiple LTE technologies and works towards methods of certification for interoperability providing marketing, education and collective certification

Technologies Tested in Mash-Up by CBRS Alliance to Test Readiness for Commercial Deployment. To further demonstrate the viability and potential for success of the CBRS band, CBRS Alliance recently hosted the inaugural OnGo Interoperability test event. Over 50 test rounds showed the readiness for deployment of technologies for 16 leading SAS and equipment manufacturers.⁷¹

Developing Dynamic Protection Areas to Replace Huge Static Protection Zones. The 2015 *CBRS Order* requires protection of Federal incumbents in static protection zones. These protection zones covered wide areas of the coasts and some inland areas of the United States and encompassed overly large areas that were not necessarily needed for protection at any given time. To reduce this restrictive process, and through cooperation of the Commission, NTIA, and the CBRS stakeholder community including WinnForum, a series of Dynamic Protection Areas (“DPAs”) was developed which instead of covering fixed areas, target smaller regions and are

⁷¹ See “CBRS Alliance Demonstrates Strong Industry Cohesion and Progress Toward Commercial Deployment at Inaugural OnGo™ Interoperability Test Event” (Sept. 5, 2018), *available at* <https://www.cbbsalliance.org/news/interoperability-test-event/> (last visited Sept. 11, 2018).

monitored by a connected set of sensor receivers (ESC) that operate in conjunction with the SAS to identify when a region requires Federal incumbent protection. DPAs can be activated through the ESCs when needed to alert the SAS of the need to protect a frequency in an area. In addition, if needed to protect national security, DPAs may be activated even when a Federal incumbent is not physically present. The outcome of using the DPA process is that much more spectrum is preserved for commercial use without a negative effect on Federal incumbents.

Test and Certification of SASs and CBSDs. WinnForum has developed a full test suite for the CBRS ecosystem. As such, a test regimen was created for SAS operation and for CBSD equipment certification. The SAS side was delivered to ITS-NTIA (as the contractor for the Commission) in May 2018 to begin the validation and verification process to confirm to the Commission that WinnForum standards and the SAS applicants can conform to the direction of the CBRS rules. That process has been ongoing and will eventually provide the lab testing for SASs.

Although the SAS and ESC development process has taken longer than expected, WISPA is pleased that the Commission is moving forward with Initial Commercial Deployments to assess and test conditionally approved SAS databases prior to final certification. Assuming the trial deployments are successful, WISPA understands that GAA operations could be authorized in the coming months.⁷² WISPA anticipates that many of its members will quickly establish GAA operations by leveraging their existing 3650-3700 MHz equipment purchased in reliance on the *CBRS Order*. For some, GAA spectrum will be acceptable, but for many it will be insufficient to meet the near-term and long-term needs of rural consumers that lack broadband

⁷² Ruckus Wireless recently announced that it was the first manufacturer to obtain Commission certification for its CBRS equipment. See “Industry coalescing around CBRS deployments in Q4” (Sept. 10, 2018), available at <https://www.rcrwireless.com/20180910/network-infrastructure/cbrs-ruckus-fcc-certification> (last visited Sept. 11, 2018).

choice, a problem that can be addressed by ensuring that PALs remain available at the census tract level.

Conclusion

WISPA had hoped that it could be more optimistic about its analysis of the results of the 2015 *CBRS Order*, but intervening efforts to overturn the intended benefits has cast a pall on the expectations of the small fixed wireless broadband providers that desperately seek access to cost-effective, interference-protected mid-band spectrum. The Commission has the opportunity to choose a different path, one that is acceptable to both mobile wireless carriers seeking spectrum for 5G services and all other stakeholders that seek to deploy their diverse business models to serve the unserved and offer competitive services.

