

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

Promoting Investment in the 3550-3700 MHz
Band

GN Docket No. 17-258

COMMENTS OF GOOGLE LLC

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INTRODUCTION AND SUMMARY

The Commission set a clear goal for this rulemaking: to ensure that its Citizens Broadband Radio Service (“CBRS”) rules “keep up with technological advancements, create incentives for investment, encourage efficient spectrum use, support a variety of different use cases, and promote robust network deployments in both urban and rural communities.”¹ To achieve this goal, the Commission must both account for substantial differences between the 3.5 GHz band and other licensed mobile bands, and ensure that its decisions support the full range of heterogeneous operators and business plans that are at the heart of the 5G transition.

The current CBRS rules, which provide access to census-tract-sized licenses with three-to-six-year terms, realize this balance. The Commission should not change course by radically expanding the geographic size of these licenses or making license terms practically permanent through ten-year licenses with an expectation of renewal. Today’s Part 96 rules embody a compromise that enables a diverse group of potential Priority Access License (“PAL”) licensees to access the band. In addition to overwhelming support by rural broadband providers, industrial IoT operators, venue owners, and other non-traditional licensees, the existing rules won the support of some of the largest mobile wireless carriers. AT&T, for example, “support[ed] census tract licensing” of PALS² “with an initial term of three years, with a first renewal of two years.”³

¹ *Promoting Investment in the 3550-3700 MHz Band et al.*, Notice of Proposed Rulemaking and Order Terminating Petitions, FCC 17-134, 32 FCC Rcd. 8071, 8072 ¶ 3 (2017) (“NPRM”).

² Reply Comments of AT&T at 17, GN Docket No. 12-354 (filed Aug. 15, 2014) (“AT&T Reply Comments”).

³ *Id.*

Likewise, Verizon did not oppose rules with the same license sizes and shorter license terms than the ones the Commission ultimately adopted.⁴

Today's CBRS rules garnered wide support across the entire wireless industry because they reflect the fact that the 3.5 GHz band is significantly different from other bands the Commission has designated in the past for commercial use. The 3.5 GHz band includes significant federal operations that need to be protected using a Spectrum Access System ("SAS"), and displays distinct propagation characteristics. Accordingly, as the Commission has recognized, the 3.5 GHz band is likely to be used for new 5G wireless technologies not deployed in any other existing band. This will include denser, higher-capacity network deployments using small cells and neutral-host systems. Due to a combination of these new technologies and the characteristics of 3.5 GHz spectrum itself, the CBRS band offers a promising opportunity to host a uniquely diverse set of wireless licensees.

As a result of these differences, assumptions the Commission has made in setting rules in other bands are inapplicable to PAL spectrum in the 3.5 GHz environment. However, these differences also make the 3.5 GHz band ideal for new innovation and growth. With the right rules, PAL spectrum can support both established wireless carriers and new investors with novel business models. This will allow companies with traditional carrier models to offer increased capacity where it is needed. It will also support a new wave of rural broadband deployments, and, for the first time, access to flexible-use licenses for industrial IoT, hospitality, healthcare, stadium operations, and applications in other geographically discrete venues. But all this will be

⁴ Verizon Comments on Further Notice of Proposed Rulemaking at 13-14, GN Docket No. 12-354 (filed July 14, 2014) ("Verizon Comments") (advocating a "transitional framework" to apply temporarily to a portion of the band while industry "adapt[ed]" to census-tract licensing with one-year terms).

possible only if the Commission’s rules make acquiring PALs commercially feasible for these entrants.

Opening PAL spectrum to a wider set of potential licensees advances greater overall intensity of use, supports additional economic activity, and avoids the hazards that follow when government auction rules artificially limit access to spectrum that otherwise would support many business models. As Professor Paul Milgrom has explained, “[g]enerally, 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. In particular, local users with high value uses should be able to bid to supply their own needs, without being forced to bargain with a third party that controls their access.”⁵ Promoting access to spectrum by as many entities and business models as possible is consistent with the Commission’s statutory duty to promote “efficient and intensive use of the electromagnetic spectrum,”⁶ “disseminate licenses among a wide variety of applicants,” and “avoid excessive concentration of licenses.”⁷

Furthermore, the Commission has acknowledged the warehousing problem inherent in carrier control of oversized PAL areas. The NPRM accordingly suggests new regulatory intervention in the form of build-out requirements, replacing the Commission’s current reliance on market forces to push network construction.⁸ This further regulatory mandate flows directly from the fact that while census tracts align well with likely 3.5 GHz network deployments,

⁵ Letter from Paul Milgrom, Auctionomics, to Marlene H. Dortch, Secretary, FCC, ¶ 15, GN Docket No. 12-354 (Aug. 7, 2017) (“Milgrom Letter”).

⁶ 47 C.F.R. § 309(j)(3)(D).

⁷ *Id.* § 309(j)(3)(B).

⁸ *See, e.g.*, NPRM ¶ 32.

operators are less likely to have a market incentive to deploy throughout their license areas if these areas are significantly expanded. In fact, according to Google’s field tests of CBRS equipment, an operator would need to deploy more than 1,271 high-power 3.5 GHz base stations to cover even half of the average PEA. Absent additional regulations forcing broader build-outs, even major carriers are likely to cover only a small fraction of a typical PEA with CBRS equipment.

