6712-01

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Parts 1 and 96

[GN Docket No. 17-258; FCC 18-149]

Promoting Investment in the 3550-3700 MHz Band

AGENCY: Federal Communications Commission.

ACTION: Final rule.

SUMMARY: In this document, the Federal Communications Commission (Commission) adopts limited changes to the rules governing Priority Access Licenses (PALs) that will be issued in the 3500-3700 MHz Band (3.5 GHz band)—including larger license areas, longer license terms, renewability, and performance requirements—as well as changes to the competitive bidding rules for the issuance of PALs and to the ability to partition and disaggregate areas within PALs. These changes are consistent with the rules that helped foster the development of 4G and LTE services in the United States, and adopting similar rules in this band will help promote additional investment in the next generation of wireless services. The Commission also adopts changes to the technical rules to facilitate transmissions over wider bandwidth channels without significant power reduction and changes to the information security requirements to better safeguard commercially sensitive information and protect critical infrastructure. These targeted changes will spur additional investment and broader deployment in the band, promote robust and efficient spectrum use, and help ensure the rapid deployment of advanced wireless technologies—including 5G—in the United States.

DATES: Effective Date: **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].**

Compliance Date: Compliance will not be required for § 96.23(a) or for § 96.25(b) or for § 96.32(b) until after approval by the Office of Management and Budget. The Commission will publish a document in the Federal Register announcing that compliance date.

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SUPPLEMENTARY INFORMATION: This is a summary of the Commission's Report and Order in GN Docket No. 17-258, FCC 18-148 adopted October 23, 2018 and released October 24, 2018. The full text of the Report and Order, including all Appendices, is available for inspection and copying during normal business hours in the FCC Reference Center, 445 12th Street SW, Room CY-A157, Washington, DC 20554, or by downloading the text from the Commission's website at https://docs.fcc.gov/public/attachments/FCC-18-149A1.pdf. Alternative formats are available for people with disabilities (Braille, large print, electronic files, audio format), by sending an e-mail to FCC504@fcc.gov or calling the Consumer and Government Affairs Bureau at (202) 418-0530 (voice), (202) 418-0432 (TTY).

The Commission will send a copy of this Report and Order in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, see 5 U.S.C. 801(a)(1)(A).

Synopsis

I. Background

1. In 2015, the Commission adopted rules for shared commercial use of the 3.5 GHz band. It created a three-tiered access and authorization framework to coordinate shared federal and non-federal use of the band. Incumbents comprise the first tier (Incumbent Access) and receive protection from all other users, followed by PALs, the second tier (Priority Access), and General Authorized Access (GAA), the third tier. Over half of the band—a minimum of 80 megahertz—is reserved for GAA use. PALs receive protection from GAA operations but must protect and accept interference from Incumbent Access tier users. GAA is licensed-by-rule and must avoid causing harmful interference to higher tier users and accept interference from all other users, including other GAA users. GAA users can operate throughout the entire 150 megahertz of the 3.5 GHz band on any frequencies not in use by PALs. Automated frequency coordinators, known as Spectrum Access Systems (SASs), will coordinate operations between and among users in different access tiers. The Commission adopted service and technical rules governing

the 3.5 GHz band as the new part 96 of its rules.

2. In June 2017, CTIA and T-Mobile filed petitions for rulemaking, which asked the Commission to reexamine several of the part 96 rules related to PALs. CTIA proposed several changes to the PAL licensing rules, including much larger license areas, longer license terms, and renewability. T-Mobile supported CTIA's proposals and made additional proposals, including changes to the amount of spectrum available for PALs and to the technical rules governing the 3.5 GHz band. Both petitioners argued that these requested changes were necessary to promote additional investment to facilitate 5G network deployment in the band. On June 22, 2017, the Wireless Telecommunications Bureau and Office of Engineering and Technology sought comment on the Petitions and on related issues raised in ex parte communications, and they received comments and reply comments from more than 120 parties.

3. On October 24, 2017, the Commission issued a Notice of Proposed Rulemaking (82 FR 56193, Nov. 28, 2017) (2017 NPRM) seeking comment on potential changes to the PAL rules, including significantly larger geographic license areas, longer license terms, PAL renewability, and changes to the way in which PALs are assigned and auctioned. The Commission also sought comment on relaxing the emissions limits for Citizens Broadband Radio Service Devices (CBSDs) and/or End User Devices to allow operation over wider bandwidths without power reduction. The Commission simultaneously adopted an Order Terminating the Petitions, in which it declined to seek comment on discrete proposals from T-Mobile's Petition that would have fundamentally altered the sharing framework of the band, including its proposal to reapportion the amount of spectrum available for GAA versus PAL use and designating the entire band for PAL use.

4. The Commission received nearly 200 comments and 40 reply comments in response to the 2017 NPRM, including from mobile wireless service providers, Wireless Internet Service Providers (WISPs) and other fixed wireless service providers, cable providers, Internet of Things (IoT) providers, energy and utility associations, and consumer groups.

III. DISCUSSION

A. PAL Licensing Rules

1. Geographic Licensing Area

5. Background. In the 2015 Report and Order (80 FR 36164, June 23, 2015), the Commission defined the geographic license area for each PAL as one census tract. In the 2017 NPRM, the Commission proposed to increase the geographic license area to "stimulate additional investment, promote innovation, and encourage efficient use of spectrum resources." The Commission sought comment on petitioners' specific request to increase the license size to Partial Economic Areas (PEAs), asking whether the larger size and the ability to combine and partition licenses would strike the right balance between supporting targeted deployments and incentivizing additional investment in the band. Noting concerns in the record about whether PEAs would incent diverse auction participants, differing technologies, and rural deployments, the Commission also sought comment on alternative or hybrid approaches, such as licensing PEAs in urban areas and census tracts in rural areas, or offering PALs of different sizes in each market.

6. Several commenters support increasing the PAL license area significantly, from census tracts to PEAs, as a way to simplify the auction process, reduce interference risks and coordination complications at border areas, and encourage investment by all providers. Other commenters argue that the Commission should retain census tracts as the geographic licensing unit for PALs, arguing that using census tracts would increase the likelihood of localized services reaching rural and underserved areas, and open up PAL auctions to a wider variety of potential users and uses. Other commenters support using county-sized PALs as a compromise between census tracts and PEAs. Some commenters suggest that the Commission rely on a hybrid approach and to adopt multiple, different-sized PAL license areas. After the comment cycle closed, many stakeholders worked to find a hybrid solution for the size of the PAL license area.

7. Discussion. After review of the extensive record on this issue and in light of the changed circumstances since adoption of the 2015 rules, the Commission finds that increasing the size of the PAL

license area to counties will better serve the public interest.

8. In 2015, the Commission determined that larger license areas were inconsistent with its desire to promote innovative, low power uses in the band, such as small cells, which align well with small, targeted geographic areas, and that census tracts would permit intensive use of the band and support a variety of use cases. The Commission now reassesses these determinations in the wake of the changed technological landscape, with efforts here and abroad to prioritize mid-band spectrum as part of the spectrum portfolio that will support next generation wireless networks, including 5G. While the decision to use census tracts may well support the deployment of targeted use cases—particularly fixed uses—as discussed below, the record shows that census tracts could disadvantage flexible mobile use, including 5G, and other wide-area network deployments, which in turn would decrease investment in the band. Increasing the PAL license area slightly from 714,000 census tracts to about 3,200 counties strikes a more appropriate balance and will more effectively support next generation mobile network deployments, while still retaining the ability to support small, targeted uses, included fixed uses. In contrast, increasing the PAL license area size further (i.e., from 3,200 counties to 416 PEAs) could disproportionately favor mobile use cases and hinder investment in innovative fixed networks and localized deployments. The 3.5 GHz band will be the first mid-band spectrum suited for 5G uses that will be made available domestically, and the band will play a key role as part of the low-, mid-, and high-band spectrum toolkit for 5G uses. While census tracts seemed like an appropriate "middle ground" in 2015, since that time, the balance has shifted.

9. First, given the increasing importance of mid-band spectrum for 5G—and the importance of maximizing auction participation to ensure this band is put to its highest and best use—it is important for the size of PAL license areas not to preclude a mobile 5G use case. The record in this proceeding now demonstrates that retaining census tracts as the size of the PAL license areas would cause significant difficulties in deployment of large-scale networks for mobile 5G use. In light of this, it is necessary to reassess the Commission's decision in the 2015 Report and Order that census tract-sized PALs were large

enough to support a variety of use cases. After reviewing the record, the Commission finds that increasing the size of PAL license areas to counties is more likely to ensure that mobile 5G deployments are feasible in the 3.5 GHz band.

10. The Commission agrees with certain commenters' arguments that licensing PALs using census tracts could raise insurmountable technical issues in urban areas. These commenters stress that the number of PALs under a census tract regime—and the number of license borders in particular—will cause unnecessarily challenging border coordination issues and create network deployment complexities. In New York City, for example, there are 2,168 census tracts, spanning an average of less than one-sixth of a square mile. This appears to be far smaller than the area necessary for a single CBSD to operate in its coverage area on at least 20 megahertz of PAL spectrum. Some commenters argue that there are engineering and cost challenges to using census tracts, and stress that, in order to cover the border areas of census tracts, Priority Access Licensees will need to severely limit their power and deploy many more CBSDs than what may be actually needed. They also argue that TDD-LTE technology requires coordination among co-channel and adjacent channel systems at the border, and that synchronization of uplink and downlink operations with neighbors would be almost impossible to implement in census tracts in large urban areas.

11. Further, the smaller the license area, the more the interference protection requirements will limit a licensee's ability to use its assigned spectrum throughout its service area. This is because there is a much higher likelihood that when a licensee seeks to deploy a CBSD, there will be a nearby PAL Protection Area that requires protection, forcing the licensee to reduce power or take other steps to protect the transmitter deployed in the adjacent geographic area. Some commenters argue that licensing PALs by census tract will add tremendous administrative overhead to the process of acquiring PALs and building networks to align with areas where licensees actually want to operate, and also express concern over the cost of designing and deploying networks under a census tract licensing regime. The Commission finds this evidence credible that census-tract based licensing risks intractable interference

problems at PAL borders, potentially precluding the use of this spectrum for mobile 5G services.

12. Other commenters argue that these border interference concerns are overstated, because a licensee can operate within its entire PAL Protection Area, which may consist of several aggregated PAL licenses areas, and because the signals from CBSDs whose service contours form the PAL Protection Area would be treated as GAA outside of the PAL area. The Commission is unconvinced that these factors fully mitigate the problem. For instance, commenters describe scenarios illustrating that there is no guarantee that a licensee will have a common channel assignment in adjacent markets. And with respect to potentially extending a licensee's service contours outside of its license area on a GAA basis, some providers note that they cannot make network deployment decisions that are premised on not having to protect adjacent operations because they might not be deployed, and will need to assume that adjacent markets are robustly utilized by PAL (or GAA) licensees to the fullest extent possible.

13. Nor is the Commission persuaded by the argument that it need not worry about these interference concerns because they will not affect a licensee with a geographically targeted LTE deployment, such as within a hotel, convention center, or business campus. If relying on census tracts precludes wide-area use of the 3.5 GHz band (and thus prevents its use for 5G or rural broadband deployments), the Commission would be improperly tipping the scales towards one use case over others rather than allowing a neutral market mechanism—an auction—to ensure that this valuable spectrum is put to its highest and best use.

14. The Commission further finds that the requirement that the SAS assign geographically contiguous PALs held by the same Priority Access Licensee to the same channel block in each geographic area does not mitigate these concerns. This requirement applies only "to the extent feasible," and doing so may not be feasible when, for example, multiple licensees want common channels across overlapping aggregate PAL Protection Areas. The smaller the license area, the greater the likelihood of such conflicts occurring. For example, a carrier seeking to offer 5G mobile broadband throughout the New York area would be required to bid on 28,000 licenses and be the auction winner 4,000 times in a single geographic

area; this would increase dramatically the likelihood that, instead of taking advantage of the contiguous-area rule, an auction winner with a checkerboard of census tract-based licenses would be able to use none of them. Further, even if some form of package or combinatorial bidding could mitigate such risks, licensees would still face potentially discontiguous channel assignments.

15. Although other commenters, in disputing these claims, stress the legal obligation of the SAS to protect a licensee's PAL Protection Area, they do not persuasively refute the demonstration that the use of census tracts is likely in practice to increase dramatically the number of potential border conflicts and related engineering and coordination challenges, potentially precluding next generation mobile services, including 5G, in the 3.5 GHz band. As the Commission recognized in 2015, licensees may have a legitimate need to coordinate with holders of both geographically and spectrally adjacent licenses in order to maximize the utility of the band and facilitate efficient network planning. The record presents serious concerns that, for large scale deployments, such coordination could involve a prohibitive number of co-channel and adjacent channel licensees.

16. Second, county-based licensing will allow Priority Access Licensees to take advantage of economies of scale, which will reduce deployment costs. Economic analysis submitted in the record suggests that the population of a census tract is likely not sufficiently large to take advantage of possible economies of scale for many of the potential uses of the band, particularly for the deployment of 5G. Counties—in contrast—are large enough for network deployers to achieve scale economies for both fixed and mobile services. Indeed, counties cover a large enough geographic footprint to incentivize investment in wider area geographic deployments that take full advantage of the CBSD power limits in the 3.5 GHz band, a particularly important issue for 5G networks.

17. Third, counties will service the needs of rural communities and will allow new and innovative services to reach underserved and unserved communities, consistent with the Act's objectives. County-sized PALs will provide small, rural providers with a reasonable opportunity to obtain spectrum and promote more effective use of spectrum for actual service delivery in rural areas. Senators of

Montana, Wyoming, and Alaska argue that use of counties for licensing PALs in rural areas would serve the needs of their rural communities because it will provide small carriers with an opportunity to access PALs that best fit their targeted service at a price that fits their budget. Several small, rural carriers note that census tract licensing would render the spectrum useless for many small carriers in rural areas, arguing that county-sized licenses will make logical sense in rural communities. And many commenters support using counties to license at least some PALs, particularly in rural communities. The Commission agrees with this ample record that county-based license areas will enable a wide variety of use cases needed to ensure deployment of the 3.5 GHz band in rural areas.