Respectfully submitted,

WIRELESS INTERNET SERVICE PROVIDERS ASSOCIATION

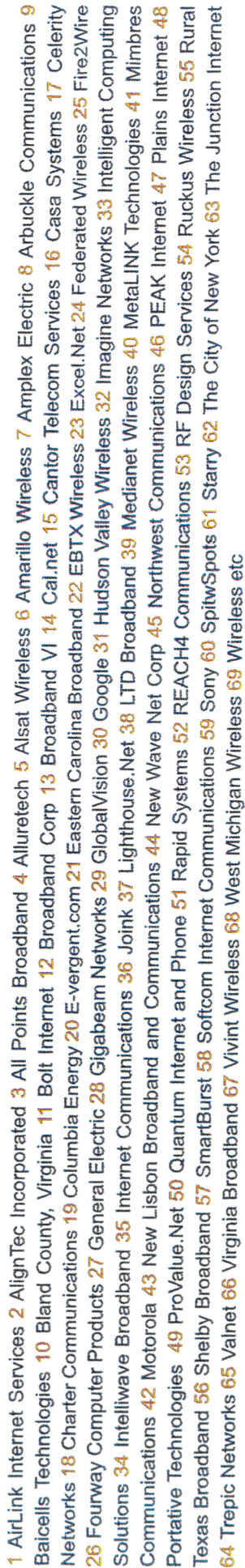
By: /s/ Claude Aiken
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Counsel to the Wireless Internet Service Providers Association

September 11, 2018

Appendix A

Map and List of WISPs Filing Comments in Response to Petitions



Appendix B

Copy of Ex Parte Letter dated July 23, 2018 Submitted by 182 Fixed Wireless Broadband Providers

July 23, 2018

FILED VIA ECFS

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W., Room TW-B204
Washington, D.C. 20554

**Re: Citizens Broadband Radio Service
Ex Parte Notification
GN Docket No. 17-258**

Dear Ms. Dortch:

We are 182 fixed wireless broadband providers. We serve hard-to-reach places that no one else will: remote farms, schools, libraries, healthcare institutions, and other businesses that but for us would have no broadband or no broadband competition. But we are running out of the critical infrastructure we need to serve rural America: spectrum.

For decades, we have served rural families and businesses using unlicensed spectrum. But that spectrum is becoming more crowded with each passing day. We have potential customers within range of our towers that we cannot serve because we do not have access to adequate spectrum to do so.

But the FCC can help. Continued access to Citizens Broadband Radio Service (“CBRS”) spectrum is vital to our ability to continue serving rural America. And we write to urge the FCC to ensure that census tracts remain available as bidding units for Priority Access Licenses (“PALs”) in the CBRS band. We ask you to reject options that take census tracts off the table and propel rural broadband access backwards instead of forwards. Without census-tract-sized licenses, we will have virtually no ability to acquire protected spectrum in this band. That would be an intolerable outcome that would harm our rural broadband businesses and inhibit our ability to grow, but worse it would harm the millions of consumers for whom mid-band spectrum is the key to high-speed fixed broadband access.

Over the last year, many of us have spoken and written to the FCC to explain why census tract licenses in the CBRS band are critical to rural economic development and our ability to provide broadband to more rural consumers. We’ve provided maps showing that auctioning larger areas will effectively shut us out of the auction. We’ve explained that we’ve already invested in the CBRS band under the current rules by deploying software-defined radios in the 3650-3700 MHz band that can be easily upgraded to operate in the entire 3550-3700 MHz band, reaching more rural consumers within months. And we’ve explained how we’ve curtailed our investments based on the threat that we may not be able to bid for census tract PALs. While our businesses and networks are diverse and independent, we are united that census tracts are the only way that we can participate in the CBRS band auction.

We recognize the national priority of promoting 5G wireless technology. But 5G is not for mobile wireless only. We, too, want to deploy 5G to connect more devices and support precision

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agriculture and other industrial and enterprise solutions. “Winning the race to 5G” does *not* mean we need to let the most powerful companies in the mobile wireless industry define the rules of the road.

Our economy depends on small businesses like ours, and we are poised to invest – if the FCC gets the rules right.