Retaining the existing, lighter-touch CBRS rules thus will be more effective in allocating spectrum efficiently in the first instance, as well as more consistent with the goals of allocating spectrum through competitive bidding, and will not require new build-out regulations. As Dr. William Lehr has concluded, “the benefits of [the contemplated changes to the 3.5 GHz framework] are negligible. But the costs are significant, precluding use of the band by entities that are likely to produce large benefits for the economy.”⁹

The Commission should also reject calls to hide from public view CBRS registration data that do not reveal competitively sensitive information. The existing disclosure rules in Part 96 include provisions requiring anonymization of these data prior to public release; indeed, less information will be made public under the existing CBRS rules than is already widely available for today’s network deployments from crowd-sourced databases and, in some cases, the operators themselves. Restricting public access further would not serve any legitimate competitive purpose, but would hamper potential General Authorized Access (“GAA”) users’ efforts to identify locations and frequencies that are most likely to be available and interference-free.

⁹ William Lehr, *Analysis of Proposed Modifications to CBRS PAL Framework* 16 (Dec. 28, 2017) (“Lehr Analysis”).

Finally, if the Commission decides to change the CBRS technical rules as suggested in the NPRM, it should ensure that these changes do not undermine the significant work already done to finalize technical standards for 3.5 GHz operations. Substantially altering the CBRS rules soon after adoption, and even as industry standards implementing the current Part 96 rules are being finalized, would undermine both the Commission's reputation for predictability and private investments that have been made in reliance on the Commission's 2015 rulings.

DISCUSSION

I. PEA-SIZED LICENSE AREAS WILL DEPRESS INVESTMENT BY DENYING WISPs AND SITE-BASED INDUSTRIAL, HEALTHCARE, AND HOSPITALITY COMPANIES ACCESS TO PALs.

The NPRM seeks comment on “increasing the geographic licensing area of PALs to stimulate additional investment, promote innovation, and encourage efficient use of spectrum resources.”¹⁰ Increasing PAL areas will undoubtedly make the spectrum even more tailored to a subset of bidders: the largest wireless carriers. But, overall, this change will undercut the Commission's goals. PEA-sized areas are inconsistent with the physical characteristics of the 3.5 GHz band and far exceed the geographic footprints of most potential PAL bidders. Imposing only (or primarily) PEA-sized PAL areas would therefore exclude many bidders or drive up their costs unnecessarily, decreasing investment, stifling innovation, and leading to inefficient underutilization of spectrum.

Calls to significantly expand PAL areas overlook the particular characteristics of the 3.5 GHz band. Because of its propagation characteristics, 3.5 GHz spectrum in urban areas will generally be used to expand network capacity. As the Commission explained in adopting the

¹⁰ NPRM ¶ 23.

existing census-tract framework, “[t]he 3.5 GHz Band has physical characteristics that make it particularly well-suited for mobile broadband employing small cell technology”¹¹ which “can provide broadband coverage and capacity in targeted geographic areas.”¹² In rural areas, 3.5 GHz PAL spectrum will play an important role in bringing broadband access to residents who currently lack connectivity, through highly directional, point-to-point or point-to-multipoint links. Because it is suited to shorter-distance transmission, there is no realistic possibility that CBRS spectrum will be used to reach additional users under a traditional carrier model that relies on wide-area macrocell coverage. In urban as well as rural areas, therefore, 3.5 GHz spectrum would be an impractical tool to increase *coverage* over large areas following the network architectures large carriers employ in other bands. CBRS deployments will not involve network build-outs blanketing large geographic territories.

To confirm this understanding, Google has conducted field tests assessing the likely service area of a single CBSD. The tests indicate that even for a rural Category B CBSD, typical coverage is approximately 3.1 km² for broadband applications.¹³ This would cover only 0.2% of even the smallest PEA, and far less, 0.039%, of the average PEA in the continental United States.¹⁴ To cover even half of the total geographic area of the average PEA, a carrier would need to deploy more than 1,271 Category B CBSDs—conservatively assuming no overlap between coverage areas. For indoor operations, where CBSD coverage areas will be significantly

¹¹ *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, FCC 15-47, 30 FCC Rcd. 3959, 3961 ¶ 1 (2015).

¹² *Id.* ¶ 98.

¹³ Letter from Austin C. Schlick, Director, Communications Law, Google Inc., to Marlene H. Dortch, Secretary, FCC, Table 1, GN Docket No. 12-354 (filed Feb. 16, 2016).

¹⁴ When the entire United States, including Alaska, is considered, the average PEA is larger still.

smaller than the average coverage of a Category B CBSD, the mismatch between PEAs and CBSD coverage is even more dramatic. Examples of this mismatch are shown in Figures 1-4.

Moreover, PEAs typically cover both urban and rural areas.¹⁵ As discussed above, where population density is low, there is no realistic possibility that any cellular operator would blanket the license area with 3.5 GHz band devices. In a rural environment an outdoor Category B CBSD would only be expected to support an average of about 50 people.¹⁶ Like any other licensee, a carrier would deploy in portions of rural areas where a business case can be made. Consequently, the far more efficient solution in the 3.5 GHz band would be to retain census-tract-sized license areas and allow carriers *as well as other operators with different business models and deployment plans* to acquire spectrum in the locations where they will actually use it.