18. Fourth, the Commission finds that counties will serve a variety of innovative use cases for urban, suburban, and rural deployments, including IoT deployments and those by new entrants. Several parties stress the importance of access to PALs for IoT and other innovative spectrum uses in suburban and urban areas, and they note that 5G will be replete with these type of targeted uses cases regardless of whether the community is urban or more rural. These commenters argue that counties strike a balance between enabling efficient deployment of services and remaining small enough to ensure economic viability for a variety of businesses and technical plans. Other commenters also note that while they may prefer other license sizes, counties would nonetheless be compatible with their business cases. The Commission agrees that the Priority Access licensing structure should be flexible enough to support and encourage next-generation applications like 5G and IoT and believes that county-based licensing will help to accomplish this goal. Licensing PALs by county will help foster flexible and innovative use of the 3.5 GHz band in all areas by providing a consistent, relatively small license size appropriate for a wide range of possible network deployments. Indeed, the Commission adopted county-size PALs for the 28 GHz band for these same reasons, which likewise will be an important part of the next generation wireless ecosystem, including 5G and IoT applications. In that proceeding, the Commission found that "a county-based license affords a licensee the flexibility to develop localized services, allows for targeted deployments based on market forces and customer demand, and facilitates access by both smaller and

larger carriers." As in that context, the Commission anticipates that this approach in the 3.5 GHz band will support diverse network deployments and business models and will fulfill the Act's objectives by fostering the development and rapid deployment of new technologies, promoting economic opportunity and competition, and disseminating licenses among a wide variety of applicants.

19. Counties are sufficiently small to support the small cell deployments and localized types of service the Commission anticipates will be an important part of this band. They are also small enough to allow licensees to target their deployments where they need capacity. At the same time, as the Commission and commenters have recognized, counties are the basic "building blocks" of many geographic areas, making them suitable for aggregation for licensees that wish to operate over larger areas. This flexibility makes counties an appropriate middle ground for this band, given that the characteristics of 3.5 GHz band spectrum are favorable to support both localized and wide-area deployments, and thus to entities wanting to provide a variety of innovative services—some more targeted than others—to the public.

20. Fifth, the Commission finds that licensing PALs on a county basis will simplify the licensing regime in a way that minimizes burdens imposed on licensees, and that promotes administrative and spectral efficiency consistent with its statutory objectives including speeding the "development and rapid deployment of new technologies, products, and services" and "efficient and intensive use" of the spectrum. With just 3,200 counties nationwide (compared to about 74,000 census tracts), the Commission can reduce the administrative burden more than 20-fold by using counties as the PAL license area. It anticipates that this reduction, in turn, will reduce network design complexity and minimize border coordination issues.

21. The Commission also anticipates that fewer license areas and fewer overall biddable items available through the PAL auction will reduce auction complexity and will enable it to move forward more quickly to offer all available PALs in one multiple round auction conferring significant benefits to the public. Historically, the Commission has preferred to use a specific simultaneous multiple

round (SMR) auction format for offering spectrum licenses. In the forward auction portion of the broadcast incentive auction (Auction 1002), the Commission used a clock auction format which, like the SMR, also offers all items simultaneously in multiple bidding rounds. These auction formats allow bidders to engage in price discovery and pursue backup strategies as prices ascend, which, for many license inventories, are important benefits for bidders. The Commission's current bidding systems for multiple round spectrum auctions were designed so as to offer these bidder advantages given historically typical inventories of geographic areas. While a county-based geographic license area gives us an inventory with the largest number of areas that the Commission has ever auctioned or licensed, it is a far smaller number than an inventory based on 74,000 census tracts. Accordingly, licensing PALs on the basis of counties will enable the Commission to use an auction system that offers bidders important benefits, as well as allow it to auction them more quickly with a bidding system that is manageable for bidders.

22. Relatedly, if providers with larger-area needs have to turn to the secondary market to aggregate additional licenses, the smaller the license area used, the larger the number of transactions that would be required, thus increasing transaction costs. The Commission believes that this balance will not only promote Section 309's goal of "efficient and intensive use of the electromagnetic spectrum," but also encourage investment by a wider array of users than under the census tract regime by removing unnecessary administrative hurdles and associated costs.

23. Several parties, including those representing small and rural interests, also agree that counties will minimize administrative burdens imposed on licensees, while still being small enough to support rural deployment, reduce barriers of entry, and encourage localized use cases. They stress that, as compared to census tracts, counties will simplify license management burdens and border coordination issues, while still supporting rural deployment preserving low barriers to entry.

24. Sixth, international developments confirm the importance of creating an environment that encourages domestic investment in next generation mobile networks in the 3.5 GHz band to effectively

leverage the economies of scale created by international investments in the band. Numerous other countries have begun to auction spectrum in the 3.5 GHz range and several others are poised to do so in the near future. It is important for the United States to create a robust marketplace in the band, particularly as the band is standardized for next-generation, 5G technology. By making sure that the PAL license area will foster investment in the band, including by those seeking to use it for mobile 5G use, the Commission is better aligning itself with global developments and preparing to be a leader in the 5G ecosystem, as it has been in the LTE space. Service providers often determine their investments on a global scale, not just a domestic one, and adjustments to the Commission's approach on the geographic licensing area will better facilitate service providers including offerings to U.S. customers in their plans. Specifically, the Commission finds that its revised approach to the geographic licensing area will better align the band with global developments, and with other bands in the U.S. that the Commission has found will play a role in the 5G ecosystem, including the millimeter wave bands and the 3.7-4.2 GHz band. This consistent approach will ensure that the 3.5 GHz band in the United States is ripe for robust investment.

25. Finally, while no approach to license sizes will satisfy all stakeholders, counties represent a more appropriate middle ground that will address many of the concerns raised by stakeholders in this proceeding. The Commission finds that adopting counties as the geographic unit for PAL licensing balances the concerns that some commenters have raised about licensing PALs as small as a census tract with the concerns that other commenters have raised about licensing PALs as large as a PEA. In fact, across the various compromise proposals and hybrid approaches submitted in this proceeding, the main commonality is support for the use of counties as part of the PAL licensing scheme. As such, the Commission finds that increasing the size of the geographic license area from census tracts to counties will be more likely to unlock the potential for existing and new technologies and services to thrive in the 3.5 GHz band, while preserving the incentives and ability of smaller innovators to make use of PALs, reserved GAA spectrum, and unreserved GAA use as appropriate.

26. The Commission disagrees with the argument that census tract licensing is necessary for localized use cases, or that these localized use cases should be the primary focus of the balance struck by its rules. Some commenters argue that counties are too large for localized deployments such as those intended by colleges, industrial parks, manufacturing plants, sports arenas and other similar users, and that census tracts are the least costly way to support targeted use cases. The Commission finds that the public interest best served by ensuring that all potential use cases are technically and economically feasible, and by using competitive bidding to allocate the 3.5 GHz band to its highest and best use.

27. Further, county-sized licenses will still enable the construction of localized, private networks using 3.5 GHz spectrum. Targeted use cases are already encouraged by the "use-or-share" nature of the band and the GAA tier. A minimum of 80 out of 150 megahertz—more than half the band—will be available for GAA use even if all of the potential PAL channels are occupied, and the Commission previously denied T-Mobile's request to change the apportionment of PAL to GAA spectrum. Even census tracts are already significantly larger than a single campus, hotel, factory, or other similar enterprise, and the demands of such targeted applications can be addressed in ways that provide interference protection without using license areas as small as census tracts, including entering into transactions tailored to the area or amount of spectrum needed through leasing, partitioning, or disaggregation, or entering into commercial agreements with PAL licensees in which the licensee manages the spectrum. What is more, network deployers, manufacturers, and technology companies are well positioned to aggregate demand across counties to coordinate the deployment of localized use cases. This Report and Order also opens up the PAL market to partitioning and disaggregation, which should provide additional secondary market avenues for targeted uses and users. And the decision to impose end-of-term performance requirements will incentivize Priority Access Licensees to enter into the commercial transactions with entities that have targeted-sized uses that fall within their license areas.

28. The Commission also disagrees that increasing the size of PAL license areas will "strand" investments in the band. Those making this argument either are incumbents with grandfathered

licenses in one portion of the band or they have made those investments in reliance on the 2015 rules. For one, the Commission does not find any such reliance expectations to be reasonable. It had neither scheduled nor even sought comment on how to design a competitive bidding system for PALs before seeking comment on the petitions for rulemaking to change the 2015 rules—and no provider is ever guaranteed to win protected spectrum at auction in a given market, regardless of the size of the geographic license area. For another, the unique structure and technical rules governing the 3.5 GHz band reduce the risk of stranded investment for all entrants and largely obviate the need to rely solely on auctioned licenses for access to the band. As stated previously, a minimum of 80 megahertz of the band will be available for use on a GAA basis in any area, by any entity that registers with the SAS. Additional spectrum will also be made available when it is not in use by Priority Access Licensees. The technical rules are the same for GAA and PAL users, meaning entities can use the same equipment in either tier, and can rely on both PAL and GAA spectrum, one or the other, or switch between the two to meet their business needs. And so any entity that deploys in the band prior to the PAL auction would need to operate on a GAA basis for some period of time and would be able to continue to do so after the auction, regardless of the outcome. Moreover, counties are small enough that the Commission anticipates rural providers and WISPs will actively seek county-sized PALs at auction, or enter arrangements to partition or disaggregate county-sized areas into smaller ones. Additionally, the opportunities for small entities and rural carriers to win will be supported by the bidding credits that have been successful in other Commission proceedings.

29. The Commission rejects arguments that it should adopt PEAs nationwide, as petitioners and some commenters support, or Metropolitan Statistical Areas (MSAs) in urban areas, as suggested in multiple hybrid proposals. The incremental benefit for 5G mobile use of going from counties to MSAs or PEAs would be far less than the incremental costs incurred by other potential users of the band. In particular, the Commission agrees with those commenters that cite the potential negative effects of adopting license areas as large as PEAs. Many WISPs express concerns that the incongruity between

PEAs and WISP service footprints will diminish or foreclose their ability to win PALs at auction. In response to these concerns, the Commission has decided not to increase the size of the PAL license area to PEAs.

30. Nevertheless, to provide greater flexibility to PAL applicants interested in serving larger areas, the Commission will seek comment in the pre-auction process on allowing package bids to facilitate bidding for the counties that comprise a complete MSA in the top 305 markets. Several commenters argue that MSAs in urban areas will promote investment in the band in those markets, and—in combination with counties—provide an opportunity for parties to acquire PAL spectrum in areas that best fit their business models and investment plans and minimize burdens for applicants interested in a larger footprint in urban areas. The Commission expects that the proposed procedures for the auction will include specific procedures for a form of package bidding consistent with proposals for other bidding procedures proposed in the pre-auction public notice process. Licensing PALs by county, and seeking comment on the best flexible auction mechanism that may allow bidders to aggregate MSA bids, including possibly using package bidding for all of the counties in an MSA, could reduce secondary market transaction costs while still promoting an active secondary market.

31. The Commission rejects hybrid approaches that offer multiple size PALs in every market, such as licensing 50 megahertz of PALs by county and 20 megahertz by census tract. As discussed above, using counties nationwide will support licensee diversity and increased investment. Further, there are already significant complexities inherent to the 3.5 GHz band authorization and spectrum coordination model, which involve the SAS coordinating access between and among the three tiers of users, including the protection of multiple discrete types of Incumbent users. While SASs may be—and likely are—capable of modifying their systems to address multiple sizes of PALs in a given geographic area, on balance, it is not in the public interest to add yet another layer of complexity to the SAS's spectrum coordination responsibilities at this time. Such additional requirements could delay SAS certification and, possibly, affect the deployment timeline for the band. No party has articulated a compelling argument for

the benefits of such a hybrid model (vis-à-vis nationwide use of counties) that would outweigh the potential costs inherent in increasing the complexity of the licensing and authorization framework at this stage of the SAS development cycle. The Commission also agrees with certain commenters that, given the specific characteristics of the 3.5 GHz band, licensing all PALs available in a market using the same geographic area will avoid unnecessarily complicating network management burdens for all users. Using the same license area in both rural and urban areas, as opposed to a hybrid approach licensing different sized PALs in urban and rural areas, will minimize complexities in a band that has a unique tiered access structure with dynamic spectrum sharing.

2. License Term and Renewal

32. Background. The rules adopted in the 2015 Report and Order established a three-year license term for PALs. Under the current rules, during the first application window, an applicant may apply for up to two consecutive three-year terms for a given PAL. During subsequent regular application windows, however, an applicant will be able to apply for only a single three-year license term for any given PAL.

33. In the 2017 NPRM, the Commission proposed to revise its rules by increasing the PAL license term from three years to 10 years and eliminating the requirement that PALs automatically terminate at the end of the license term. The Commission sought comment on this change and on the appropriate performance requirements and renewal standards for PALs. The Commission noted that its proposed approach was consistent with other wireless services and would afford licensees sufficient time to design and acquire the necessary equipment and devices and to deploy facilities across the license area.

34. The Commission traditionally has licensed many wireless services on a 10-year renewable basis. For example, the Commission issues 10-year renewable licenses in Personal Communications Services, Wireless Communications Services, 700 MHz Services, and Advanced Wireless Services. Since it adopted the 2016 Report and Order (81 FR 49024, July 26, 2016), the Commission extended this licensing paradigm to the millimeter wave spectrum bands that make up the

Upper Microwave Flexible Use Service (UMFUS), which, like the 3.5 GHz band, has been identified as important spectrum for 5G deployment.

35. Discussion. The Commission finds that it is in the public interest to extend PAL license terms to 10 years and make such licenses renewable. The service rules for the 3.5 GHz band must create incentives for investment, encourage efficient spectrum use, support a variety of different use cases, and promote network deployments in both urban and rural communities. As the Commission determined with regard to the license area size, it finds that the rapid changes in the mobile marketplace, including the growing importance of mid-band spectrum for large-scale 5G mobile service, necessitate that it revises the license term for PALs to best advance these goals. Since the Commission adopted the 3.5 GHz band licensing rules in 2015, it has become apparent that supporting the rapid deployment of next generation mobile networks, including 5G, will require a combination of low-, mid-, and high-band spectrum, and that the 3.5 GHz band will play a significant role as one of the core mid-range bands for 5G network deployments throughout the world, as well as the first mid-band spectrum to be commercially available in this country for such deployments. Considering the critical importance this band will play in the United States' competitiveness in the global 5G arena, it is also important to ensure that the Commission's rules for the 3.5 GHz band support robust investment in large scale mobile deployments like 5G, as well as other use cases. For the reasons discussed below, the Commission concludes that 10-year renewable license terms will strike the right balance of providing the certainty needed to foster robust investment in next generation wireless networks—including 5G networks—while still maintaining the flexibility needed to support innovative and localized opportunities for a wide variety of entrants.