We reluctantly acknowledge that the rules are likely to be changed, that we will no longer have access to seven census tract PALs. But there is no reason why, out of those seven PALs, that the FCC cannot retain at least two census tract PALs in rural areas to facilitate broadband deployment in the areas where we live and work. We urge the FCC, in the strongest possible terms, to preserve our ability, and the ability of other stakeholders, to bid on census tract PALs in rural areas.

Respectfully submitted,

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Fred Moses
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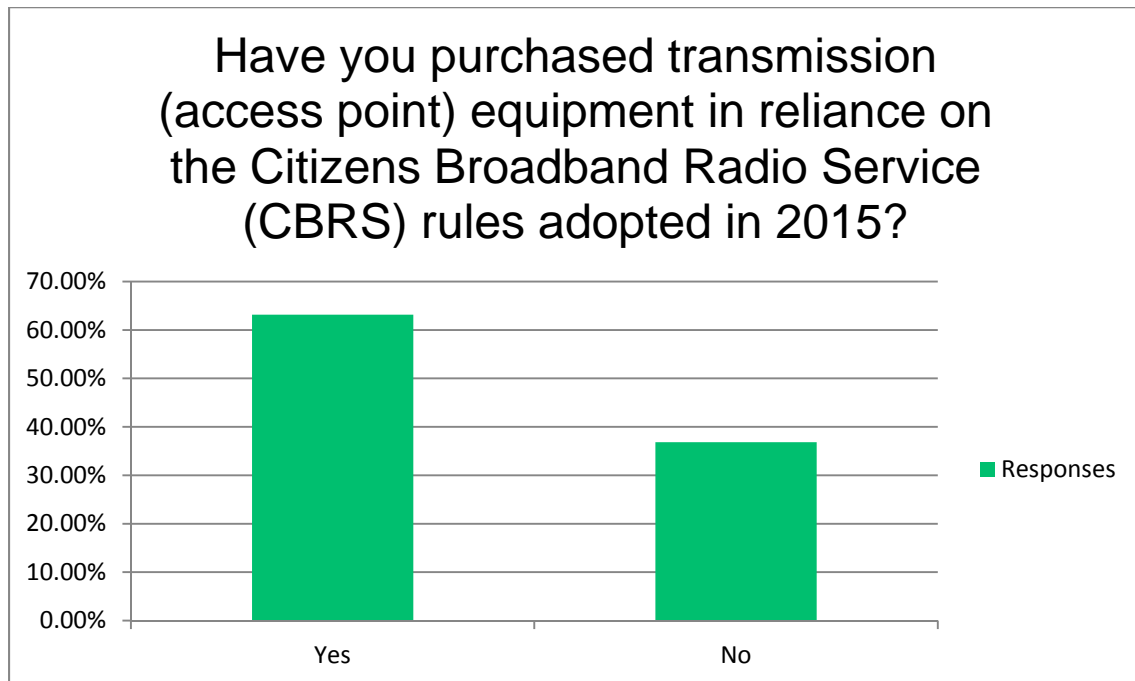
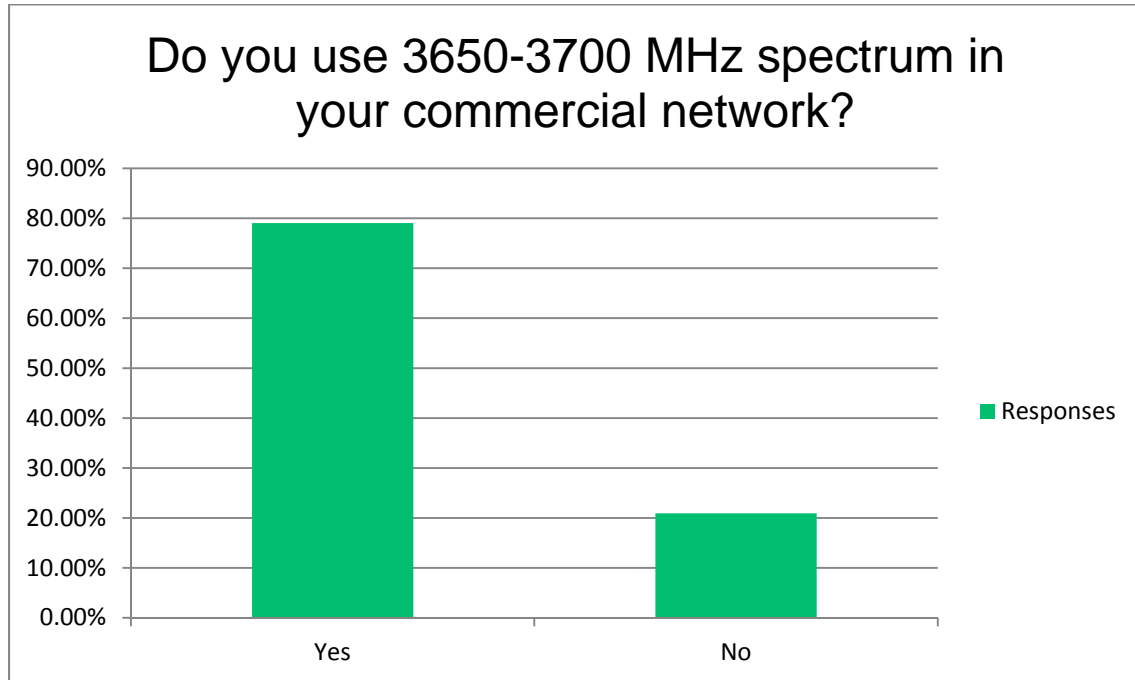
July 23, 2018
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Izzy Bocanegra
CEO
Emerald Harbor
Communications
LLP
Destin, FL