Rural broadband providers, for instance, have demonstrated widespread interest in using the 3.5 GHz band to offer connectivity using high-speed point-to-multipoint links. Rise Broadband, for example, has already invested heavily in 3.5 GHz technology but explained that the success of this business model in the 3.5 GHz band requires “a fair opportunity to bid for small, targeted PAL areas.”¹⁷ Others, such as Southern Linc, seek to use this spectrum to offer connectivity for public utilities, first responders, and other local users. But as Southern Linc has

¹⁵ See Letter from Stephen E. Coran, Counsel to WISPA, to Marlene H. Dortch, Secretary, FCC, at 4-5, GN Docket No. 17-258 (filed Dec. 6, 2017) (providing maps showing unserved areas overlapping PEA boundaries).

¹⁶ See U.S. Census Bureau, *2010 Census Urban and Rural Classification and Urban Area Criteria*, Lists of Population, Land Area, and Percent Urban and Rural in 2010 and Changes from 2000 to 2010, Percent Urban and Rural in 2010 by State, Excel file, *available at* <https://www.census.gov/geo/reference/ua/urban-rural-2010.html> (last revised Feb. 9, 2015).

¹⁷ Letter from Stephen E. Coran, Counsel to Rise Broadband and Baicells Technologies, to Marlene H. Dortch, Secretary, FCC, at 1, GN Docket No. 12-354 (filed July 28, 2016). See also Reply Comments of the Wireless Internet Service Providers Association at 15, GN Docket No. 12-354, RM-11788, RM-11789 (filed Aug. 8, 2017) (“WISPA Reply Comments”).

stated, PEAs are “much too large for the service needs of the vast majority of potential users of the CBRS band, such as rural broadband service providers, private network operators, municipalities and state and local government agencies, commercial venues (such as stadiums, arenas, and shopping malls), educational institutions, and so forth.”¹⁸ Similarly, IoT providers are likely to seek PAL licenses outside of urban areas to provide fixed connectivity to both residential and industrial users, but would likely be unable to acquire 3.5 GHz spectrum on a PEA basis due to “the combination of dense urban, urban, suburban and rural areas into a single license.”¹⁹

The fundamental point is that PEA-sized license areas are too large to be economically justifiable investments for potential licensees with geographically targeted services, such as WISPs, industrial IoT operators, and venue owners. Indeed, PEA-sized license areas have drawn opposition from a wide range of potential licensees. These companies raise concerns that expanding PALs to cover entire PEAs will frustrate their investments in the band. The cable industry’s trade association observed that “large license sizes would significantly increase barriers to entry and would therefore depress the development of the innovative business models the Commission intended to encourage.”²⁰ Industrial IoT providers such as General Electric stated that “heavy-industry deployments would become economically impracticable under PEA-

¹⁸ Comments of Southern Linc at 7, GN Docket No. 12-354, RM-11788, RM-11789 (filed July 24, 2017) (“Southern Linc Comments”).

¹⁹ Comments of Vivint Wireless, Inc. at 5, GN Docket No 12-354, RM-11788, RM-11789 (filed July 24, 2017). *See also* Reply Comments of General Electric Company at 3, GN Docket No. 12-354, RM-11788, RM-11789 (filed Aug. 8, 2017).

²⁰ NCTA – The Internet and Television Association Comments on Petitions for Rulemaking at 10, GN Docket No. 12-354, RM-11788, RM-11789 (filed July 24, 2017).

sized geographic area licensing.”²¹ Electric utilities argued that these changes would “make it more difficult for utilities to be able to access spectrum in the 3.5 GHz band.”²² Device manufacturers such as Ruckus Wireless raised concerns that the proposed changes would make PALs the “exclusive domain” of large mobile carriers.²³ And rural broadband providers warned that expanding PALs to cover entire PEAs would “send a clear and unfortunate message to millions of rural Americans that the CBRS spectrum resource will be unable to serve as a fixed broadband access platform.”²⁴ American Petroleum Institute and the Energy Telecommunications and Electrical Association, trade associations representing the petroleum, natural gas, and electric utility industries, vividly illustrate this point:

The Houston area demonstrates the importance of [retaining census-tract PALs]. The difference between the Houston PEA and any of the individual census tracts that comprise the much larger PEA demonstrates that many, if not all, CII entities would be foreclosed from competing with commercial providers for CBRS spectrum in an entire PEA. An oil and gas company would not be able to compete for CBRS spectrum to cover an individual refinery, for example, if the licensed area offered by the Commission is an entire PEA.²⁵

As depicted in Figures 1-6, even the smallest PEA dwarfs the territory of such CBSD deployments, requiring the prospective licensee to acquire far more spectrum than it needs—at

²¹ Reply Comments of General Electric Company at 3, GN Docket No. 12-354, RM-11788, RM-11789 (filed Aug. 8, 2017).

²² Reply Comments of the Utilities Technology Council at 1, GN Docket No. 12-354, RM-11788, RM-11789 (filed Aug. 8, 2017).

²³ Reply to Comments of Ruckus a Business Unit of Brocade Communications Systems, Inc. at 9, GN Docket No. 12-354, RM-11788, RM-11789 (filed Aug. 8, 2017).

²⁴ WISPA Reply Comments at 20.

²⁵ Joint Comments of the Telecommunications Subcommittee of the American Petroleum Institute and the Regulatory and Technology Committee of the Energy Telecommunications and Electrical Association at 3, GN Docket No. 17-258 (filed Dec. 21, 2017).

great expense. Forcing these entities to acquire licenses for areas hundreds or thousands of times larger than they need would render their planned use of the band economically infeasible. These entities, which have invested in CBRS under the census-tract approach, therefore are unlikely to participate at the PAL tier under a PEA framework. If their plans require quality of service guarantees that GAA cannot support, then they will not participate in CBRS at all, and the economic activity they would have undertaken will be lost. Census tracts, on the other hand, are far closer to (although still somewhat larger than) the typical sizes of these types of CBSD deployments, and would permit participation by these entities.

