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

In the Matter of	)	
	)	
Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band	)	GN Docket No. 12-354
	)	
Petition for Rulemaking of CTIA	)	RM-11788
	)	
Petition for Rulemaking of T-Mobile	)	RM-11789
	)	

COMMENTS OF ERICSSON

Ericsson submits these comments in response to the Public Notice seeking comment on Petitions for Rulemaking filed by CTIA and T-Mobile requesting changes to the Commission's Citizens Broadband Radio Service rules for the 3550-3700 MHz ("3.5 GHz") band.[1] Ericsson has actively participated in the Commission's 3.5 GHz proceeding and industry's CBRS development processes to advance new opportunities in this band.

In North America, a fivefold increase in data usage is expected between 2016 and 2022.[2] To meet this demand, cellular networks are evolving to deliver enhanced mobile broadband and communication services with high data throughput, quality of service, and low latency requirements. In addition, networks will also support new Internet of Things ("IoT") services with robust requirements on characteristics such as scalability, reliability, availability, and latency. These services are designed to support new use cases coming from industries such as

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[1] *Wireless Telecommunications Bureau and Office of Engineering and Technology Seek Comment on Petitions for Rulemaking Regarding the Citizens Broadband Radio Service*, DA 17-609, GN Docket No. 12-354, RM-11788, RM-11789, Public Notice (rel. June 22, 2017).

[2] Ericsson Mobility Report (June 2017), https://www.ericsson.com/assets/local/mobility-report/documents/2017/ericsson-mobility-report-june-2017-north-america.pdf.

automotive, manufacturing, energy and utilities, and healthcare. With cellular IoT connections set to increase by more than 200 percent—reaching 213 million by 2022, and accounting for over 30 percent of all cellular connections—the need for spectrum, particularly mid-band spectrum, is crucial.[3] Significant R&D investments are being made to enable the industrial use cases mentioned above. However, to realize the full potential of such technologies, additional spectrum in both mid- and high-bands is needed. A combination of spectrum across low, mid, and high bands has proven to be a successful formula in earlier generations of wireless technology. As Commissioner O'Rielly stated in his blog, "Next generation wireless networks will require high, mid and low band spectrum."[4] Low-band spectrum is well suited for signal range and indoor penetration, while higher frequency bands, like those in the millimeter waves, are well suited to support high capacity, but with a more limited range and with limited indoor penetration. Mid-band spectrum provides a balance of these goals: signal range, indoor penetration, and capacity.

As mid-band spectrum, the 3.5 GHz band offers great promise for small cell deployment, wide area networks, and next-generation services, but certain CBRS rules governing Priority Access Licenses ("PALs") are not tailored to advance innovation and investment. In particular, under the current PAL framework the Commission will auction up to 500,000 PAL licenses, each of which covers a census tract area (more than 74,000 across the country), for just a three-year license term.

Further, since the Commission first adopted rules for the 3.5 GHz band in 2015, the band has become increasingly important for development and deployment of 5G services, as noted

[3] *See id.* at 33.

[4] Commissioner Michael O'Rielly, *A Mid-Band Spectrum Win in the Making*, FCC Blog (July 10, 2017), https://www.fcc.gov/news-events/blog/2017/07/10/mid-band-spectrum-win-making.

above, across the world. The current CBRS rules are overly restrictive with respect to emission limits, and instead should foster 5G opportunities to advance U.S. leadership in wireless.

For these reasons, the Commission should make targeted changes to the PAL framework in the 3.5 GHz band and relax the emission limits for Citizens Broadband Service Devices ("CBSDs") to support investment, innovation, and deployment of 5G services in the band. Specifically, the Commission should:

- Provide PALs a standard, ten-year, renewable license term to provide certainty required to foster investment;
- Modify PAL license areas to comprise Partial Economic Areas ("PEAs") instead of census tracts to simplify the licensing scheme and reduce interference concerns;
- Eliminate the prohibition on partitioning and disaggregation of PALs;
- At the time of relicensing, if there is sufficient interest, at a minimum make available at auction the number of currently licensed PALs for each geographic area to ensure that PAL licensees can continue to receive needed interference protection;
- Permit bidding on specific PAL blocks to ensure a stable and predictable spectrum environment;
- Eliminate the requirement that SAS Administrators make CBSD registration information public to reduce security risks and to protect deployment information from competitors; and
- Relax the emission limits to permit wider channelization to support 5G services.

These targeted, limited changes can be made quickly to promote investment and innovation in the 3.5 GHz band without delaying implementation of the CBRS regime.