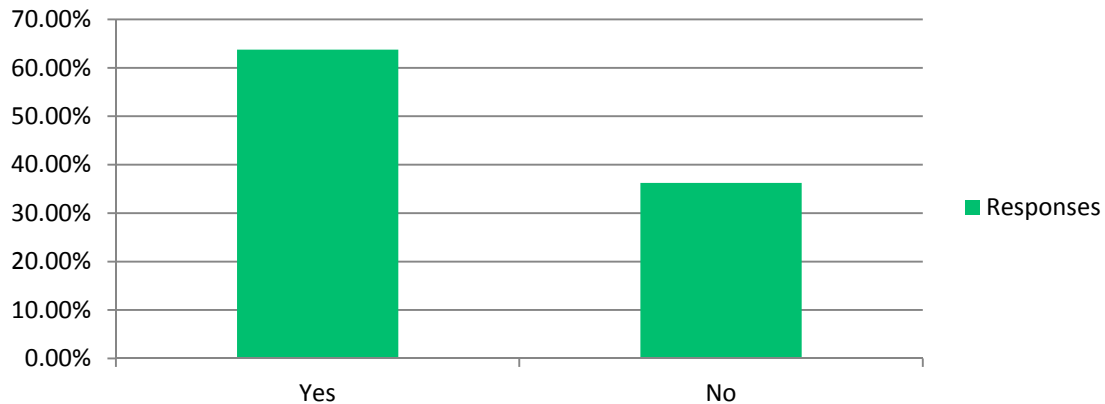
AJ Becker
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Appendix C