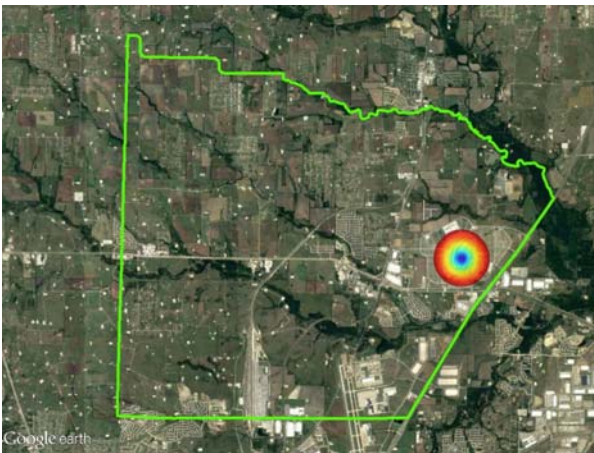


Figure 1: Defined²⁶ coverage of an outdoor Category B CBSD deployment at the Texas Motor Speedway near Dallas, TX compared to the census tract containing it (green). Figure is approximately 20 km across.

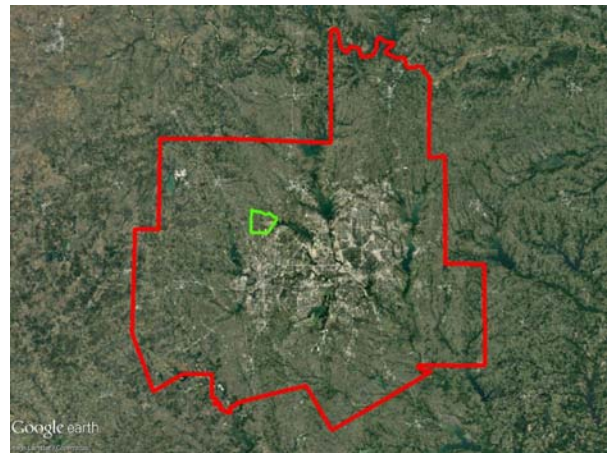


Figure 2: Comparison of the census tract containing the Texas Motor Speedway (green) to PEA 8 (red), which includes the entire city of Dallas, TX and many of its suburbs.

²⁶ CBSD coverage areas have been computed based on the definition of PAL Protection Area in the Part 96 rules and the Wireless Innovation Forum industry-standard propagation model.

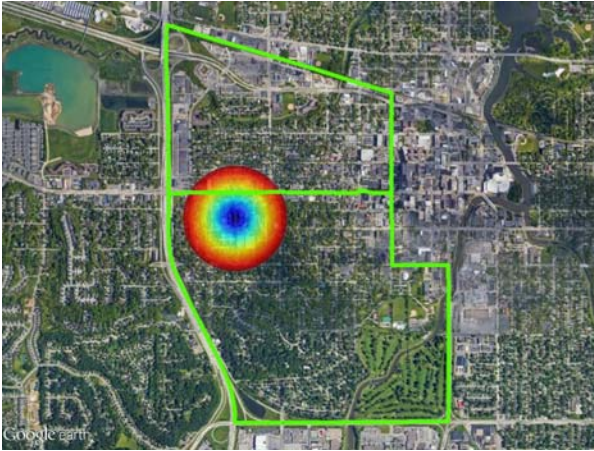


Figure 3: Defined coverage of an indoor Category A CBSD deployment at the Mayo Clinic in Rochester, MN compared to the census tracts containing it (green). Figure is approximately 4 km across.

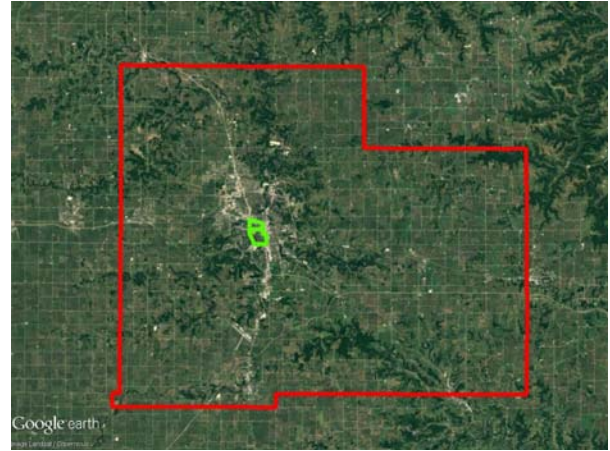


Figure 4: Comparison of the census tracts containing the Mayo Clinic (green) to PEA 301 (red), which includes the entire city of Rochester, MN and the surrounding area.

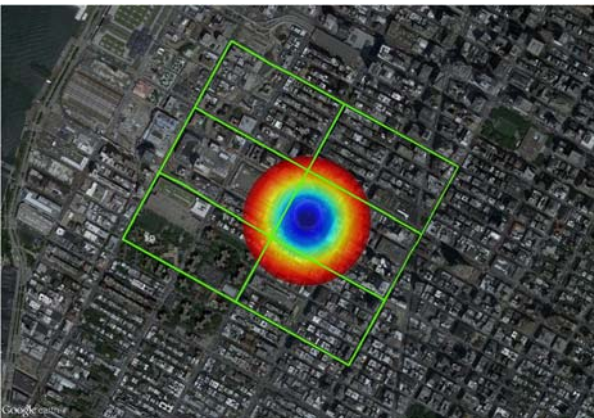


Figure 5: Defined coverage of an indoor Category A CBSD deployment at Madison Square Garden in New York City, NY compared to the census tracts containing it (green). Figure is approximately 2.5 km across.