36. First, review of the record persuades the Commission that longer, renewable license terms will provide Priority Access Licensees with the level of certainty needed to promote robust investment and widespread deployment in the band. Many commenters maintain that longer, renewable license terms are necessary to incentivize robust investment in the band. They emphasize that successful network buildout is a multi-year process that includes standardizing a new frequency band, developing

and certifying equipment, introducing a new band into end-user devices, and deploying infrastructure. They likewise maintain that 10-year renewable licenses would provide the long-term certainty required to invest in solutions utilizing the CBRS spectrum, and allow PAL holders to work with equipment manufacturers to lower equipment costs, the savings from which can in turn can be reinvested in networks to achieve higher speeds and additional rollout. Other commenters argue that the investment that larger entities have already made in 3.5 GHz band technology demonstrates that a three-year, non-renewable term will not deter their participation in the band. Such preparatory efforts certainly reflect an encouraging interest in the band, but do not guarantee a robust level of investment and deployment going forward. The Commission believes that the certainty provided by a 10-year, renewable license is warranted to help ensure the kind of robust investment and deployment that will achieve global leadership in next generation wireless technologies, including 5G.

37. The conclusion that a longer, renewable PAL license term is necessary to support robust investment in the band is further supported by economic analyses in the record. For instance, one such analysis argues that infrastructure investment decisions depend on the present value of the expected increase in profits on the investment. It explains that expected profits are a function of revenues and costs over the period a firm expects to use the investment, and thus, with shorter non-renewable licenses, expected profits will decrease. As such, it contends that three-year license terms, even when coupled with the option to obtain two consecutive three-year terms in the first license period, would provide insufficient time for investment returns in an infrastructure-heavy industry. Another analysis similarly finds that short term licenses discourage long-term investments in comparison to long-term licenses and the utilization of secondary markets. One study finds that shorter, non-renewable license terms are listed as one of the factors likely to decrease market value for PALs by as much as 50 to 95 percent overall relative to similarly licensed spectrum in the 2.5-2.6 GHz band.

38. Second, the Commission's experience managing other commercial spectrum supports adopting this modification. A 10-year renewable license term is consistent with the time-tested licensing

frameworks that have proven successful in many other bands. Further, the Commission recently concluded in the Spectrum Frontiers (81 FR 79909, Nov. 14, 2016) proceeding that this framework was particularly appropriate for a band important for 5G, finding that "a 10-year license term will give licensees sufficient certainty to invest in their systems, particularly as the new technology is still nascent and will require time to fully develop." The record in this proceeding reaffirms that conclusion. Further, the next generation flexible use deployments envisioned for this band—including 5G networks—involve large numbers of small cells, which add complexity and siting delays to roll out, particularly given that these deployments will often require new sites (e.g., street lights, billboards, sides of buildings) with new power and backhaul requirements. Longer, renewable license terms will provide time for licensees to contend with these complexities and challenges, and help to position the band for robust network development.

39. Third, the adoption of larger license areas for PALs further supports the modification to PAL license terms. The Commission in 2015 adopted a three-year, non-renewable term partly based on the conclusion that the economics and upgrade cycles for the small use case "in the context of census tract license areas" might resemble those for enterprise and Wi-Fi deployments rather than the large mobile deployments in other bands. The Commission expects the larger license areas now adopted to be more attractive to wide area network operators than census tracts and, as such, anticipates more large scale mobile deployments, including 5G. Given the nature and scale of such investments, the economics and upgrade cycles of such deployments will likely be closer to those in other bands used for mobile broadband, such as those bands addressed in Spectrum Frontiers, for which the Commission also adopted a ten-year renewable license term, and find that a longer period is appropriate to ensure a sufficient return-on-investment.

40. Fourth, as with the adoption of counties as the license area size for PALs, the Commission finds that 10-year, renewable terms are suited for a wide variety of entrants in both urban and rural areas. Ten-year renewable terms were supported by a diverse group of commenters, including

mobile wireless providers, rural telecommunications and electric cooperatives, fixed wireless broadband providers, and equipment manufacturers. Further, a large number of other parties, as part of a multi-stakeholder consensus, support adoption of a renewable license term, albeit with a term of seven years rather than 10. The Commission finds their support for renewability and a term only somewhat shorter than the one it adopts in the Report and Order as further evidence that a 10-year, renewable term will serve a wide diversity of entrants. Regarding access by rural providers in particular, the Commission's Mobility Fund II, which funds wireless broadband buildout, provides support in 10-year terms "in light of the significant capital and effort needed to deploy and upgrade broadband networks and [because it] is consistent with the timeframe used by rural carriers to plan and schedule network upgrades." Indeed, some commenters maintain that longer license terms and renewability are necessary to incentivize rural service providers and utilities to invest in 3.5 GHz band networks.

41. The Commission is not persuaded by commenters who argue that the longer term and renewability will make PALs broadly uneconomical for rural and innovative investments or lead to a less efficient use and distribution of the band. As discussed in economic analysis in the record, a licensee's expected profits from license acquisition should generally increase with a longer term and renewability. While some commenters challenge this assertion, arguing that extending the term will force prospective licensees to acquire spectrum for a longer period than they need, they offer no evidence that there is any mismatch between the longer term and the use cases discussed in the record. Numerous parties with various use cases, including rural WISPs and industrial entities, assert that they seek to deploy with the use of PALs, and they do not assert that their need for or use of such priority access will terminate by some fixed period, or that they plan to switch to GAA spectrum after that period. The Commission anticipates that the longer, renewable term will provide additional value to small and rural entities seeking to use spectrum for commercial broadband networks and other uses that involve significant long-term investments, and that the greater value to small and rural entities will help such entities absorb a higher acquisition cost at auction to the extent it may result from such terms.

42. Other aspects of the revised framework should further help ensure that small and rural providers have affordable access to the 3.5 GHz band. The bidding credits the Commission adopts for small businesses and rural providers will directly help them to compete for PALs at auction without compromising the certainty needed for substantial long-term investment. Expanded access through the secondary market will also help facilitate access to PALs. As discussed elsewhere, the Commission is not persuaded by commenters' claims that small entities will be unable to participate in secondary market transactions. Further, GAA spectrum will continue to be available on an opportunistic basis, and may be particularly suitable for short-term investments. Taking all these factors into account, to the extent a change to a longer-term, renewable license might still result in some reduction in liquidity in the market for priority spectrum access or otherwise raise the cost of access, the benefits of longer, renewable terms outweigh these concerns.

43. Finally, while commenters advocate for a variety of license terms shorter than 10 years, with limited or no renewability, these other options would not encourage investment as effectively and efficiently as a 10-year renewable license. Many commenters maintain that less than a 10-year license term is insufficient for investors to obtain a return on investment. Several commenters also contend that, without reasonable expectancy of license renewal, many potential entrants may be dissuaded from investing in the band because of the risk of stranded investment. The Commission concludes that its revised framework, when taken as a whole, appropriately addresses the needs of a wide variety of stakeholders, including those that wish to use the band for short-term purposes and those providers that require more certainty and stability, and will result in greater overall investment and deployment while still providing a wide variety of stakeholders with the opportunity to participate in this innovative band.

44. Regarding license renewal, last year, the Commission adopted a unified renewal framework for Wireless Radio Services (WRS) to replace the then-existing patchwork of service-specific rules for renewal. Consistent with that reform, the Commission finds it appropriate to include PALs in the unified WRS renewal framework rather than create a service-specific standard. Consequently, PAL

licensees must comply with § 1.949 of the Commission's rules. Under that section, each PAL licensee, in order to qualify for renewal, must demonstrate that over the course of its license term, the licensee either: (1) provided and continues to provide service to the public, or (2) operated and continues to operate the license to meet the licensee's private, internal communications needs. Like other WRS licensees, Priority Access Licensees may avail themselves of appropriate safe harbors contained in § 1.949(e) or make a Renewal Showing consistent with § 1.949(f). Including PALs in the unified WRS renewal framework is consistent with the Commission's determination in the WRS Renewals Second Report and Order (82 FR 41531, Sept. 1, 2017) that "uniform renewal rules [across different Wireless Radio Services] will promote the efficient use of spectrum resources, serve the public interest by providing licensees certainty regarding their license renewal requirements, encourage licensees to invest in new facilities and services, and facilitate their business and network planning." In this band, such an approach "will provide incentives for licensees to continue to provide service" over their license terms.

45. Some commenters have argued that, instead of renewability, the licenses should be reauctioned at the end of the license term. For example, one economist describes an auction format under which an incumbent would be required to bid for a renewal of its license at the end of the license term, but it would be given a bidding credit so that, if it won, it would have to pay only a fraction of the auction-determined price. Moreover, if the incumbent loses, it would be compensated with a transferable bidding credit to apply to the purchase of other licenses. The economist argues that this format would mitigate the risk that the incumbent licensee's investments may become stranded. This proposal gained little support in the record, however. Moreover, several commenters, opposing this proposal, argue that a "foothold" auction system will lower license valuations and initial investments in the band due to its complex approach within the setting of three-year terms and unknown subsidy rates. The Commission therefore declines to adopt this proposal in place of the time-tested approach of providing for renewability.

3. Performance Requirements

46. Background. In the 2015 Report and Order, the Commission determined that, in light of the three-year license term and non-renewability of PALs, the rules permitting opportunistic GAA use, and the relatively inexpensive deployment costs, "winning bidders for PAL licenses at auction will have sufficient incentive to deliver service so as to avoid the need for prescribing any further performance requirements." In the 2017 NPRM, the Commission sought comment on whether to adopt performance requirements for PALs, and if so, which type, if they are licensed with a longer term and renewability.

47. Discussion. The Commission finds that, given the changes to PALs adopted in the Report and Order (i.e., longer license terms, larger license areas, and renewability), it is in the public interest to revise its rules to adopt new end-of-term performance requirements for PALs. Specifically, Priority Access Licensees will be required to provide a bona fide communications service that meets a "substantial service" standard of performance, and the Commission adopts two specific safe harbors to meet this standard, one for mobile or point-to-multipoint services and a second for point-to-point services. A licensee providing a mobile service or point-to-multipoint service may demonstrate substantial service by showing that it provides reliable signal coverage and offers service over at least 50 percent of the population in the license area. A licensee deploying a point-to-point service may demonstrate substantial service by showing that it has constructed and operates, using Category B CBSDs, at least four links in license areas with 134,000 population or less, and at least one link per 33,500 population (rounded up) in license areas with greater population. Licensees may fulfill their performance requirements by showing that they meet at least one of these safe harbors, or they may make an individualized showing of substantial service by relying, for example, on a combination of different services for which there is a safe harbor or on services for which there is no defined safe harbor.

48. New performance requirements are warranted given the other changes to the PALs that adopted in this Report and Order. Performance requirements promote the productive use of spectrum, encourage licensees to provide service in a timely manner, and promote the provision of innovative services and technologies in unserved areas, particularly rural ones. Further, Section 309(j)(4)(B) of the

Act requires that the Commission, in establishing rules for auctioned licenses, must "include performance requirements, such as appropriate deadlines and penalties for performance failures . . . ." These considerations have led the Commission to require licensees to meet a particular standard or metric for performance in numerous other bands. The Commission found in 2015 that Priority Access Licensees had sufficient incentive to use their licensed spectrum that similar requirements were not necessary, in part due to the short license term and non-renewability. Given that the revised PALs will have a longer license term and renewability, as well as larger license areas, the Commission finds that the revised PALs are comparable to licenses in the other bands for which it has adopted a standard or metric for performance. Consistent with these past Commission actions, the Commission adopts such a performance requirement for the revised PALs to meet its obligations under Section 309(j)(4)(B), to reduce warehousing, and to promote timely and efficient use of spectrum, including in rural areas.

49. The Commission also find that, given the revised PAL parameters adopted herein, the potential for opportunistic GAA use of unused PAL spectrum does not obviate the need for performance requirements. Under the current rules, GAA users can operate in unused 3.5 GHz band spectrum on an opportunistic basis. GAA users will be excluded from operating only to the extent that the Priority Access Licensee actually operates over a given channel within its license area (i.e., only from the PAL Protection Area surrounding a deployed CBSD). Given the other changes to PALs (e.g., 10-year license terms, renewability, larger license areas), the Commission does not believe that opportunistic GAA use is, in itself, sufficient to prevent warehousing and encourage robust spectrum use. Absent performance requirements, the revisions to PALs likely will increase incentives for parties to seek PALs for speculative investment or warehousing. Such conduct could prevent intensive use of the band and reduce overall investment notwithstanding the option of GAA use. Notably, a lack of PAL performance would increase the uncertainty for GAA users surrounding long term spectrum availability. Potential GAA users would have little idea regarding when, where, and with what technology Priority Access Licensees may ultimately choose to deploy, which could reduce the incentive for GAA users to invest and innovate in the

band. Further, the record indicates that there is significant demand for 3.5 GHz spectrum that is contingent on the ability to obtain interference protection, and while an unused PAL will not foreclose GAA use, it can preclude others from deploying in that area with the benefit of priority access. Adopting performance requirements in the 3.5 GHz band will encourage Priority Access Licensees to make timely and productive use of their licenses, and to the extent they choose not to do so, will incentivize them to make priority access to spectrum available to others through secondary market transactions. Accordingly, the Commission finds that adopting performance requirements in this band is in the public interest.

50. After review of the record, and the various alternatives for performance requirements discussed therein, the Commission concludes that an end-of-term performance requirement of substantial service, with certain specific safe harbors, is the appropriate requirement for the revised PALs. Many commenters emphasize the importance of ensuring that performance requirements do not inhibit the innovation anticipated in this band. The substantial service requirement, with appropriate safe harbors for different types of network deployments, will provide licensees with the flexibility to deploy new and innovative technologies while ensuring that the spectrum is used in a productive manner by the end of the license term.