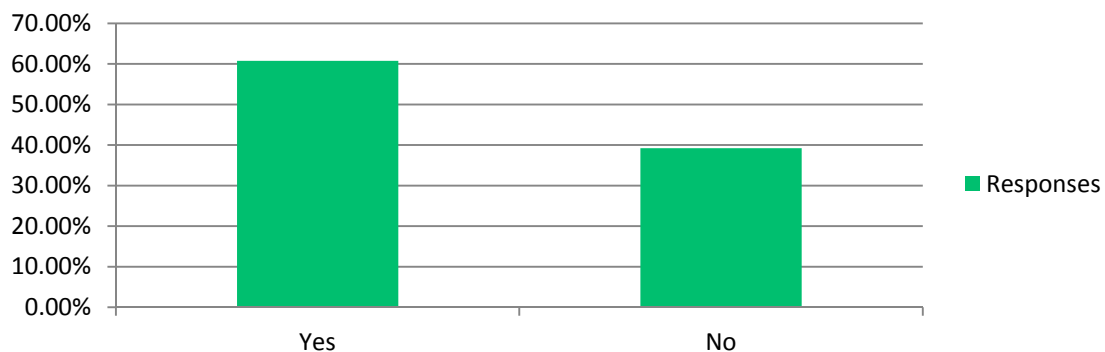
WISPA Member Survey Results



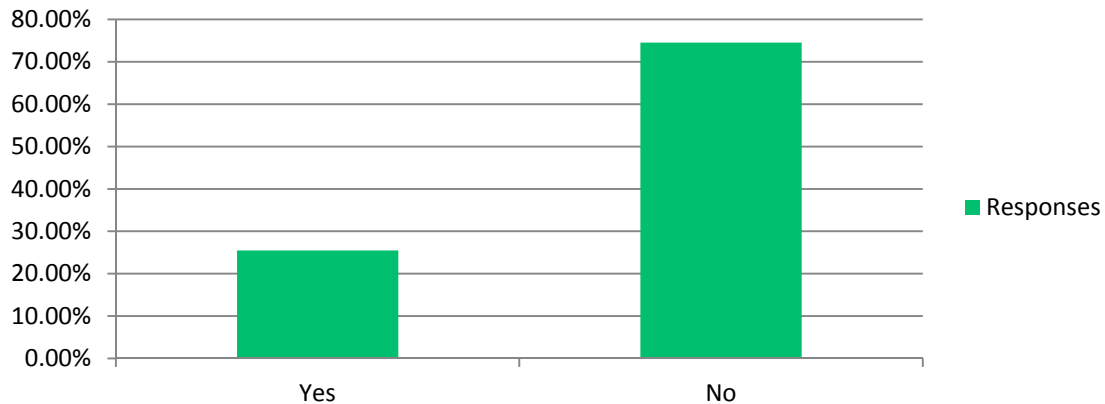
Are you using the 3650-3700 MHz band to provide broadband service to paying customers in reliance on the CBRS rules adopted in 2015?



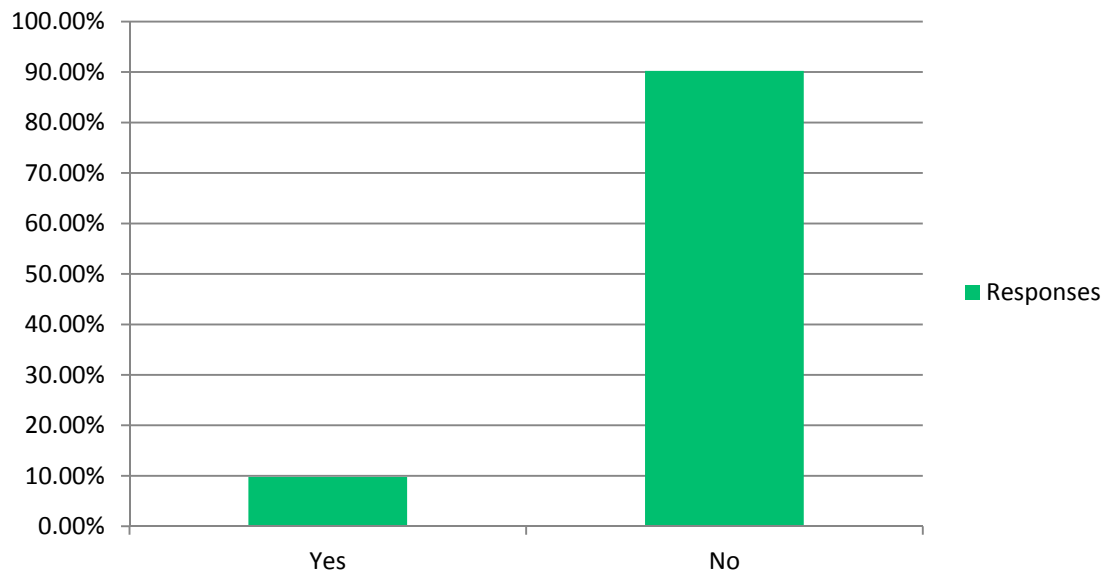
Have you reduced investment and/or curtailed deployment based on FCC proceedings that could result in changes to rules regarding Priority Access Licenses (PALs) in the CBRS band?