Figure 6: Comparison of the census tracts containing Madison Square Garden (green)—nearly invisible at this scale—to PEA 1 (red), which covers the entire New York City metro area, including large portions of New York, New Jersey, Pennsylvania, and Connecticut.

Crucially, and unlike the PEA proposal, the current census-tract approach allows both large carriers needing additional local capacity *and* new licensees with different business models to acquire the PAL spectrum they need. New licensees with geographically targeted business models benefit from having a genuine chance to acquire the interference-protected spectrum they

need. At the same time, carriers will be able to achieve their coverage objectives by bidding on PALs in multiple contiguous census tracts, using combinatorial bidding to optimize their bidding strategies, if necessary.²⁷

Dramatically larger license areas would disrupt this balance. Unlike the current rules, a Commission decision to use only PEAs would pick a small and closed subset of operators that can economically bid on PEA-sized PALs over a large and open class of potential bidders who cannot. It would reduce the overall utility of the spectrum by effectively barring rural broadband providers, industrial IoT operators, venue owners, and other non-traditional licensees from the PAL market, and concentrate the remaining benefits in a small group of large carriers.

In addition to frustrating otherwise-promising business models, enlarged license areas (and other Commission rules that exclude large numbers of potential market participants) would reduce overall economic efficiency and intensity of spectrum use. The higher absolute prices for PEA licenses mask the fact that, in many cases, would-be licensees excluded from the market would likely have placed a greater value per square kilometer or per population in their geographic area of interest than the entity that ultimately prevails at auction. A factory owner, for example, may value the spectrum that covers its facility and nearby areas far more than a large carrier would. Unnecessarily large license areas exclude this value from the auction by leaving the factory owner with the choice of irrationally bidding on an entire PEA or not participating. This loss will depress investment, result in less intensive spectrum use, and likely lower aggregate revenue to the U.S. Treasury from all PALs.

²⁷ For example, an auction participant could bid on “packages” of licenses to account for the fact that a given license may be more valuable in conjunction with “complementary” licenses covering neighboring areas. *But see* Milgrom Letter ¶ 17 (discussing the relative unimportance of complementarity of licenses in the 3.5 GHz framework).

Mere administrative convenience for mobile wireless licensees does not justify these costs. Those providers today hold spectrum licenses across market areas of varying sizes with no apparent difficulty. A review of the Commission’s Universal Licensing System reveals that AT&T and Verizon, for example, hold licenses in more than a dozen different radio services, with at least seven different sets of license areas. Only a small minority of these are licensed on a PEA basis, undermining claims that PEAs are necessary to ensure the uniformity of carriers’ license portfolios.

Moreover, designing auction rules specifically to favor one class of bidders over all others is inconsistent with modern Commission spectrum policy, reinstituting the logic of the “beauty contest” era. This style of industrial policymaking has long been discredited in the United States, and for good reason: assignment processes that are specifically designed to favor a particular business model (here, suggestions that the highest and best use of a band, in perpetuity, is for carriers to employ it for mobile 5G services) are often based on imperfect predictions. To drive home the point, only a few years ago, AT&T, T-Mobile, and CTIA all stated that 3.5 GHz spectrum was poorly suited for mobile broadband—the very use they now say is uniquely desirable.²⁸ Commissioner O’Rielly has rightly pledged that “[w]hat the Commission won’t do [with CBRS] is adopt artificial restrictions through license and auction structure to dissuade some uses or users while promoting others. Such preferences are not in the public interest.”²⁹ Unfortunately, the Commission would take precisely that course if it adopts rules that exclude important classes of bidders.

²⁸ Comments of AT&T at i, GN Docket No. 12-354 (filed Feb. 20, 2013); Comments of CTIA – The Wireless Association at 1, GN Docket No. 12-354 (filed Feb. 20, 2013); Comments of T-Mobile USA, Inc. at 7, ET Docket No. 10-123 (filed Apr. 22, 2011).

²⁹ NPRM, Statement of Commissioner O’Rielly at 8110-8111.

In addition to principles of sound policymaking, the express terms of the Communications Act require that the Commission design an auction that promotes “efficient and intensive use of the electromagnetic spectrum,”³⁰ “disseminat[es] licenses among a wide variety of applicants,” and “avoid[s] excessive concentration of licenses.”³¹ The Commission should not, and may not, gerrymander the CBRS auction design in order to guide this newly available spectrum to one group of companies over all others.

II. LENGTHY PAL TERMS ARE NOT NECESSARY TO SPUR INVESTMENT IN CBRS, AND WILL EXCLUDE POTENTIAL LICENSEES.

The NPRM asks how lengthening PAL terms, and making them renewable, would affect future investment, deployment of a wide array of technologies, and rural areas.³² Extending 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. As comments on the large carriers’ recent Petition for Rulemaking revealed, numerous potential licensees could be excluded from PAL auctions if the Commission imposes 10-year license terms. Southern Linc, for example, explained that extending PAL license terms would “make the cost of obtaining PALs that much more expensive and could drive the cost of PALs beyond what many of the potential users of the CBRS band, such as smaller commercial entities and private network operators, could afford.”³³ This artificial

³⁰ 47 C.F.R. § 309(j)(3)(D).