51. In particular, the Commission finds that specific safe harbors for different types of network deployments will provide additional regulatory certainty that will promote investment and encourage robust deployment in the band. Priority Access Licensees will have the option of satisfying their end-of-term performance requirement by demonstrating that they have provided service that meets or exceeds one of the safe harbors or making an individualized showing of substantial service in the license area. This approach will incentivize licensees to provide service throughout their license areas while retaining the flexibility to deploy new and innovative services. In addition, the Commission anticipates that the option of opportunistic GAA use, while not eliminating the need for new performance requirements, will complement such requirements and provide a low-cost entry point in the band. This should promote additional use of spectrum assigned to PALs and thereby help ensure efficient and

productive use of the band. For these reasons, the Commission finds that a substantial service standard, with appropriate specific safe harbors, adequately safeguards effective use of spectrum in the 3.5 GHz band and satisfies its obligations under section 309(j)(4)(B).

52. In selecting an appropriate safe harbor for mobile and point-to-multipoint services, the Commission notes that a wide range of metrics are proposed in the record. In addition, the Commission has adopted a range of performance standards for similar services in other spectrum bands. Several considerations in this band weigh in favor of a safe harbor that provides licensees with relatively greater flexibility. First, such flexibility is appropriate given the power limits for deployments in the 3.5 GHz band. The Commission adopted significantly lower limits in this band than it has typically imposed in other bands in order to reduce coexistence challenges and with the expectation that deployment in the 3.5 GHz band would often focus on innovative low-power technologies. The adopted power limits and the technologies that the Commission anticipates will be appropriate for them may bring significant localized benefits such as increased network capacity, but they may be less suitable for wide-area coverage as compared to other bands. A more flexible safe harbor will therefore better accommodate these technologies and promote the innovation anticipated in the band. In addition, the Commission's rules incorporate several other measures to facilitate coexistence that may introduce some uncertainty in the timing, cost, interference management, or technical specifics of deployment, such as limitations on commercial operations to protect incumbent users, the SAS authority to require, in specific cases, power reduction below the rule limits (and potentially other technical restrictions), and the potential for dynamic spectrum re-assignments or even cessation of operations to which licensees will be subject to protect incumbent operations. These unique aspects of the licensing and authorization regime in the 3.5 GHz band generally supports providing licensees with greater flexibility in deployment than the Commission has provided in some other bands.

53. In addition, a flexible performance requirement for mobile and point-to-multipoint may provide particular benefits to WISPs and other small providers in the 3.5 GHz band. The record supports

the conclusion that many small providers seek to overlay existing service areas that may incompletely cover a PAL license area, such as those who have deployed networks targeting unserved or underserved rural populations under the Commission's prior 3650-3700 MHz service rules. A flexible requirement that allows these providers to implement such overlay or incremental strategies will thus benefit small entities and help to foster a diversity of users in the band. Further, the Commission anticipates that opportunistic GAA use, although not eliminating the need for performance requirements, will complement such requirements and help to ensure that spectrum is used productively, including in rural areas. Accordingly, the Commission does not need to rely as heavily on performance requirements to ensure intensive and productive use in the 3.5 GHz band as in other bands.

54. After considering these factors and the arguments and proposals in the record, the Commission concludes that a 50 percent population coverage safe harbor strikes an appropriate balance between, on the one hand, ensuring spectrum is used efficiently and productively in rural and non-rural areas, including through secondary market access, and, on the other, providing licensees the flexibility to invest in and deploy innovative network technologies that may be more suitable for smaller coverage areas and the co-existence regime that governs the 3.5 GHz band. The Commission finds, consistent with the analysis above, that a 50 percent requirement, rather than the higher coverage requirements adopted in certain other bands, is appropriate in the context of the low power limits and other unique aspects of the licensing and authorization regime in the 3.5 GHz band. Further, this safe harbor for substantial service, together with secondary market mechanisms and the potential for opportunistic GAA use, will foster efficient and innovative use of the band, including in rural areas.

55. As the Commission indicated in 2015, it contemplates that the band may also be used for fixed point-to-point services. Commenters responding to the inquiry in the 2017 NPRM concerning the possible performance metrics provide little discussion of a metric or approach for fixed point-to-point services. The Commission has adopted a link-based metric for fixed point-to-point services in many other bands, however. In the absence of commenter proposals, the Commission draws on the link-based metric

adopted for fixed point-to-point services in the 2.3 GHz Band. Specifically, in the WCS Report and Order (75 FR 45058, Aug. 2, 2010), the Commission required 2.3 GHz licensees using the spectrum for point-to-point service to construct and operate a minimum number of links within each license area equal to the population of the license area divided by 33,500 and rounded up to the nearest whole number. The Commission found that this metric was "achievable" and would "further our goal of ensuring meaningful wireless deployment." A similar metric is generally a reasonable safe harbor for such services in the 3.5 GHz band. However, for license areas with 134,000 population or less, licensees must construct and operate a minimum of four links to meet the safe harbor, which will be an achievable minimum given the geographic license areas adopted. Further, the Commission limits the safe harbor to links that operate using registered Category B CBSDs. Category B CBSDs must be deployed outdoors and have higher maximum power limits in comparison with Category A CBSDs. Links using Category B CBSDs are therefore likely to be more consistent with the traditional point-to-point services the Commission intends for this safe harbor, and they will avoid the possibility that a licensee could satisfy its performance requirement for an entire license area with a single in-building IoT deployment such as a sensor network.

56. The Commission recognizes that Priority Access Licensees may seek to deploy innovative services, including low-power IoT-type services, for which the safe harbors discussed above may not be suitable. Given the lack of any comment on a metric or safe harbor for such services, and the uncertainty regarding what type of services will be deployed and what safe harbor would be appropriate in the context of the 3.5 GHz band's multi-tiered sharing regime, power limits, and other band-specific rules, the Commission declines to adopt a specific safe harbor for such services at this time. Priority Access Licensees providing such services may file individualized showings to demonstrate that they provided a bona fide communications service, either for unaffiliated customers or for private, internal use, that meets the standard of substantial service.

57. Priority Access Licensees also may provide a mix of services covered by more than one safe harbor. With respect to such mixed deployments, the Commission declines to establish a specific

formula for applying the safe harbors. Instead, licensees whose deployments contain a mix of services covered by more than one safe harbor may either demonstrate that at least one of these safe harbors is met, or they may make an individualized showing that the services in combination meet a standard of substantial service. The Commission clarifies, however, that in its assessment of individualized substantial service showings, the safe harbors established above will generally be important factors in cases involving, in whole or in part, services that fall within the scope of such safe harbors. Absent justifications such as those discussed above, and given the flexibility already incorporated into the safe harbors, its expects that, in cases of a service addressed by a safe harbor, substantial service will meet or exceed the relevant safe harbor standard.

58. The Commission declines to adopt interim performance requirements for PALs. Adopting specific coverage requirements as an interim requirement would be inconsistent with the flexible substantial service showings allowed at the end of the license term, and that requiring licensees to provide "substantial service" by both the end-of-term and some earlier interim point would create significant regulatory uncertainty as to the difference between the interim and end-of-term requirements, raise the risk of arbitrary and inconsistent results between licensees, and be unlikely to incentivize more rapid or extensive deployment in the band. Indeed, there is little support in the record for either of these approaches. In addition, the still-nascent status of 5G and other innovative wireless technologies anticipated for this band and the unique aspects of the 3.5 GHz sharing regime support providing Priority Access Licensees with additional flexibility in the timeframe provided to develop and deploy services in the band.

59. In order to confirm that the spectrum is being utilized consistent with the performance requirements, the Commission adopts performance verification procedures largely consistent with those for other bands. Parties must comply with the procedures under § 1.946 of the Commission's rules in making their compliance demonstration. That section provides, in part, that licensees must notify the Commission of compliance with the performance requirement within 15 days of the relevant deadline by

filing FCC Form 601. As part of this notification, licensees will be required to submit and certify to a description of the service and documentation of the extent of the service, including electronic coverage maps accurately depicting the boundaries of each license area and where in the license area the licensee provides service that meets the performance requirement (e.g., for mobile services, where in the license area the licensee offers the service at a reliable signal level), supporting technical documentation, population-related assumptions if relevant, and any other information as the Wireless Telecommunications Bureau may prescribe by public notice. The Commission further concludes that licensees, in demonstrating service coverage, may rely on the PAL Protection Areas of the relevant CBSDs they use to provide the service. They must, however, specify the CBSDs and certify that they actually are being used to provide service, either to customers or for internal use. In any case, licensees may not claim service coverage outside of these PAL Protection Areas or deployments that are not reflected in SAS records of CBSD registrations. This approach appropriately leverages the SASs to help ensure consistency and accuracy in performance demonstrations, reduce administrative burdens on licensees and the Commission, and speed compliance and renewal review. The Commission delegates authority to the Wireless Telecommunications Bureau to specify the format of submissions, consistent with these determinations.

60. Consistent with the approach in many other bands, if a licensee fails to meet the substantial service requirement, its authorization under the relevant license will terminate automatically without Commission action. The Commission declines to adopt a "use-or-lose" regime, as suggested by some commenters, under which a licensee would lose only those areas or census tracts within a license area that are not developed. Such an approach, which has been adopted rarely for other bands, would complicate coordination with the PAL tier and between PAL and GAA users, may reduce incentives for licensees to build out to the less populated areas covered by their license, and is unnecessary to ensure effective use of the spectrum.

61. The Commission clarifies that operations pursuant to lease arrangements, other than

short-term de facto transfer leasing arrangements, may be counted toward meeting the performance requirement, either under the safe harbors or as part of an individualized showing of substantial service. Doing so is consistent with the general rules for spectrum leasing, and the Commission finds that it will encourage parties to enter into secondary market transactions while ensuring that performance requirements will be met for the license overall. Consistent with the general short term de facto transfer leasing rule (covering de facto transfer leasing arrangements of one year or less), a licensee in such an arrangement will not be permitted to attribute to itself the activities of its spectrum lessee when seeking to establish that performance or build-out requirements applicable to the licensee have been met. The Commission rejects proposals that it credit licensees for merely making spectrum available for leasing on a spectrum exchange or otherwise, which would undermine the purposes of the performance requirement discussed above.

B. Competitive Bidding Procedures

1. Applicability of Part 1 Competitive Bidding Rules

62. PAL Applications Subject to Competitive Bidding. Consistent with its proposals to lengthen the term of a PAL, to make a PAL renewable, and to increase the size of a PAL's geographic area, the Commission proposed in the 2017 NPRM to employ its standard practice for finding mutual exclusivity among accepted applications. It also proposed to eliminate the rule that made available one less PAL than the total number of PALs in a license area for which all applicants had applied. The Commission further proposed to assign a PAL even when only one applicant has applied for a PAL in a specific license area, subject to the applicant's being otherwise qualified, rather than to adhere to its decision in the 2015 Report and Order not to assign any PAL for such a license area.

63. Given the other modifications the Commission adopts for PALs in this Report and Order, it eliminates the rule that made available one less PAL than the total number of PALs for which all applicants had applied in a given geographic license area. By making a PAL renewable, increasing the size of its geographic area, and lengthening its license term to 10 years, the Commission anticipates that

the rights conferred by a PAL will be more beneficial to a wider range of potential users. The previous rule, which was adopted to limit the number of PALs available in a given license area, was premised on the view that GAA use should be easy to access and sufficient for many applications in the 3.5 GHz band, but that PALs should be available for those limited applications that required greater certainty as to interference protection because they would suffer in a congested use environment. The changes adopted in this Report and Order ensure that PALs will support all technologies and foster additional investment from a wide variety of users in the 3.5 GHz band, thereby expanding the potential use cases by Priority Access Licensees, and based on the record, the Commission agrees with the argument that GAA use is less likely to provide sufficient access for many application in the 3.5 GHz band. Therefore, it can no longer conclude that the similar use cases for PALs and the GAA that existed under the prior rules provide a reasoned basis on which to limit the number of PALs available in a given geographic area. The Commission therefore agrees with commenters that the public interest will not be served by limiting the availability of PALs within a given geographic area in the 3.5 GHz band. Rather, by eliminating this rule, the Commission can better achieve a licensing process that will promote the "efficient and intensive use" of this spectrum and the "development and rapid deployment of new technologies, products, and services for the benefit of the public, including those residing in rural areas," that "recover[s] for the public . . . a portion of the value of the public spectrum resource made available for commercial use, and achieves the other goals of Section 309(j)."

64. Instead, the Commission will use its standard approach to determine whether accepted applications with respect to initial geographic area licenses are mutually exclusive applications subject to competitive bidding, which takes into consideration the Commission's need to "effectively implement" the public interest considerations underlying the licensing of the spectrum. Here, determining mutual exclusivity based on applicant interest in a given geographic area serves the public interest objective of assigning these licenses to the applicant that values them most highly and therefore is most likely to make effective use of them. Making the determination based on interest in geographic areas without respect to

particular frequencies or bandwidth is necessary to provide applicants with maximum flexibility to pursue back-up strategies to aggregate blocks to meet their licensing needs as the auction progresses and the value of and opportunities in the band become better known. Applicants here will have an opportunity to identify on their short-form application each geographic area(s) in which they are interested in bidding for PALs. An applicant will only be permitted to bid for PALs in the particular geographic area or areas that it initially selects on its short-form application, subject to the 40-megahertz PAL aggregation cap. The record supports following this approach for identifying an applicant's interest in a particular geographic area. If the Commission accepts more than one application to bid on the generic PALs available in any particular geographic area, those PALs will be assigned by competitive bidding. As in other Commission auctions, the Commission will proceed to competitive bidding even if other applicants ultimately do not pursue licenses in that area or pursue fewer than all the licenses available.