Have you attempted to acquire spectrum
(e.g., 700 MHz, 2.5 GHz) from AT&T,
Verizon, Sprint or T-Mobile to use in your
fixed wireless broadband operations?



If yes, were you successful?



Appendix D

List and Summary of Selected Experimental Authorizations in the 3550-3650 MHz Band

Digis LLC (Call Sign WI2XKN) – Operating as Rise Broadband, the country’s largest WISP with approximately 200,000 customers, Digis is conducting a market trial in Utah County, Utah to “inform its business, investment, technology and deployment decisions as it plans for expansion of its broadband networks” and to determine “the value and utility of PALs.” The trial is currently providing service to more than 200 customers.

SkyWerx Industries (Call Sign WU2XTF) – SkyWerx is a WISP serving rural Colorado. Its trial purpose is “to determine the financial and technical viability of the CBRS band and assess consumer acceptance at various speeds and price points.”

Speedwavz LLP (Call Sign WI2XOC) – Speedwavz, a WISP based in rural Richwood, Ohio, explained that “[w]e want to test the feasibility of connecting LTE Access Points to SAS database in the new proposed 3.5 band. This will provide broadband in rural underserved areas. We plan to run tests in collaboration with the manufacturer so that they can ensure their equipment operates as designed, and plan to obtain permanent PAL license when that becomes available.”

CellTex Networks, LLC dba ZipLink (Call Sign WI2XYI) – ZipLink is a WISP based in South Texas that obtained an experimental license to test LTE equipment manufactured by different companies. In the trial, ZipLink plans to determine the best balance of cost and performance to inform its financial modeling and to assess consumer acceptance at various performance and price points.

First Step Internet, LLC (Call Sign WI2XYD) – First Step, a fixed wireless broadband provider in rural Idaho, plans to conduct an experiment to gain information on future expansion and network investment plans. First Step also has proposed to serve identified unserved areas that are funded through the Commission’s rural broadband experiment program.

Plexicomm, LLC (Call Sign WI2XVY) – Plexicomm, a fixed wireless broadband provider, describes its planned experiment as a way to quantify any differences in customer satisfaction between the Cambium PMP450 and its existing WiMAX connections. Note that this trial does not include LTE equipment.

ExteNet Systems, Inc. (Call Sign WI2XKQ) – ExteNet, a neutral host service provider, obtained an experimental license “to test and demonstrate prototype high-speed wireless data infrastructure communications equipment that will operate in the 3.5GHz Band” at its indoor facilities.

SpiderCloud Wireless, Inc. (Call Sign WI2XXS) – SpiderCloud Wireless is a startup company that is designing 3G/4G small cells for outdoor enterprise applications.

Broadcast Sports International (multiple call signs) – The licensee is a video production company that provides video for broadcast, satellite broadcast and cablecast of sporting and other

events. It explains that “the spectrum usage in many major cities and the limited available spectrum for these events makes it necessary to make coordinated, temporary use of additional channels in the vicinity of 3.6 GHz.”

The Walt Disney Corporation (Call Sign WI2XTG) – Disney is testing equipment at its Disneyland and Disney World venues in California and Florida.

Rice University (Call Sign WI2XLO) – Rice University is conducting a trial on its campus to test “a first-of-its-kind multi-cell wireless network research platform capable of massive MIMO” pursuant to a National Science Foundation grant.