³¹ *Id.* § 309(j)(3)(B).

³² NPRM ¶¶ 14-58.

³³ Southern Linc Comments at 6.

exclusion of many potential market participants, the City of New York added, would “lead to slower buildouts and more dead zones.”³⁴

There is no merit to claims that longer PAL terms are necessary to attract investment. 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. Prominent leaders in developing CBRS equipment and systems include AT&T, Verizon, Charter, Qualcomm, Nokia, GE, and Google, among others.³⁵ Indeed, the vocal support for the existing rules by rural WISPs—which seek to cover sparsely populated rural areas and typically have tight construction budgets—confirms that the existing license terms are long enough for licensees to recoup their investments in the parts of the country where deployment costs are highest. As the Wireless Internet Service Providers Association explained, “[t]he record is chock full of examples where the band is poised to flourish as soon as final Spectrum Access System (‘SAS’) and Environmental Sensing Capability certification occurs and existing equipment can be software upgraded and certified—a matter of months.”³⁶ This is because, “the 3.5 GHz band serves as an ideal home for small cell operations, where a buildout can occur quite expeditiously and equipment can be amortized within a three (3) year window.”³⁷

³⁴ Comments of the City of New York at 2, GN Docket No. 12-354 (filed July 24, 2017).

³⁵ See Comments of Google Inc. and Alphabet Access in Response to Petitions for Rulemaking at 7-11, GN Docket No. 12-354, RM-11788, RM-11789 (filed July 24, 2017); Reply Comments of Google Inc. and Alphabet Access in Response to Petitions for Rulemaking at 2-9, GN Docket No. 12-354, RM-11788, RM-11789 (filed Aug. 8, 2017); Letter from Austin C. Schlick, Director, Communications Law, Google Inc., to Marlene H. Dortch, Secretary, FCC, Attachment at 4, GN Docket No. 12-354 (filed Sept. 21, 2017) (“September Ex Parte”).

³⁶ WISPA Reply Comments at 13.

³⁷ Reply Comments of Vivint Wireless, Inc. at 6, GN Docket No 12-354, RM-11788, RM-11789 (filed Aug. 8, 2017).

It is unclear at best why large wireless carriers seeking additional capacity to cover relatively dense urban areas, and thus likely deriving greater revenue from each base station, need longer license terms than these rural companies. In fact, AT&T and Verizon expressed few concerns in 2014 about a compromise proposal with shorter license terms than those the Commission ultimately adopted. AT&T explicitly “support[ed] census tract licensing” of PALs “with an initial term of three years, with a first renewal of two years,”³⁸ and Verizon did not oppose census-tract licensing with *one* year terms.³⁹ Indeed, if rural WISPs are able to return a profit on CBRs investments more quickly than large carriers, then it is even clearer that optimizing the size and duration of PAL licenses solely for carrier use is bad economic policy and contrary to the rationale for auctioning spectrum rights.

Of course, the three-to-six-year license terms provided by the current Part 96 rules do not foreclose renewal. If an initial licensee wishes to extend its term, it can bid on additional terms—and continue doing so indefinitely. Initial licensees in fact would have an inherent advantage in subsequent PAL auctions; they generally would have lower costs for the successive license term due to their use of the spectrum in the initial term. Unlike these incumbent PAL licensees, new auction participants would face the challenge of acquiring equipment and infrastructure and developing a new revenue stream from scratch. These dynamics will tend to reduce the net value of spectrum for new licensees relative to those that have already commenced operations, reducing risk for existing licensees. Conversely, where a licensee does *not* prevail in a subsequent PAL auction, this would indicate that the licensee was not deriving the greatest

³⁸ AT&T Reply Comments at 17.

³⁹ Verizon Comments at 13-14.

possible revenue from that spectrum, meaning that an additional PAL term would only prolong a misallocation of scarce spectrum resources.

Contestable reauctions of PALs would promote economic efficiency, ensuring over time that the spectrum is used by the entity that values it most highly and, therefore, is likely to generate the most value from it. License terms that are longer than necessary reduce long-term efficiency by preventing spectrum resources from moving where they are most valued. In fact, as Dr. Lehr has shown, “[t]he inability to repurpose spectrum resources that were originally 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.”⁴⁰

Furthermore, as with overly large license areas, lengthy license terms force higher initial auction bids (even while reducing overall auction revenue) and can raise upfront costs so significantly that they exclude many would-be licensees from participating in the auction at all. As Dr. Lehr explains, “[l]onger license terms and the prospect for renewability will serve to foreclose many enterprise users with more localized or specialized spectrum requirements. These are precisely the same users who hold the greatest potential for deploying innovative new wireless applications and promoting increased competition in wireless services.”⁴¹ Indeed, the benefits of shorter license terms—increasing market efficiency and expanding the potential uses of PALs to new classes of licensees—are so significant that the Commission’s cost-benefit-analysis should definitively favor these more appropriate license durations.

Even if there were some legitimate basis for concern that the license terms set out in Part 96—including the option of an initial term of six years—will not support investment in PAL

⁴⁰ Lehr Analysis at 13.

⁴¹ *Id.* at 14.

operations, the excessive license terms urged by CTIA still would not be the answer. Instead, in that situation the Commission would want to consider alternative methods of providing additional certainty for licensees, without foreclosing strong auction contests. One possible technique suggested by Professor Milgrom is the creation of a bidding credit for incumbent licensees in future PAL auctions.⁴² 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.