65. The Commission also adopts the proposal to assign PAL(s) even when there is only one application in a given geographic area, assuming the applicant is otherwise qualified. In the absence of accepting mutually exclusive applications, the Commission cannot assign a license through the use of competitive bidding. Accordingly, consistent with its long-standing approach, if the Commission does not accept competing applications in a particular geographic area, it will cancel the auction for the PAL(s) in that area, and if the short form application is otherwise acceptable, it will establish a date for the filing of a long-form application by the applicant. The Commission also eliminates the single applicant exception in rural areas as the exception is no longer necessary under this approach. Adopting this licensing approach for PALs generally is also consistent with the Commission's earlier decision to do so on a limited basis. The fundamental benefit of a PAL is the right to prioritized, interference protected use of 10 megahertz of spectrum in a given geographic area. Commenters maintain that there are certain use cases that require the interference protected use of the spectrum that only a PAL can confer, making GAA access, with its lack of prioritized access, insufficient. Under the rules adopted in this Report and Order, if there is only one applicant seeking a PAL in an area, that applicant will be able to acquire a PAL

outside of the auction process. Given that the decisions in this item make PALs similar in many ways to licenses in other services, the Commission concludes that it should follow this approach as it does in other services. In light of this decision and given the limited record received on the issue, the Commission further concludes that it need not address the issue of whether an application for a PAL in a given geographic area should be considered to be mutually exclusive with an application for GAA use in the same area.

66. The Commission reminds parties that it will conduct any auction of PALs in conformity with the general competitive bidding rules set forth in part 1, subpart Q of the Commission's rules, including any modifications that the Commission may adopt to its part 1 general competitive bidding rules in the future. As has been the Commission's practice in past spectrum auctions, the rules adopted in this Report and Order allow subsequent determination of specific final auction procedures. The pre-auction process will be initiated by the release of an auction Comment Public Notice, which will solicit public input on final auction procedures, and which will include specific proposals for auction components, such as minimum opening bids and bidding credit caps. Thereafter, an auction Procedures Public Notice will specify final procedures, including dates, deadlines, and other final details of the application and bidding processes. Accordingly, issues involving bidding procedures, like those raised by commenters, will be addressed at that time, and the Commission will seek public input on the competitive bidding procedures to be used for a particular auction of PALs. The Commission's practice of finalizing auction procedures in the pre-auction process provides time for interested participants both to comment on the final procedures and to develop business plans in advance of the auction.

67. Bidding on Specific PAL License Blocks. Under the current rules, Priority Access Licensees do not bid on specific spectrum blocks. Rather, the SAS assigns frequencies based on the amount of spectrum that a PAL licensee is authorized to use in a given license area. Licensees may request a particular channel or frequency range from the SAS, but they are not guaranteed a particular assignment. The SAS will "assign geographically contiguous PALs held by the same Priority Access

Licensee to the same channels in each geographic area" and "assign multiple channels held by the same Priority Access Licensee to contiguous frequencies within the same License Area" when it is feasible to do so.

68. In the 2017 NPRM, the Commission sought comment on the feasibility and desirability of allowing PAL licensees to bid on specific channel assignments. Specifically, the Commission sought comment on how it could allow bidding on specific license blocks given the constraints of the band and the need to protect incumbents. The Commission sought comment on whether the Incentive Auction could provide a model for a separate, voluntary channel assignment phase of the auction, and, if so, what changes to the Incentive Auction framework might be necessary to accommodate interference protection of federal incumbents by PALs. It also sought comment on possible alternative auction methodologies that might be appropriate.

69. The Commission affirms its decision that PALs will operate over 10 megahertz unpaired channels, wherein all channels will be assigned by the SAS. The exact frequencies of specific assigned channels may be changed by the SAS, if necessary, to facilitate sharing between the three tiers of authorized users. Accordingly, bidders will not be permitted to bid on specific channel assignments through competitive bidding. As the Commission previously explained, "flexible band management is essential to effective spectrum sharing between the three tiers of authorized users in the band." Coupled with the requirement that CBSDs be capable of operating across the entire 3.5 GHz band, SAS-controlled assignments will ensure that individual users are provided with flexible, stable access to the band. In assigning frequencies for Priority Access, the SAS must assign multiple channels held by the same Priority Access Licensee to contiguous channels in the same license area. Likewise, an SAS will be required to maintain consistent and contiguous frequency assignments for licensees with multiple PALs in the same or adjacent license areas whenever feasible. A wide variety of commenters support the current framework of SAS-assigned PAL channels.

70. While there may be some uncertainty for a Priority Access Licensee in receiving a

channel assignment from an SAS rather than bidding on a specific PAL license block, it is precisely this flexibility that is needed in a tiered licensing approach to ensure that a Priority Access Licensee is not forced to shut down its operations indefinitely or even permanently. Under a static channel assignment framework proposed by certain commenters, a Priority Access Licensee could be required to move off of a frequency to protect an incumbent, thus losing access to the exclusive channel until incumbent operations were no longer affected. In contrast, under the approach the Commission affirms in the Report and Order, the SAS will be able to reassign the Priority Access Licensee dynamically, ensuring prioritized access to 10 megahertz of spectrum. A flexible channel assignment plan where the SAS can reassign a PAL dynamically when an incumbent is using a specific channel, will lead to better coordination and co-existence between PAL holders and incumbents. For this reason, the Commission rejects the argument that a predictable, static spectral environment provides the certainty needed for network deployments, and concludes that the approach the Commission adopted in 2015 supports a wide variety of use cases in the 3.5 GHz band. As the Commission previously explained, by having the SAS assign all channels, its rules aim to create a flexible, responsive spectral environment while retaining much of the stability of traditional static channel assignments. As the Commission has previously observed, modern networks typically have control features that allow for automated or managed channel selection. On balance, the flexibility afforded by the assignment of channels by the SAS allows the Commission to ensure protection to the Incumbent tier, including federal users, exclusivity to the Priority Access tier, and access to GAA users.

2. Bidding Credits for PALs

71. In the 2017 NPRM, the Commission revisited its decision not to offer bidding credits in the 3.5 GHz band and sought comment on whether it should consider adopting such provisions for certain bidders or areas if it increased the size of a PAL's license area. Specifically, the Commission sought comment on whether it should adopt the bidding credits it used in the 600 MHz Band auction (Incentive Auction).

72. Small Business Bidding Credit. Based on the significant changes adopted for PALs in the Report and Order, as well as the Commission's experience with the use of bidding credits in recent spectrum auctions, the Commission concludes that utilizing bidding credits in competitive bidding for the 3.5 GHz band will provide it with an effective tool to achieve its statutory objective of promoting the participation of designated entities in the provision of spectrum-based service. Section 309(j)(4) of the Communications Act requires that when the Commission prescribes regulations to establish a methodology for the grant of licenses through the use of competitive bidding, it must "ensure that small businesses, rural telephone companies, and businesses owned by members of minority groups and women are given the opportunity to participate in the provision of spectrum-based services, and, for such purposes, consider the use of . . . bidding preferences." In addition, Section 309(j)(3)(B) provides that in establishing eligibility criteria and bidding methodologies, the Commission shall promote "economic opportunity and competition . . . by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants, including small businesses, rural telephone companies, and businesses owned by members of minority groups and women." Historically, one of the principal means by which the Commission fulfills this mandate is through "bidding preferences" in the form of bidding credits to small businesses.

73. Because the Commission has modified the characteristics of PALs to more closely resemble those of other wireless licenses, it concludes that designated entities might have less opportunity to obtain spectrum in the 3.5 GHz band without small business size standards and bidding credits. Thus, by modifying its rules to include bidding credits, the Commission can address the concerns that some commenters have raised that the decision to adopt counties as the geographic area size for PAL licensing and a longer, renewal license term will impede small businesses' ability to effectively compete in the auction. Commenters generally support implementing a system of bidding credits for the 3.5 GHz band and recognize the related pro-competitive benefits for smaller carriers. Accordingly, the Commission is persuaded by commenters that maintain offering bidding credits here should improve the ability of small

businesses to attract the capital necessary to meaningfully participate in a PAL auction.

74. In the 2017 NPRM, the Commission sought comment on using the same small business size standards and bidding credits for the 3.5 GHz band as the Commission offered in the 600 MHz Band. In adopting competitive bidding rules for the 600 MHz Band, and more recently in the UMFUS bands, the Commission offered bidding credits to promote opportunities for small businesses, rural telephone companies, and businesses owned by members of minority groups and women to participate in the provision of spectrum-based services. Specifically, for the 600 MHz and UMFUS band auctions, the Commission adopted two small business definitions, the highest two of the three thresholds included in the Commission's part 1 standardized schedule of bidding credits.

75. As a general matter, the Commission defines eligibility requirements for small businesses benefits on a service-specific basis, taking into account the capital requirements and other characteristics of each particular service in establishing the appropriate threshold. While the capital requirements of the services to be deployed in the 3.5 GHz band are not yet known, based on the record and on the its most recent actions in other similar wireless spectrum bands, the Commission concludes that using the same small business size standards and bidding credits adopted in the 600 MHz and UMFUS bands should enhance the ability of small businesses to acquire and retain capital and thereby compete more meaningfully at auction in the 3.5 GHz band. Use of these small business definitions and associated bidding credits should provide consistency and predictability for small businesses participating in competitive bidding in the 3.5 GHz band.

76. Accordingly, for the 3.5 GHz band, an entity with average annual gross revenues for the preceding three years not exceeding $55 million will be eligible to qualify as a "small business" for a bidding credit of 15 percent, while an entity with average annual gross revenues for the preceding three years not exceeding $20 million will be eligible to qualify as a "very small business" for a bidding credit of 25 percent, consistent with the standardized schedule in part 1 of the Commission's rules.

77. Rural Service Provider Bidding Credit. In the auction of 600 MHz Band licenses, the

Commission also offered, for the first time, a rural service provider (RSP) bidding credit to counter the fact that rural service providers have often faced "challenges in their efforts to obtain financing because the rural areas they seek to serve are not as profitable as more densely-populated markets." The RSP bidding credit provides a 15 percent bidding credit to eligible entities that predominantly serve rural areas and have fewer than 250,000 combined wireless, wireline, broadband and cable subscribers. Here too, the record supports the conclusion that an RSP bidding credit should provide an adequate tool to enable rural service providers to compete for 3.5 GHz band spectrum licenses at auction and in doing so, will support the statutory objectives to disseminate licenses among a wide variety of applicants, ensure that rural telephone companies have an opportunity to participate in the provision of spectrum-based services, and promote the availability of innovative services to rural America.

78. Tribal Lands Bidding Credit. The Commission also made tribal lands bidding credits available to winning bidders of licenses in the 600 MHz auction. In light of the record support for having similar bidding credits here as the Commission offered in the 600 MHz Band auction, and the modifications adopted for PALs that, as explained above, may cause designated entities to have less opportunity to obtain spectrum in this band, the Commission concludes that it should revise its earlier determination not to offer tribal lands bidding credits in competitive bidding for the 3.5 GHz band. The Commission generally has determined that such a credit should be available where wireless licenses are subject to the Commission's part 1 competitive bidding rules, and wireless providers are willing to offer service to qualifying tribal lands. Accordingly, a winning bidder for a market will be eligible to receive a credit for serving qualifying Tribal lands within that market, provided it complies with the applicable competitive bidding rules.

79. Finally, the Commission rejects a proposal from some commenters to provide a bidding preference for applicants that indicate their intention to use a PAL to meet Connect America Fund (CAF) obligations. Insofar as providers participating in CAF would be receiving CAF support already, additional bidding preferences should not be necessary, and are likely to distort participation in and the

results of both the CAF-II and 3.5 GHz auctions. It also rejects other proposals from commenters asking the Commission to offer bidding credits to entities based upon standards other than the ones discussed above. The record lacks support to justify a departure from the Commission's approach to promoting the participation of designated entities in the provision of spectrum-based service, and it believes that the small business and rural service bidding credits should help sufficiently to address the challenges that such groups face.

C. Partitioning and Disaggregation of PALs on the Secondary Market

80. Background. In the 2016 Report and Order, the Commission prohibited Priority Access Licensees from partitioning or disaggregating their licenses because the Commission found that the typical reasons for permitting partitioning and disaggregation in more traditionally licensed bands were not present in the 3.5 GHz band. The Commission noted that the licensing rules that it adopted in the 2015 Report and Order did not have the same characteristics as other bands where partitioning and disaggregation were permitted, such as longer license terms, larger license areas, and construction obligations. In other bands, partitioning and disaggregation were needed to promote key policy goals such as access to spectrum and flexibility of use, which in turn could result in greater service to consumers.

81. In the 2016 Report and Order, the Commission also determined that a light-touch leasing process could achieve the goal of making PAL spectrum use rights available in secondary markets—on a targeted, flexible basis—without the need for the Commission oversight required for partitioning and disaggregation. The Commission modified its streamlined part 1 spectrum manager lease rules to create a process tailored to the 3.5 GHz band. Under this streamlined process, parties contemplating spectrum manager lease arrangements with Priority Access Licensees may submit the required, non-lease specific certifications, including ownership information, to the Commission at any time prior to reaching a spectrum manger lease agreement with a Priority Access Licensee. The Commission will expeditiously process these certifications and provide SASs with confirmation that the putative lessee meets the

corresponding eligibility criteria for a spectrum manager lease. Once the lessee notifies the SAS of a spectrum manager leasing agreement with a Priority Access Licensee, the SAS may then quickly complete the spectrum manager lease notification process for that lease, and provide confirmation to the parties. The lessee may then immediately begin operating under the lease.

82. In the 2017 NPRM, the Commission proposed to allow partitioning and disaggregation of PALs in secondary market transactions. It noted that such a modification would be consistent with proposals to lengthen the license term and enlarge the geographic area of PALs, and that it also would be consistent with the licensing paradigm for other similarly licensed services. The Commission anticipated that, when coupled with a longer license term or larger license area for PALs, the ability to partition and disaggregate a PAL would be an effective way to improve spectral efficiency and facilitate targeted network deployments.