Artis, LLC (Call Sign WI2XXK) – Artis is funded by the U.S. Army and develops tank protection systems using radar to detect and track projectiles. It is testing the capabilities of this software-defined radar technology using its experimental license.

5D Robotics, Inc. (Call Sign WK9YYX) – 5D Robotics is an IoT software company that plans to test ultra-wideband devices attached to street lamps and vehicles in order to track vehicles in Manhattan and Brooklyn, New York.

Caterpillar, Inc. (Call Sign WI2XHO) – Caterpillar is a manufacturer of diesel motors, heavy construction, and mining equipment, and plans to use its experimental license to test the equipment that relies on embedded LTE devices and uses Wi-MAX to operate autonomously.

Xvergent Networks (Call Sign WJ2XCG) – Xvergent is a fixed wireless broadband provider in rural Pennsylvania that plans to test “LTE equipment on 20-megahertz channels in a challenging topographic and geographic environment” with its experimental license because the larger 20-MHz channel sizes are not available in another band in which it operates.

ViaSat, Inc. (Call Sign WI2XQD) – ViaSat is a broadband internet provider and antenna manufacturer that plans to simulate a satellite using its experimental license in order to test the performance of its antennas and ensure the antennas meet ViaSat’s design specifications.

TGM Pinnacle Network Solutions LLC (Call Sign WJ2XDC) – Pinnacle is testing equipment with software-defined radios to assess their features and determine their ability to provide last-mile broadband service to broadband customers in rural North Texas.

Clarity Telecom, LLC dba Vast Broadband (Call Sign WJ2XED) – Vast Broadband plans to test whether the CBRS band will improve the transmission of broadband service through dense tree coverage in rural South Dakota.

Appendix E

Copy of CBRS Coalition Letter dated May 29, 2018

May 29, 2018

Via Electronic Filing

Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

Re: *Ex Parte* Notice: *Promoting Investment in the 3550-3700 MHz Band* –
GN Docket No. 17-258

Dear Ms. Dortch:

On May 24, 2018, Marissa Mitrovich of Frontier Communications; Michael Fitzpatrick of General Electric Company; Michael Purdy of Google LLC; Frank Korinek of Motorola Solutions, Inc.; Danielle Piñeres of NCTA – The Internet & Television Association; Jill Canfield of NTCA – The Rural Broadband Association; David Wright of Ruckus Networks (an ARRIS Company); Erin Fitzgerald on behalf of the Rural Wireless Association, Inc.; and Claude Aiken of the Wireless Internet Service Providers Association met with Commissioner Michael O’Rielly and Erin McGrath, Legal Advisor to Commissioner O’Rielly, regarding the Commission’s pending Notice of Proposed Rulemaking on the licensing of Priority Access Licenses (“PALs”) in the 3.5 GHz Citizens Broadband Radio Service (“CBRS”) band.¹

In this meeting, these company and trade association representatives provided Commissioner O’Rielly and Ms. McGrath with the terms of a proposed compromise framework for PAL licensing that is supported by parties from many categories of stakeholder in this proceeding. This broad-based, cross-industry coalition is the largest yet in this proceeding and includes entities from cable, technology and equipment development, rural broadband, regional and rural mobile wireless carriers, industry and manufacturing, critical infrastructure, and enterprise solutions. In the spirit of compromise, all of these diverse parties are willing to accept some obstacles to their own CBRS opportunities in order to ensure that the largest possible group of stakeholders can derive value from the 3.5 GHz band, which the Commission has indicated is a key goal in this proceeding. A list of these parties – who together constitute a substantial portion of the U.S. economy – is provided in the attachment to this letter.

These parties urge the Commission to adopt a licensing framework for CBRS PALs that includes the following elements:

¹ See *Promoting Investment in the 3550-3700 MHz Band*, Notice of Proposed Rulemaking and Order Terminating Petitions, 32 FCC Rcd 8071 (2017) (“*NPRM*”).