III. SECONDARY MARKET TRANSACTIONS AND BUILD-OUT REQUIREMENTS WILL NOT RESOLVE THE ECONOMIC PROBLEMS POSED BY LARGER PAL AREAS AND LONGER TERMS.

The NPRM asks whether “the ability to combine and partition licenses to customize service areas effectively address[es] the concerns raised by commenters and promote[s] robust deployment in the band.”⁴³ The NPRM also asks “[w]hat types of requirements would be appropriate to encourage a robust secondary market for PALs to facilitate targeted and intensive spectrum use” and how those requirements would “interplay with construction requirements for PALs more broadly.”⁴⁴ Although complicated build-out requirements and secondary market rules will become necessary if the Commission expands and extends PALs, these regulatory measures are no substitute for right-sized PALs. PAL areas that better match actual patterns of investment and deployment would more efficiently achieve the same goals as these additional regulations, and do so through market interactions rather than regulatory management.

⁴² Milgrom Letter ¶ 24.

⁴³ NPRM ¶ 24.

⁴⁴ *Id.* ¶ 32.

The current federal spectrum auction policy assumes that substantial transaction costs hamper private markets for spectrum. According to Ronald Coase, although initial assignment of property rights is relatively unimportant where transaction costs are low, a regulator must take care to make initial assignments of property rights that are as close to economically optimal as possible in markets that operate less efficiently.⁴⁵ The market for spectrum falls into the latter category. This—in addition to the need to support more effective price signals for spectrum generally—is why Coase advocated that the Commission use a system of competitive bidding to make initial assignments. As Paul Milgrom has observed, “[t]he history of the US wireless telephone service offers direct evidence that the fragmented and inefficient initial distribution of rights was not quickly correctable by market transactions.”⁴⁶ These are the reasons why Congress codified the auctions approach in Section 309(j) of the Communications Act. And for the same reasons, the Commission cannot rely on the theoretical possibility of secondary market partitioning to justify excessively large, and excessively long, initial allocations.

History confirms that the Commission’s partitioning and disaggregation rules, while sound, cannot be relied upon to promote access to spectrum for non-traditional or rural licensees. According to Commission records, the large wireless carriers who typically win mobile-ready spectrum in auctions only rarely engage in secondary market transactions with smaller entities, much less entities other than established telecommunications companies. According to a study of the Commission’s Universal Licensing System database done by the major wireless carriers’ own advocacy group, 89% of secondary market transactions have involved the transfer of

⁴⁵ Ronald Coase, *The Problem of Social Cost*, 3 J.L. & Econ. 1, 17-18, 27-28 (1960).

⁴⁶ Paul Milgrom, *Putting Auction Theory to Work* 20 (2004).

spectrum resources *to* major wireless carriers or between non-nationwide carriers.⁴⁷ Thus, although carriers may tout partitioning and disaggregation as a theoretical means of transferring spectrum to smaller operators that will use it more intensively, this very rarely happens in practice. In fact, transfers *away* from smaller operators far outnumber those *to* these licensees.⁴⁸

These data likely reflect that for a non-telecommunications participant, such as a hotel, hospital, or factory, initiating a spectrum purchase on the secondary market is extremely challenging. It requires identifying the licensee for the particular territory at issue, finding the right point of contact within that entity, and then engaging in a potentially complex negotiation. For its part, the licensed carrier may believe that small transactions to divest excess spectrum are simply not worth its time or—more disturbingly—that they could provide a footing for disruptive operators or technologies that the carrier would rather block. As Dr. Lehr explains:

Favoring large territories by auctioning only PEA-sized PALs would impose asymmetric transaction costs on the small users who would need to induce those with excess spectrum to partition it and make it available for secondary market leasing. Those with excess spectrum may prefer not to partition their spectrum either to foreclose the competition or simply to avoid incurring the transaction costs. Moreover, if those with excess spectrum are small users, then they have to incur spectrum leasing costs that are likely to be higher for them than for a large national operator who is likely already to have an in-house team to manage spectrum transactions.⁴⁹

In fact, it is self-evident that secondary-market transactions are not sufficient to create the meaningful spectrum opportunities for businesses outside the telecommunications industry.

⁴⁷ Mobile Future, *FCC Spectrum Auctions and Secondary Market Policies: An Assessment of the Distribution of Spectrum Resources Under the Spectrum Screen* 19 (Nov. 2013), available at <http://mobilefuture.org/wp-content/uploads/2013/11/Paper-Distribution-of-Spectrum-Resources.pdf>.

⁴⁸ *Id.*

⁴⁹ Lehr Analysis at 12.

While the Commission’s partitioning, disaggregation, and other secondary market rules have existed for years, factories, hotels, or hospitals have rarely, if ever, acquired licensed spectrum for their own industrial IoT or private LTE networks. But this is not due to a lack of demand. The data show virtually ubiquitous deployments by such local users that are similar in function, but that rely on unlicensed spectrum, and therefore may lack the quality-of-service guarantees that PAL spectrum would make possible.

In light of these data, the possibility of secondary market transactions provides yet another reason to retain existing PAL areas, not to enlarge them. Because the overwhelming majority of secondary market transactions involve the transfer or leasing of spectrum to large carriers, who are experienced in such spectrum acquisitions, these transactions provide an effective way for carriers to augment the PAL portfolios that they acquire at auction by adding new census-tract areas. Thus, secondary market transactions further facilitate investment by large mobile carriers, and provide yet another tool for them to add capacity where and when they need it.⁵⁰

The promise of the 3.5 GHz band was precisely that it would become “a new tool in the spectrum tool kit,” with rules that “support and incentivize a wide variety of use cases and deployments.”⁵¹ Simply importing the license areas and durations from the cellular bands of the past would ignore that important goal, and lead predictably to the exclusion, rather than invitation, of new wireless services and entrants.