83. Discussion. The Commission adopts the proposal in the 2017 NPRM to allow partitioning and disaggregation of PALs in the 3.5 GHz band, because it will promote investment, encourage robust use of the band by a wide variety of stakeholders, and help to ensure that spectrum is used efficiently. The Commission consistently has found that the flexibility afforded by partitioning and disaggregation facilitates the efficient use of spectrum by enabling licensees to make offerings directly responsive to market demands for particular types of services, increasing competition by allowing new entrants to enter markets, and expediting provision of services that might not otherwise be provided in the near term. Particularly here, where the Commission has decided to license the 3.5 GHz band in larger geographic areas for longer, renewable license terms, allowing secondary market transactions will allow licensees and the marketplace to determine the correct size of licenses on a market-specific and needs-based basis. These licensing changes also bring the 3.5 GHz band in line with other bands where partitioning and disaggregation are allowed. Thus, the unique features of PALs that had previously militated against allowing partitioning and disaggregation in the band—small census tract licenses with three-year, non-renewable terms—are no longer present. Partitioning and disaggregation of licenses in

the 3.5 GHz band must comply with § 1.950 of the Commission's rules. Accordingly, each party to a partitioning or disaggregation agreement must have a clear construction and operation requirement and each party will face license termination, in the event of failure to meet these requirements. Allowing partitioning and disaggregation will not alter the light-touch leasing rules adopted in the 2016 Report and Order.

84. Many commenters support allowing partitioning and disaggregation of PALs, particularly when coupled with the larger geographic area license size, longer license term, and license renewability that the Commission adopts in this Report and Order. These entities maintain that the flexibility afforded by partitioning and disaggregation will encourage a thriving secondary market, facilitate "right sizing" PALs for any local market, and increase the likelihood that a greater percentage of the whole PEA ultimately will receive service." These rationales all support the Commission's decision to allow PAL partitioning and disaggregation in the 3.5 GHz band.

85. Some commenters maintain that partitioning and disaggregation are not substitutes for initially licensing smaller license areas. Their positions, however, relate to disagreements over license size rather than opposition to these secondary market transactions per se. Some commenters that oppose increased license sizes in the band contend that partitioning and disaggregation offer some benefits, particularly in rural areas where even census tract-sized licenses can be very large. For the reasons discussed above, the Commission determines that licensing PALs on a county basis serves the public interest. It agrees, however, that partitioning and disaggregation are important tools which will help it fulfill its statutory mandate to make spectrum available across the United States, in all markets from urban to rural.

86. Other commenters contend that simply allowing secondary market transactions in the band will not necessarily result in such transactions. These commenters maintain that large wireless providers generally are unwilling to make licensed spectrum available on the secondary market. Some assert that secondary market transactions operate far more frequently and efficiently in the opposite

direction, allowing large carriers to aggregate spectrum that initially was acquired by smaller operators. Other commenters argue that high transaction costs inhibit a robust secondary market.

87. The Commission is unpersuaded by commenters' claims that small entities will be unable to participate in secondary market transactions. Commission records reflect that there is an active secondary market for partitioned and disaggregated licenses. The Commission has received about 1,000 assignment applications involving partitioned or disaggregated licenses over the last 10 years. Further, the unique characteristics of the 3.5 GHz band are particularly conducive to secondary market transactions. First, the SAS can be leveraged to facilitate secondary market transactions. In addition, the use-or-share rule greatly diminishes the concerns of potential hoarding or incomplete deployment over a license area. Priority Access Licensees will be incentivized to sell on the secondary market spectrum within their license area that may lie outside of their current network build or that they otherwise do not need access to for their future deployments. The availability of up to seven PALs in each market combined with a 40 megahertz spectrum aggregation limit also decrease the likelihood of excessive or even prohibitive transaction costs.

88. The Commission rejects the suggestion of some commenters that, if it determines to license PALs in larger geographic areas, it should impose an affirmative obligation on larger providers to engage in secondary market transactions with smaller providers and new entrants. The Commission typically relies upon market forces and economic incentives to drive spectrum to its most beneficial use. This remains the correct approach in this band.

89. One commenter questions whether this approach fulfills the Commission's statutory and public responsibilities under section 309(j) of the Act to promote "economic opportunity for a wide variety of applicants." It maintains that the Commission would be relying solely on private commercial interests' use of partitioning, disaggregation, and secondary market transactions to provide such economic opportunities. The Commission disagrees. By developing a new framework to license PALs by counties, the Commission creates opportunities for a variety of applicants both large and small to participate in this

innovative band. Further, by making a variety of secondary market opportunities available to all licensees, it creates economic opportunities for all types of entrants to the band. The decision to permit partitioning and disaggregation in the band furthers, rather than undermines, efforts to fulfill the Commission's statutory responsibilities under section 309(j). This change, along with the others adopted in this Report and Order, will best balance the statutory objectives to promote competition, the efficient use of spectrum, and the deployment of innovative services to consumers—including those in rural areas. The Commission's decision to adopt performance requirements for PALs also advances its efforts to fulfill the statutory obligations under section 309(j) by helping to ensure that spectrum won't lie fallow.

90. For these reasons, the Commission finds that it is in the public interest to permit partitioning and disaggregation in the 3.5 GHz band, subject to the requirements in § 1.950 of the rules. The Commission's spectrum manager and de facto leasing rules remain in effect for PALs, thus affording potential entrants to the band a variety of options for accessing this spectrum.

D. PAL Spectrum Aggregation Limit

91. Background. In the 2015 Report and Order, the Commission adopted an in-band spectrum aggregation limit of 40 megahertz (i.e., four PALs) of the possible 70 megahertz per license area at any given point in time. The Commission concluded that the benefits of facilitating competition, innovation, and the efficient use of the 3.5 GHz band outweighed any harms of imposing such an aggregation limit. In the 2017 NPRM, the Commission asked whether it should modify or eliminate the PAL aggregation limit, in the event it determined to change the geographic license area or make other changes to the PAL licensing scheme.

92. Discussion. The record largely supports retaining the PAL aggregation limit. For the reasons articulated in the 2015 Report and Order, the Commission finds that the current framework for auction, assignment, and operation of the 3.5 GHz band is sufficient to incentivize investment and participation by a broader range of participants. The other changes made to the PAL licensing regime do not alter the Commission's underlying rationale that the 40 megahertz PAL aggregation limit will provide

a minimum degree of diversity among users that likely will be operating in this band, and foster competition and innovation in both PAL and GAA uses. Accordingly, the Commission maintains the PAL aggregation limit for both licensees and lessees.

E. Confidentiality of CBSD Registration Information

93. Background. In the 2015 Report and Order, the Commission required that all CBSDs register with and be authorized by an SAS prior to initial service transmission. The SAS ensures spectral efficiency, non-discriminatory coexistence, and the minimalization of interference among GAA users, by such means as managing the frequencies in a manner to avoid assignment of the same frequency to multiple GAA users at the same location to the extent possible. CBSD registration must include detailed information specifying the location and characteristics of the CBSD. In addition, the CBSD must send an update to the SAS within 60 seconds of any change in the registration information. The Commission required SAS Administrators to disclose CBSD registration information in three circumstances. First, SAS Administrators must immediately respond to requests from Commission personnel for information stored or maintained by the SAS. Second, SAS Administrators must make available to other SAS Administrators all information necessary to effectively coordinate operations between and among CBSDs. Third, SAS Administrators must make CBSD registration information available to the general public. However, due to concerns raised by commenters about the potential for public disclosure of confidential business information that could compromise personal privacy or affect competitive interests, the Commission required SAS Administrators to "obfuscate the identities of the licensees providing the information for any public disclosures."

94. Noting that some parties had asserted that public disclosure of the registration information, even with licensee identities obfuscated, would raise both competitive and security concerns, the Commission proposed in the 2017 NPRM to amend the rules to prohibit an SAS from disclosing publicly any CBSD registration information that may compromise the security of critical network deployments or be considered competitively sensitive. The Commission noted that it was not proposing

any change in SAS-to-SAS information sharing requirements. The Commission sought comment, inter alia, on the potential risks presented by the public disclosure requirement, how to balance these potential risks against potential users' need for information to plan future GAA and/or PAL deployments, and whether there was a mechanism short of public disclosure for potential users to plan future GAA and/or PAL deployments, such as by communicating with an SAS on a confidential basis. It further sought comment on whether there was certain information an SAS could publicly provide while balancing data sensitivity and security concerns.

95. Discussion. After careful consideration of the record, the Commission finds that it is in the public interest to protect CBSD registration information from public disclosure while still ensuring that aggregated data on spectrum use is made available to the public. Specifically, the Commission prohibits SAS Administrators from disclosing disaggregated CBSD registration data to the public except where such disclosure is authorized by the registrant. However, it also requires SAS Administrators to make aggregated spectrum usage data for any particular area of interest available to the public, including the extent of usage and available spectrum in the 3.5 GHz band throughout that area and the maximum available contiguous spectrum, using graphical "heat maps" or other appropriate formats. This approach will effectively balance the interests in protecting sensitive network information and the legitimate needs that parties—including potential GAA operators—may have for information on the local spectrum environment. The Commission is not modifying the current requirements governing SAS-to-SAS information exchange.

96. Although the current requirement provides that licensees' identities must be obfuscated, numerous commenters argue that public disclosure of CBSD registration information would still allow competitors or other parties to identify the licensee—using a combination of publicly available data—and obtain competitively sensitive information about the licensee's network. Some commenters also argue that such information could compromise the security of network infrastructure. Due to the concerns raised by commenters, the Commission finds that, on balance, the current requirement to publicly disclose

CBSD registration information does not adequately protect sensitive information about licensees' network deployments.

97. The Commission continues to find, however, that the success of the shared spectrum model adopted for the 3.5 GHz band requires providing potential users of the band with enough information to accurately assess the overall spectrum environment in an area in order to make investment and deployment decisions. It further finds substantial support in the record for the conclusion that revising the public disclosure requirement to require the disclosure of aggregated spectrum usage data will enable potential users of the 3.5 GHz band to make investment and deployment decisions, while significantly reducing the concerns from the disclosure of disaggregated device registration data. Several commenters support disclosure of a heat map based on aggregate data showing the level of spectrum use in a given area and the amount of spectrum available, arguing that such an approach would permit current and prospective users to better plan for future deployments while withholding potentially commercially sensitive or security-related, licensee-specific information. Accordingly, the Commission finds that it will serve the public interest to require SAS Administrators to make publicly available up-to-date aggregated spectrum usage data for any desired area of interest, including the extent of usage and available spectrum in the 3.5 GHz band throughout that area and the maximum available contiguous spectrum, using graphical "heat maps" or other appropriate formats that provide this information.

98. This approach strikes a better balance between protecting sensitive network information and the legitimate needs that parties have for information on the local spectrum environment than a prohibition on any public disclosures. Some commenters, while not disputing that potential users will need information on the spectrum environment to plan their deployments, argue that any public disclosure is nevertheless unnecessary because, under a Wireless Innovation Forum working document, SAS Administrators must publish certain information to assist operators in assessing whether there is available spectrum. The suggestion that no Commission requirement is needed in the light of the working document requirements is unpersuasive, particularly given that the working document requirements were

only adopted pursuant to the existing Commission disclosure requirement. Some commenters argue that disclosure is unnecessary because potential users can obtain information from SAS Administrators on a confidential basis to make such decisions. But these commenters do not provide details regarding how such an option would operate, who would be authorized to access CBSD registration information, and under what circumstances access would or would not be provided. The Commission finds that, on the record before it, the revised public disclosure requirement it adopts in this Report and Order is the best choice because it will ensure that all potential users have certain and convenient access to aggregate data on the spectrum environment for the area of interest while substantially reducing any legitimate concerns regarding the sensitivity of network data. The Commission acknowledges that aggregate spectrum usage data might in some circumstances implicitly reveal some provider- or CBSD-specific information (such as in cases where a 3.5 GHz Priority Access Licensee has deployed CBSDs in a particular geographic area with no other deployments in the band). It finds, however, that the benefits of the revised public disclosure requirement and its importance to the success of the shared model in the 3.5 GHz band far outweigh any remaining concerns from the potential for such inferred disclosures.

99. Some proponents of the current requirement assert that the harms of disclosure should be discounted because the deployment information will in any case become available through other means. The Commission disagrees that the possibility that, in the future, there may be independent methods to obtain data about some licensees' networks is an appropriate justification for us to disregard concerns over the commercial sensitivity of that data and to allow today the public disclosure of commercially sensitive data about all licensees' networks. Further, there is no evident source currently that would reproduce the CBSD registration information and find it unlikely that any third-party public source will provide 3.5 GHz band network infrastructure data of the same character, in terms of information covered, specificity, comprehensiveness, timeliness, and accuracy. As evidence that CBSD registration data will likely be available from providers' own voluntary disclosures, some commenters cite several cable provider websites disclosing the location of their commercially offered Wi-Fi hotspots. However, the

Commission finds these disclosures of the locations of Wi-Fi hotspots reflect that such Wi-Fi services are typically provided only at discrete locations. Such disclosures do not support the conclusion that mobile broadband providers would similarly disclose the location of individual antenna sites that are subsumed within the broad coverage of a cellular service. The Commission also rejects the argument that concerns regarding the disclosure of the network data should be discounted because access points will cover very limited areas. While the anticipated deployment of 5G services in the band will likely often involve small cell technologies, that does not reduce the sensitive nature of the deployment information.

100. Some commenters also argue that the Commission typically has disclosed site information in historic site-based licensing regimes and that there is no reason to provide any greater protection here. Their assessment of Commission practice disregards other Commission or Bureau actions, however, that have found that comparable disclosures of network infrastructure information encompass sensitive information that warranted some degree of protection. These latter precedents, as well as the record in this proceeding, support a determination that parties have legitimate concerns regarding the sensitivity of CBSD registration data that may impact their investment and deployment decisions.

101. Arguments in the record that a disclosure of aggregate data would be insufficient are similarly unpersuasive. Some commenters argue that a GAA user will need to know how many contiguous channels are available throughout its service area in order to predict the speeds it can offer its subscribers; however, the modified requirement directly addresses that concern because the Commission requires publicly disclosed information to include aggregate information on the maximum number of contiguous channels available. While one commenter argues that a heat map is inadequate because it does not necessarily provide sufficient information for the aiming of directional antennas, aggregate data should enable potential users to identify geographic areas with sufficient available spectrum to support a range of directional orientations for deployments within that area. Some commenters argue that licensees need information on specific channel availability. However, specific channel availability will be far less

relevant to 3.5 GHz band network planning than aggregate spectrum availability, given that all 3.5 GHz band equipment must be operable across the entire band, and that the SASs will be making the frequency assignments, which will be subject to change during the operation of the equipment.