- In every census tract in every U.S. county, there will be two (2) census-tract-based CBRS PALs available at auction.
- In the top 30 U.S. Cellular Market Areas (ranked by population), there will be five (5) county-sized PALs available at auction in every county.
- In U.S. Cellular Market Areas ranked 31-306 (based on population), there will be five (5) Metropolitan Statistical Area (“MSA”)-sized PALs available at auction.
- In U.S. Cellular Market Areas ranked 307-734 (based on population), there will be five (5) county-sized PALs available at auction in every county.
- The license term for all PALs will be seven (7) years, and PALs will be renewable based on performance criteria.

As discussed at the meeting, the mix of large-area and small-area licensing under this compromise framework will accommodate the needs of *all* stakeholders in the 3.5 GHz band. The availability of either five county-based or MSA-based PALs throughout the United States will meet the business and operational requirements of commercial mobile wireless carriers, cable companies, and other broadband providers serving rural areas that desire larger license areas. At the same time, the availability of two census-tract licenses nationwide will satisfy the minimum spectrum requirements of a wide variety of industrial and critical-infrastructure entities, broadband operators serving rural areas, enterprise solution providers, commercial real estate interests, and other entities planning geographically targeted CBRS deployments.

This compromise framework reflects a substantial revision of the Commission’s existing census-tract licensing framework, and its inclusion of MSA-sized licenses incorporates a key part of the plan submitted last month by the Competitive Carriers Association and CTIA.² This balanced proposal will promote a wide range of business models and innovative wireless deployments by spectrum users both large and small, well-established and non-traditional.

If it adopts this compromise framework, the Commission will maximize the enormous social and economic benefits of the CBRS band, catalyze U.S. wireless technology and 5G leadership, and promote the modernization of U.S. infrastructure. Both the makeup of our coalition and the substance of our proposal reflect the diversity of deployment options and network operators that will be required to realize the vision for 5G wireless – ubiquitous wireless services in urban and rural areas, both outdoor and indoor, and involving a breadth of industries (e.g., mobile, cable, industrial, WISPs, and enterprise). The parties listed in the attachment

² Letter to Marlene H. Dortch, FCC Secretary, from Rebecca Murphy Thompson, CCA, and Scott K. Bergmann, CTIA, GN Docket No. 17-258 (Apr. 20, 2018).

collectively urge the Commission to adopt this compromise framework as part of its upcoming order revising its CBRs rules.

Respectfully submitted,

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NCTA – The Internet & Television Association

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May 29, 2018
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**Wireless Internet Service Providers
Association**

/s/ Claude Aiken

Claude Aiken

President/CEO

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**Companies and Associations Supporting
Proposed Compromise Framework for PAL Licensing**

**Charter Communications, Inc.
Cox Communications, Inc.
Edison Electric Institute
Enterprise Wireless Alliance
Exelon Corporation
FedEx Corporate Services, Inc.
Frontier Communications
General Electric Company
Google LLC
Motorola Solutions, Inc.
National Rural Electric Cooperative Association
National Rural Telecommunications Cooperative
NCTA – The Internet & Television Association
NTCA – The Rural Broadband Association
pdvWireless, Inc.
The Port of Los Angeles
Ruckus Networks, an ARRIS Company
Rural Wireless Association
Southern Linc
Transit Wireless
Union Pacific
Utilities Technology Council
Windstream Holdings, Inc.
Wireless Internet Service Providers Association**

Appendix F

Census Tract Density Tables

Table 1
All PEAs

Land area in square mi.	Number of tracts	Total square miles in tracts	Percentage of total land area	Population in tracts	% of total population	Average density
<10	53,910	100,976	2.9%	222,197,682	71.1%	2200.5
>=10	20,092	3,434,353	97.1%	90,273,645	28.9%	26.3

Table 2
PEAs with population of <1,000,000

Land area in square mi.	Number of tracts	Total square miles in tracts	Percentage of total land area	Population in tracts	% of total population	Average density
<10	41,482	66,564	1.9%	173,672,481	55.6%	2,609.1
>=10	6799	431,035	12.2%	34,045,064	10.9%	79.0