⁵⁰ *See id.*

⁵¹ NPRM, Statement of Commissioner Carr at 8112.

IV. THE EXISTING PART 96 RULES PROPERLY PROTECT CONFIDENTIALITY WHILE PROVIDING OPERATORS AND THE PUBLIC SOME OPPORTUNITY TO UNDERSTAND THE RADIO ENVIRONMENT.

The Commission proposes to “prohibit SASs from disclosing publicly CBSD registration information that may compromise the security of critical network deployments or be considered competitively sensitive”⁵² and seeks comment on which information should be withheld.

However, the existing rules already protect sensitive information, and efficient operation of the 3.5 GHz framework depends on the public availability of some information.

The Commission’s existing rules protect confidentiality while permitting SASs to make information about the radio environment available to stakeholders. Part 96 currently requires the SAS to maintain, and make available to the public and other SAS operators, CBSD registration data, such as device location, frequency, etc. However, the rules also require that registration data made available to the public be “obfuscated” so that the public cannot determine the identity of the licensee that submitted the data.⁵³ This strikes the right balance between licensees’ desire for confidentiality and the needs of GAA users and the public to understand how the airwaves are being used.

Under these procedures, 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. Interested members of the general public would have the same opportunity to examine CBRS utilization at a high level. PAL holders, however, will be

⁵² *Id.* ¶ 37.

⁵³ 47 C.F.R. § 96.55(a)(3).

fully protected against disclosure of competitively sensitive information and, because the available data will be no different than what is available from other public sources, anonymized CBSD registration data poses no threat to network security.

The Commission must also be sure that it has properly assessed the benefits of any further restrictions. Far 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.⁵⁴ Therefore, the Commission should be skeptical of unsupported claims that mere location and frequency information constitutes sensitive information. It should also bear in mind 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.

V. THE COMMISSION SHOULD ENSURE THAT ANY CHANGES TO EXISTING TECHNICAL RULES DO NOT DELAY 3.5 GHZ DEPLOYMENTS.

The NPRM asks whether the Commission should alter the existing Part 96 emissions and interference limits. In principle, minor revisions to some 3.5 GHz technical rules could improve the utility of the band. However, the Commission should take care not to make any changes that disrupt the process of developing industry standard specifications and protocols to support rapid

⁵⁴ See, e.g., CellMapper, *T-Mobile USA 4G – LTE Network*, <https://www.cellmapper.net/map?MCC=310&MNC=260&type=LTE&latitude=38.88286208803332&longitude=-77.02798337002793&zoom=18&showTowers=true> (last visited Dec. 27, 2017); Comcast, *XFINITY WiFi Hotspot Finder*, <http://hotspots.wifi.comcast.com> (last visited Dec. 27, 2017); AT&T, *AT&T Wi-Fi Hot Spot Locations*, <https://www.att.com/maps/wifi/basic.html> (last visited Dec. 27, 2017); Optimum, *Find Optimum WiFi Hotspots*, <https://www.optimum.net/internet/hotspots/> (last visited Dec. 27, 2017); Cox Communications, *Find a WiFi Hotspot*, <https://www.cox.com/aboutus/wifi-hotspot-map.html> (last visited Dec. 27, 2017); Spectrum Wifi, *Find WiFi Locations*, <https://www.spectrum.com/wifi-hotspots.html> (last visited Dec. 27, 2017).

3.5 GHz deployments. Significant progress has already been made toward finalizing aggregate interference, SAS, and other standards—based on industry’s reliance on the Commission’s reputation for stability. The Wireless Innovation Forum (“WInnForum”) has already released protocols regarding commercial CBSD operations and SAS-to-SAS communication, and Google and Federated Wireless have tested the interoperability of their SAS implementations using these WInnForum standards.⁵⁵ Commercial deployments would likely be possible almost immediately upon the Commission’s approval of a SAS if the Commission’s rules do not change substantially. Any changes that force revisions to these standards would waste significant private investments predicated on the existing rules, and ultimately delay deployments. Therefore, the Commission should make changes to the technical rules at this late date only if it is confident the new rules are compatible with the significant technical work that has already been done.

CONCLUSION

The existing CBRS rules were adopted, after extensive deliberation and compromise on all sides, precisely to enable traditional carriers to use 3.5 GHz spectrum to supplement their mobile networks while also “allow[ing] a mix of innovative offerings to flourish.”⁵⁶ The rules accomplish this balance through an auction design that encourages large national mobile carriers, cable operators, rural broadband providers, hospitals, factories, and many other types of licensees all to pursue access to PAL spectrum. The existing rules favor market forces and genuinely contestable auctions over imposing the Commission’s own current view of the best use of the band. And they are working well, as shown by substantial investment in the band even now.

⁵⁵ September Ex Parte, Attachment at 5.

⁵⁶ NPRM, Statement of Chairman Pai at 8107.

A change in course to offer PEA-sized licenses, for essentially permanent terms, would tailor the CBRS auction for the one set of companies for which acquiring such licenses is economically feasible. These changes would reduce competition and decrease spectrum utilization, and contravene principles of sound, market-based regulatory policy. They should be rejected.

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