102. One commenter proposes that if the Commission determines that the current public disclosure requirement raises security or competitive concerns, it should require SAS Administrators, in their public disclosure of disaggregated data, to obscure or randomize the location of individual CBSDs within a triangle of points 50 linear feet apart or another defined area. The Commission finds this proposal does not differ significantly from the current requirement, which does not adequately protect competitively sensitive information. The modified requirement is a better approach to address the concern, as it will directly provide current and potential users with information on the availability of spectrum in a geographic area without requiring public disclosure of disaggregated CBSD data.

103. Other purposes that commenters identify for the public disclosure of disaggregated registration data are likely to be able to be achieved without the public disclosure of such data. For example, while some argue that disclosure will help users identify sources of interference, that is a core function of the SAS itself and therefore does not require public disclosure of disaggregated SAS registration data. The role of the SASs further distinguishes the 3.5 GHz band from the prior 3650-3700 MHz Band service rules, where the Commission adopted public disclosure of site registrations to enable non-exclusive licensees to coordinate to avoid harmful interference. Under that regime, there was no license administrator to facilitate coordination.

104. The Commission does not find that disclosure would enable the public to detect and hold operators accountable for erroneous or obsolete information, as some commenters argue. The Commission acknowledges that, for the white space database, it did adopt public disclosure for some registrations in part to "permit public examination of protected entity registration information to allow the detection and correction of errors." However, it finds the 3.5 GHz band is not analogous to the white space service in this regard, as the Commission discussed extensively in the 2016 Order on

Reconsideration (81 FR 49038, July 26, 2016). Among other distinctions in the case of 3.5 GHz, the Commission noted that "[t]he licensed nature of the service coupled with industry certification requirements for professional installers provides a higher degree of accountability for Citizens Broadband Radio Service users and SAS Administrators, ensuring that CBSD locations are accurately reported and verified." It further noted that SASs "will have capabilities and responsibilities that exceed those of White Spaces database administrators," including rules that require authentication of CBSDs with an SAS and require that SAS Administrators maintain the accuracy of CBSD records, which "places a duty on SAS Administrators to take reasonable steps to validate newly entered data and to purge obsolete data." Accordingly, the Commission finds there is not the same benefit from public disclosures in helping to ensure registration accuracy in this context as was present in the white space service.

105. The Commission also disagrees that Category B GAA users will need disaggregated registration data, and particularly relevant contact data, to fulfill their obligation to coordinate with other Category B GAA users under § 96.35(e) of the Commission's rules. Mandatory disclosure of disaggregated CBSD registration data, including contact data, is not necessary for Category B GAA coordination, and voluntary mechanisms and arrangements facilitated by an SAS, supplemented by the mandatory disclosure of aggregate spectrum usage data, can reasonably be expected to support and achieve the coordination contemplated in § 96.35(e), given that Category B GAA users will generally have mutual incentives to coordinate with one another and SASs are required to facilitate such coordination. For example, one multi-stakeholder standards document for Citizens Broadband Radio Service commercial operation, noted by several commenters, addresses the need for GAA coordination through a voluntary approach to be administered by the SASs. The Commission anticipates that the SAS Administrators will play an active role in facilitating GAA coordination, and bases its expectation that a voluntary mechanism will be successful in part on SAS involvement.

106. The Commission also anticipates that disclosure of aggregate information on spectrum availability will be sufficient in many cases to help interested parties identify potential secondary market

opportunities, and that the SASs will help facilitate secondary market transactions in other ways that do not require disaggregated disclosure. Further, parties can directly contact the Priority Access Licensees in a particular license area (which will be a matter of public record) for that purpose. Indeed, even if the Commission continued to mandate disclosure of anonymized CBSD data, it would still generally be necessary to determine from the licensees in an area (either directly or through SAS facilitation) whether a particular licensee has unused PAL spectrum it is willing to make available through a secondary market transaction. To the extent that mandatory public disclosures of detailed, disaggregated CBSD registration data might in some circumstances provide some additional benefit over aggregate data, and the benefits are outweighed by the security and competitive concerns that such disclosures would raise. In sum, the Commission concludes that the revised requirement provides a reasonable balance for the services in the 3.5 GHz band, including emerging 5G and other innovative services anticipated in this band, and will thus promote its effective and efficient use.

F. Emissions Limits for CBSDs and End User Devices

107. Background. The Commission's rules include the following emissions limits for CBSDs and End User Devices operating in the 3.5 GHz band:

- -13 dBm/MHz from 0 to 10 megahertz from the assigned channel edge;
- -25 dBm/MHz beyond 10 megahertz from the assigned channel edge down to 3530 megahertz and up to 3720 megahertz;
- -40 dBm/MHz below 3530 megahertz and above 3720 megahertz.

108. The Commission adopted these limits to achieve a balance between the ability of CBSDs and End User Devices to protect out-of-band incumbent services, the ability of equipment vendors to meet reasonable standards of design performance, and the ability of CBSD and End User Devices to minimize the addition of in-band noise affecting other users of the band. The Commission denied petitions for reconsideration that sought changes to these limits in 2016.

109. In the 2017 NPRM, the Commission sought comment on two alternative emission masks to address concerns about the need to reduce transmit power for channels wider than 10 megahertz under

the emissions mask set forth in § 96.41(e) of the Commission's rules. Both alternative emission masks would extend the width of the -13 dBm/MHz transition step. Instead of the fixed 10 megahertz wide transition step in § 96.41(e)(1), each alternative emission mask would extend the total transition bandwidth to be the bandwidth (B) of the fundamental transmission in megahertz. The first alternative emission mask (the Qualcomm Mask) has a single transition step at a level of -13 dBm/MHz. The second alternative emission mask (the Graduated Mask) has two steps with a steeper reduction of adjacent emission power, -13 dBm/MHz from 0 to B/2 megahertz from the channel edge, and -20 dBm/MHz from B/2 to B megahertz from the channel edge. The Commission sought comment on these two alternative emission masks and specifically requested quantitative analysis of the tradeoffs between the use of wider channels and the risk of higher interference to users in adjacent channels.

110. Qualcomm submitted results of a simulation study of the additional maximum power reduction (A-MPR) that would be required for the Qualcomm Mask and the Graduated Mask. Qualcomm asserts that both masks require the same amount of (non-zero) power reduction (e.g., 2.2 dB) for channels with high resource utilization, but the Graduated Mask requires 0.8 dB – 2.5 dB additional power reduction than the Qualcomm Mask for channels with low resource utilization. Thus, Qualcomm argues that its mask will more effectively facilitate wider bandwidth operations with less impact on transmit power. In ex parte presentations on March 6, 12, and 14, 2018, Qualcomm further asserted that with its proposed mask, emission reduction is achieved by power reduction resulting from both the spectrum emission mask (SEM) and the 3GPP Adjacent Channel Leakage Ratio (ACLR) requirement of 30 dB for user devices. In some cases, the ACLR requirement (and not the SEM) determines the amount of emission reduction, and in other cases the SEM requirement (and not the ACLR) determines the amount of emission reduction.

111. Discussion. After review of the record, the Commission concludes, first, that it should make no changes to the OOBE limits outside the 3.5 GHz band, specifically at or beyond the 3550 and 3700 MHz band edges. Second, it is not convinced that any change is needed in the emissions mask for

Category A and B CBSDs to facilitate next generation wireless deployments, including 5G channels up to 40 megahertz wide. Third, it finds that some relaxation in the emissions mask for uplinks from End User Devices is warranted to accommodate wider bandwidths. This change will help facilitate wide-network deployments, consistent with the other changes adopted herein.

112. There is little in the record to suggest that changes in the OOBE limits outside the 3.5 GHz band are necessary to accommodate signals having wide bandwidths. Indeed, many commenters argue that there should be no relaxation of the emissions limits outside the 3.5 GHz band. The existing OOBE limits outside the 3.5 GHz band were adopted to ensure interference protection for fixed satellite services operating above the band and federal operations below the band. These important adjacent band coexistence issues have not changed since the rules were adopted and, as such, there is no need to reconsider the Commission's prior findings on this matter.

113. In addition, the Commission finds that no changes to the emission limits for CBSDs are needed. Qualcomm's proposal is focused solely on End User Devices and there were no other technical showings that would support relaxation of the emissions limits for CBSDs. Indeed, equipment vendors argue that no change to the emission limits are necessary because current technologies can meet the existing limits and the existing rules allow higher power with wider bandwidth, which helps counteract the need for a reduction in power. The Commission believes their comments were in the context of CBSDs (i.e., base stations).

114. The Commission is aware that it is generally easier to employ linearization techniques and better filtering in CBSDs to achieve low out-of-channel emissions because they operate off external electrical power and are less constrained by space limitations in the device as compared to End User Devices. Accordingly, the Commission is maintaining the existing OOBE limits for CBSDs.

115. There is justification for relaxing the OOBE limits within the 3.5 GHz band for End User Devices to accommodate bandwidths wider than ten megahertz. The Commission adopts the Qualcomm Mask and an adjacent channel leakage requirement of -30 dBc for End User Devices, because

Qualcomm's analysis showed that -30 dBc, a 3GPP standard, in addition to the Qualcomm Mask, would limit the total emission power that affects adjacent channels. While most commenters support the Qualcomm Mask rather than the Graduated Mask, the Commission is concerned that the Qualcomm Mask, by itself, may lead to a higher level of OOBE than necessary to accommodate wider bandwidths with little or no power reduction. The Commission also believes that much of the equipment that will be used in this band will be designed to meet 3GPP standards. The 3GPP standards are based on an adjacent channel leakage ratio (ACLR) of 30 dBc for End User Devices, as well as a spectrum emission mask. The value of ACLR is a measure of the total power in the adjacent channel, as opposed to an emission mask that specifies a (typically) flat (per-megahertz) limit over some frequency range, with reductions at particular points (i.e., 10 megahertz outside the channel). In its March 14, 2018 filing, Qualcomm demonstrated that for End User Devices, neither the Qualcomm Mask nor the Graduated Mask is sufficient, in some cases, to ensure that adjacent channel leakage is at least 30 dB below the fundamental channel power (i.e., 3GPP ACLR limit of 30 dB). This necessitates maximum power reduction based on an ACLR limit, to ensure that adjacent channel emission power is sufficiently minimized. Qualcomm performed software simulation of End User Device transmitter emission performance for many combinations of uplink sub-carrier assignments, for inner channels, for edge channels, and for different configurations of contiguous and non-contiguous spectrum assignments. Their analysis showed the power back-off required to meet 3GPP performance standards for edge channels and inner channels, for the current mask, the Qualcomm Mask, and the Graduated Mask. Based on this analysis, the Commission believes that adopting the two emission requirements assessed by Qualcomm—the Qualcomm emission mask and ACLR—would allow for wider transmission bandwidths, and ensure that in-band noise is appropriately limited for all End User Devices, not just 3GPP user equipment. Therefore, it adopts the Qualcomm Mask and an adjacent channel leakage requirement of -30 dBc for End User Devices.

116. Some commenters expressed concern that changes to the emission limits could make some channels in the band (i.e., those furthest from the band edges) more desirable than others. While

wider bandwidth operations using spectrum near the upper and lower edges of the 3.5 GHz band may need to make adjustments—including operating at lower power—to use those parts of the band, the Commission does not believe this makes these parts of the band any less usable. The 3.5 GHz band will likely be used by a variety of different operators, each with unique spectrum needs. These operators should have the flexibility to use the band at a variety of different bandwidths and operational power levels suited to their particular business. For example, parties seeking to use the lower 10 megahertz channel may also seek to use it together with adjacent channels for wider aggregated bandwidth. They can also choose to employ devices with better filtering, slightly reduce power, or aggregate non-contiguous individual channels. The Commission is also cognizant that there is apt to be wide variability in the ability of multiple contiguous channels at any given location because it will depend on factors such as which channels have different licensees and the extent of other deployments in the band.

117. Finally, the Commission corrects a typographic error in a paragraph reference in § 96.41(e)(2) of its rules, which should reference paragraph (e)(1) instead of (d)(1).

IV. Procedural Matters

118. Paperwork Reduction Analysis.—This Report and Order contains new and modified information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA), Public Law No. 104-13. It will be submitted to the Office of Management and Budget (OMB) for review under section 3507(d) of the PRA. OMB, the general public, and other Federal agencies will be invited to comment on the new and modified information collection requirements contained in the proceeding. In addition, the Commission notes that pursuant to the Small Business Paperwork Relief Act of 2002, it previously sought specific comment on how we might "further reduce the information collection burden for small business concerns with fewer than 25 employees." It has described impacts that might affect small businesses, which includes most businesses with fewer than 25 employees, in the Final Regulatory Flexibility Analysis (FRFA), in Appendix B of the Report and Order.

119. Congressional Review Act.—The Commission will send a copy of this Report and Order

to Congress and the Government Accountability Office pursuant to the Congressional Review Act, see 5 U.S.C. 801(a)(1)(A).

120. Regulatory Flexibility Act.—The Regulatory Flexibility Act of 1980, as amended (RFA), requires that an agency prepare a regulatory flexibility analysis for notice and comment rulemakings, unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities." Accordingly, the Commission has prepared a FRFA, set forth in Appendix B of the Report and Order, concerning the possible impact of the rule changes.

V. Ordering Clauses

121. Accordingly, IT IS ORDERED that, pursuant to Sections 1, 2, 4(i), 4(j), 5(c), 302, 303, 304, 307(e), and 316 of the Communications Act of 1934, as amended, 47 U.S.C. 151, 152, 154(i), 154(j), 155(c), 302, 303, 304, 307(e), and 316, this Report and Order in GN Docket No. 17-258 IS HEREBY ADOPTED.

122. IT IS FURTHER ORDERED that the amendments of the Commission's rules as set forth in the Final Rules section ARE ADOPTED, effective thirty (30) days after publication in the Federal Register. Sections 96.23(a), 96.25(b)(4), and 96.32(b) contain new or modified information collection requirements that require review by the Office of Management and Budget (OMB) under the Paperwork Reduction Act. The Commission directs the Bureau to announce the effective date of those information collections in a document published in the Federal Register after the Commission receives OMB approval, and directs the Bureau to cause §§ 96.23(d), 96.25(b)(5), and 96.32(d) to be revised accordingly.

123. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Report and Order, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

124. IT IS FURTHER ORDERED that this Report and Order SHALL BE sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, see 5 U.S.C. 801(a)(1)(A).

List of Subjects in 47 CFR Parts 1 and 96

Telecommunications, Radio.

FEDERAL COMMUNICATIONS COMMISSION.

Katura Jackson,

Federal Register Liaison Officer,
Office of the Secretary.

Final Rules

For the reasons discussed in the preamble, the Federal Communications Commission amends 47 CFR parts 1 and part 96 as follows:

PART 1—PRACTICE AND PROCEDURE

1. The authority citation for part 1 is revised to read as follows:

Authority: 47 U.S.C. chs. 2, 5, 9, 13; Sec. 102(c), Div. P, Public Law 115-141, 132 Stat. 1084; 28 U.S.C. 2461, unless otherwise noted.

2. Amend § 1.907 by revising the definition of "Covered Geographic Licenses" to read as follows:

§ 1.907 Definitions.

* * * * *

Covered Geographic Licenses. Covered Geographic Licenses consist of the following services: 1.4 GHz Service (part 27, subpart I, of this chapter); 1.6 GHz Service (part 27, subpart J); 24 GHz Service and Digital Electronic Message Services (part 101, subpart G, of this chapter); 218-219 MHz Service (part 95, subpart F, of this chapter); 220-222 MHz Service, excluding public safety licenses (part 90, subpart T, of this chapter); 600 MHz Service (part 27, subpart N); 700 MHz Commercial Services (part 27, subparts F and H); 700 MHz Guard Band Service (part 27, subpart G); 800 MHz Specialized Mobile Radio Service (part 90, subpart S); 900 MHz Specialized Mobile Radio Service (part 90, subpart S); Advanced Wireless Services (part 27, subparts K and L); Air-Ground Radiotelephone Service (Commercial Aviation) (part 22, subpart G, of this chapter); Broadband Personal Communications Service (part 24, subpart E, of this chapter); Broadband Radio Service (part 27, subpart M); Cellular Radiotelephone Service (part 22, subpart H); Citizens Broadband Radio Service (part 96, subpart C, of this chapter); Dedicated Short Range Communications Service, excluding public safety licenses (part 90, subpart M); H Block Service (part 27, subpart K); Local Multipoint Distribution Service (part 101, subpart L); Multichannel Video Distribution and Data Service (part 101, subpart P); Multilateration Location and Monitoring Service (part 90, subpart M); Multiple Address Systems (EAs) (part 101, subpart O); Narrowband Personal Communications Service (part 24, subpart D); Paging and

Radiotelephone Service (part 22, subpart E; part 90, subpart P); VHF Public Coast Stations, including Automated Maritime Telecommunications Systems (part 80, subpart J, of this chapter); Upper Microwave Flexible Use Service (part 30 of this chapter); and Wireless Communications Service (part 27, subpart D).

* * * * *

3. Amend § 1.949 by revising paragraph (c) to read as follows:

§ 1.949 Application for renewal of authorization.

* * * * *

(c) *Implementation*. Covered Site-based Licenses, except Common Carrier Fixed Point-to-Point Microwave Service (part 101, subpart I, of this chapter), and Covered Geographic Licenses in the 600 MHz Service (part 27, subpart N, of this chapter); 700 MHz Commercial Services (part 27, subpart F); Advanced Wireless Services (part 27, subpart L) (AWS-3 (1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz) and AWS-4 (2000-2020 MHz and 2180-2200 MHz) only); Citizens Broadband Radio Service (part 96, subpart C, of this chapter); and H Block Service (part 27, subpart K) must comply with paragraphs (d) through (h) of this section. All other Covered Geographic Licenses must comply with paragraphs (d) through (h) of this section beginning on January 1, 2023. Common Carrier Fixed Point-to-Point Microwave Service (part 101, subpart I) must comply with paragraphs (d) through (h) of this section beginning on October 1, 2018.

* * * * *

PART 96—CITIZENS BROADBAND RADIO SERVICE

4. The authority citation for part 96 continues to read as follows:

Authority: 47 U.S.C. 154(i), 303, and 307.

5. Amend § 96.3 by:

a. Adding the definitions of "Adjacent Channel Leakage Ratio" and "Aggregated Channel Bandwidth" in alphabetical order;

b. Removing the definition of "Census tract";

c. Adding the definitions of "County" in alphabetical order; and

d. Revising the definition of "License area."

The additions and revision read as follows:

§96.3 Definitions.

* * * * *

Adjacent Channel Leakage Ratio. The Adjacent Channel Leakage Ratio (ACLR) is the ratio of the filtered mean power over the assigned Aggregated Channel Bandwidth to the filtered mean power over the equivalent adjacent channel bandwidth. The power in the assigned Aggregated Channel Bandwidth and its equivalent adjacent channel bandwidth are measured with rectangular filters with measurement bandwidths equal to the Aggregated Channel Bandwidth.

Aggregated Channel Bandwidth. The Aggregated Channel Bandwidth is the bandwidth of a single channel, or in the case of multiple contiguous channels, the bandwidth between the upper and lower limits of the combined contiguous channels.

* * * * *

County. For purposes of this part, counties shall be defined using the United States Census Bureau's data reflecting county legal boundaries and names valid through January 1, 2017.

* * * * *

License area. The geographic component of a PAL. A License Area consists of one county.

* * * * * *

6. Amend § 96.23 by revising paragraph (a) introductory text and adding paragraph (d) to

read as follows:

§96.23 Authorization.

(a) An applicant must file an application for an initial PAL. Applications for PALs must:

* * * * *

(d) Paragraph (a) of this section contains information-collection and recordkeeping requirements. Compliance will not be required until after approval by the Office of Management and Budget. The Commission will publish a document in the *Federal Register* announcing that compliance date and revising this paragraph (d) accordingly.

7. Amend § 96.25 by revising paragraph (b)(3) and adding paragraphs (b)(4) and (5) to read as follows:

§96.25 Priority access licenses.

* * * * *

(b) * * *

(3) *License term.* Each PAL has a ten-year license term. Licensees must file a renewal application in accordance with the provisions of § 1.949 of this chapter.

(4) *Performance requirement*. Priority Access Licensees must provide substantial service in their license area by the end of the initial license term. "Substantial" service is defined as service which is sound, favorable, and substantially above the level of mediocre service which might minimally warrant renewal. Failure by any licensee to meet this requirement will result in forfeiture of the license without further Commission action, and the licensee will be ineligible to regain it. Licensees shall demonstrate compliance with the performance requirement by filing a construction notification with the Commission in accordance with the provisions set forth in § 1.946(d) of this chapter. The licensee must certify

whether it has met the performance requirement, and file supporting documentation, including description and demonstration of the bona fide service provided, electronic maps accurately depicting the boundaries of the license area and where in the license area the licensee provides service that meets the performance requirement, supporting technical documentation, any population-related assumptions or data used in determining the population covered by a service to the extent any were relied upon, and any other information the Wireless Telecommunications Bureau may prescribe by public notice. A licensee's showing of substantial service may not rely on service coverage outside of the PAL Protection Areas of registered CBSDs or on deployments that are not reflected in SAS records of CBSD registrations.

(i) *Safe harbor for mobile or point-to-multipoint service.* A Priority Access Licensee providing a mobile service or point-to-multipoint service may demonstrate substantial service by showing that it provides signal coverage and offers service, either to customers or for internal use, over at least 50 percent of the population in the license area.

(ii) *Safe harbor for fixed point-to-point service.* A Priority Access Licensee providing a fixed point-to-point service may demonstrate substantial service by showing that it has constructed and operates at least four links, either to customers or for internal use, in license areas with 134,000 population or less and in license areas with greater population, a minimum number of links equal to the population of the license area divided by 33,500 and rounded up to the nearest whole number. To satisfy this provision, such links must operate using registered Category B CBSDs.

(5) *Compliance date.* Paragraph (b)(4) of this section contains information-collection and recordkeeping requirements. Compliance will not be required until after approval by the Office of Management and Budget. The Commission will publish a document in the *Federal Register* announcing that compliance date and revising this paragraph (b)(5) accordingly.

* * * * *

§96.27 [Removed and Reserved]

8. Remove and reserve § 96.27.

9. Section 96.29 is revised to read as follows:

§96.29 Competitive bidding procedures.

Mutually exclusive initial applications for PALs are subject to competitive bidding. The general competitive bidding procedures set forth in part 1, subpart Q, of this chapter will apply unless otherwise provided in this subpart.

10. Section 96.30 is added to read as follows:

§96.30 Designated entities in the Citizens Broadband Radio Service.

(a) *Small business*. (1) A small business is an entity that, together with its affiliates, its controlling interests, and the affiliates of its controlling interests, has average gross revenues not exceeding $55 million for the preceding three (3) years.

(2) A very small business is an entity that, together with its affiliates, its controlling interests, and the affiliates of its controlling interests, has average gross revenues not exceeding $20 million for the preceding three (3) years.

(b) *Eligible rural service provider*. For purposes of this section, an eligible rural service provider is an entity that meets the criteria specified in §1.2110(f)(4) of this chapter.

(c) *Bidding credits*. (1) A winning bidder that qualifies as a small business as defined in this section or a consortium of small businesses may use a bidding credit of 15 percent, as specified in §1.2110(f)(2)(i)(C) of this chapter. A winning bidder that qualifies as a very small business as defined in this section or a consortium of very small businesses may use a bidding credit of 25 percent, as specified in §1.2110(f)(2)(i)(B) of this chapter.

(2) An entity that qualifies as eligible rural service provider or a consortium of rural service

providers who has not claimed a small business bidding credit may use a bidding credit of 15 percent, as specified in §1.2110(f)(4) of this chapter.

11. Amend § 96.32 by revising paragraph (b) and adding paragraph (d) to read as follows:

§96.32 Priority access assignments of authorization, transfer of control, and leasing arrangements.

* * * * *

(b) Priority Access Licensees may partition or disaggregate their licenses and partially assign or transfer their licenses pursuant to § 1.950 of this chapter and may enter into de facto transfer leasing arrangements for a portion of their licensed spectrum pursuant to part 1 of this chapter.

* * * * *

(d) Paragraph (b) of this section contains information-collection and recordkeeping requirements. Compliance will not be required until after approval by the Office of Management and Budget. The Commission will publish a document in the *Federal Register* announcing that compliance date and revising this paragraph (d) accordingly.

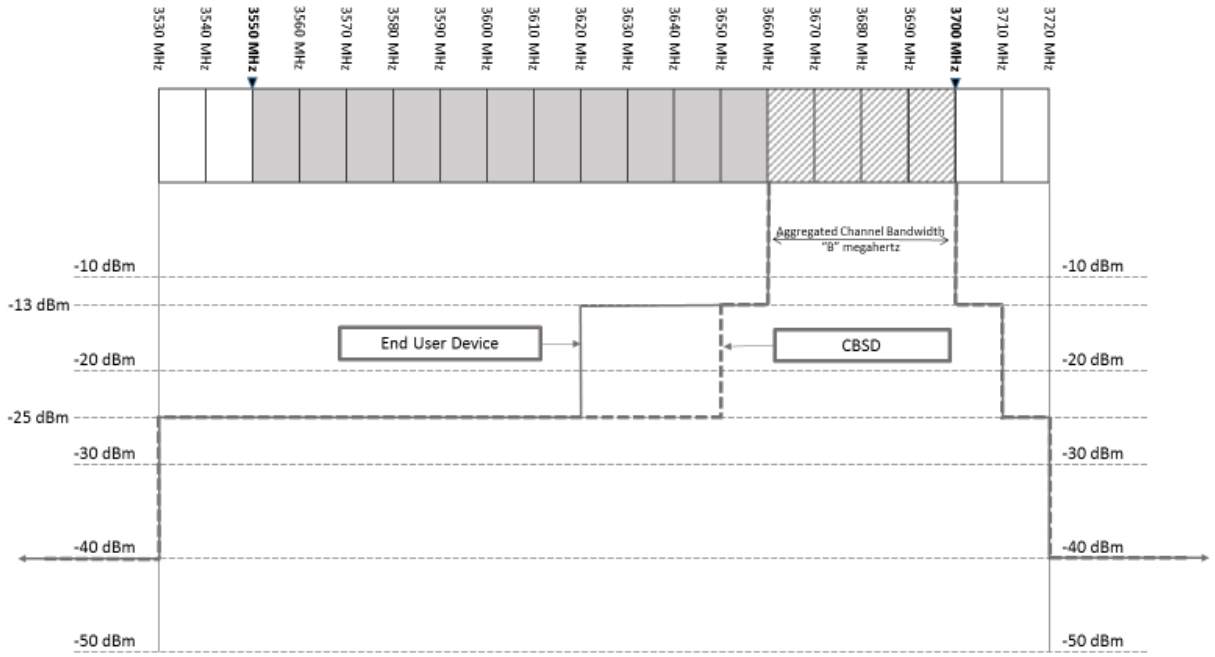
12. Amend § 96.41 by revising paragraphs (e)(1) and (2) and (e)(3)(i) to read as follows:

§96.41 General radio requirements.

* * * * *

(e) *3.5 GHz Emissions and Interference Limits*--(1) *General protection levels.*

Figure 1 to paragraph (e) – Protection levels



(i) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission is inside or outside of the authorized band) shall not exceed −13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed −25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

(ii) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed

-13 dBm/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed -25 dBm/MHz. Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

(2) *Additional protection levels.* Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

(3) *Measurement procedure.* (i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's authorized frequency channel, a resolution bandwidth of no less than one percent of the fundamental emission bandwidth may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full reference bandwidth (*i.e.*, 1 MHz or 1 percent of emission bandwidth, as specified). The fundamental emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

* * * * *

13. Amend § 96.55 by revising paragraph (a)(3) to read as follows:

§96.55 Information gathering and retention.

(a) * * *

(3) Upon request, SAS Administrators must make available to the general public aggregated spectrum usage data for any geographic area. Such information must include the total available spectrum and the maximum available contiguous spectrum in the requested area. SAS Administrators shall not disclose specific CBSD registration information to the general public except where such disclosure is authorized by the registrant.

* * * * *

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