I. MID-BAND SPECTRUM IS INCREASINGLY BEING TARGETED FOR 5G AROUND THE WORLD

Mid-band spectrum is increasingly important in the mix of spectrum that should be available for 5G, and many nations around the globe have opened proceedings to make 3 GHz band spectrum available for 5G services. For example, Australia, China, the European Union, Ireland, Japan, Russia, South Korea, and the United Kingdom have all recently taken steps to

make 3 GHz spectrum available for 5G.[5] As Commissioner O'Rielly recognized, in the United States the Commission has made progress to make high- and low-band spectrum available, but "more attention needs to be paid to the mid-bands."[6]

Globally harmonized spectrum remains integral to the continued growth of the mobile industry and should be the touchstone for selecting spectrum for 5G, because globally harmonized spectrum allocations result in a broader ecosystem for technology, equipment, and engineering expertise, leading to economies of scale, lower costs for deployment, more rapid roll-out of new services, and enhanced competition among suppliers to the U.S. and global markets.[7] The broader ecosystem spurs innovation at the application level and creates a platform

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[5] Australian Communications and Media Authority, Australia's Approach to the 3.6 GHz Band (Jun. 23, 2017), http://www.acma.gov.au/theACMA/australias-approach-to-the-36-ghz-band; Monica Alleven, *China Issues Plan to Use 3300-3600 MHz, 4800-5000 MHz for 5G*, FierceWireless (June 7, 2017), http://www.fiercewireless.com/wireless/china-issues-plan-to-use-3300-3600-mhz-4800-5000-mhz-for-5g; European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions, *5G for Europe: An Action Plan*, at 5 (Sept. 14, 2016); Commission for Communications Regulation, Results of the 3.6 GHz Band Spectrum Award, ComReg 17/38 (May 22, 2017), https://www.comreg.ie/media/dlm_uploads/2017/05/ComReg-1738.pdf; *Forward Thinking for Spectrum: Getting Ready for 5G*, GSMA-GSA Seminar, ITU World Telecom (Nov. 16, 2016), https://www.gsma.com/spectrum/wp-content/uploads/2016/11/GSMA-GSA-5G-seminar-panel-session.pdf; *5G in China: Outlook and Regional Comparisons* (July 2017), http://www.gsma.com/futurenetworks/wp-content/uploads/2017/07/5G_Report_5G_in_China_EN_July2017.pdf; Cho Jin-young, South Korean Government to Secure 40 GHz Frequency Width for 10 Years, BusinessKorea (Dec. 23, 2016), http://www.businesskorea.co.kr/english/news/ict/16837-strategic-securement-south-korean-government-secure-40-ghz-frequency-width-10-years.

[6] Commissioner Michael O'Rielly, *A Mid-Band Spectrum Win in the Making*, FCC Blog (July 10, 2017).

[7] Comments of Ericsson, *Use of Mobile Spectrum Bands Above 24 GHz for Mobile Radio Services, et al.*, GN Docket No. 14-177, *et al.* (filed Sept. 30, 2016), https://ecfsapi.fcc.gov/file/109300197300983/ericsson%20spectrum%20frontier%20fnprm%20comments%20(final).pdf.

for transformation as being experienced currently thanks to the U.S leadership with 4th Generation Wireless / LTE.

The 3550-3700 MHz band has a high degree of overlap with 5G spectrum development in other countries (for example, the MIIT in China released a public consultation in June for frequency planning in the 3.3-3.6 GHz range), and efforts to harmonize the band globally with licensing and technical rules that more closely align with those around the world will unlock the full potential for the band. Ericsson is concerned that the U.S. will lag behind in establishing a strong mid-band spectrum platform for 5G that at least includes CBRS and 3.7-4.2 GHz, and for that reason, as described below, we support several of the changes proposed by CTIA and T-Mobile to the CBRS band. In addition, the Commission should carefully consider the T-Mobile proposal to increase spectrum available for PAL use—as that could serve to increase investment attractiveness in the band—while balancing the potential for delays that changes to the licensing framework might cause.

The establishment of a strong mid-band spectrum platform for 5G is essential to maintain U.S. leadership in wireless and spur a new wave of innovation. We are committed to being part of the journey and look forward to the collaboration. Ericsson supports the Commission's plan to initiate an inquiry into mid-band spectrum for flexible use,[8] and in the meantime the Commission should also make targeted changes to the CBRS framework to ensure that the 3.5 GHz band is available in the United States to support 5G services.

[8] *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 GHz and 24 GHz*, GN Docket no. 17-183, Notice of Inquiry, FCC-CIRC1708-04 (July 13, 2017).

II. TARGETED CHANGES TO THE PAL FRAMEWORK WILL INCREASE INVESTMENT INCENTIVES AND FACILITATE 5G DEVELOPMENT IN THE 3.5 GHZ BAND

A. Increasing PAL License Terms to 10-Years with an Expectation of Renewal Will Provide Certainty Required to Invest in the Band

The current PAL licensing framework, which provides for a three-year license term and no right of renewal, creates the risk that PAL licensees will face stranded investments, will likely diminish interest in PALs, and may undermine the success of the three-tiered sharing regime.[9] While a provider can obtain an initial six-year license term under the existing rules, six years is still insufficient to ensure a return on investment.[10] The Commission's explanation that these concerns are mitigated because PALs licensees can switch to the General Authorized Access ("GAA") tier is unpersuasive.[11] Presumably, a carrier that invests in a PAL has a business reason to require the interference protection and certainty that a PAL ensures. Because the GAA tier can offer no such assurances, the PAL licensee thus may not have access to the spectrum they relied on. The Commission should amend the licensing rules to provide for a ten-year license term with an expectation of renewal to foster investment in the 3.5 GHz band.

B. Modifying PAL Geographic Areas to Consist of PEAs Instead of Census Tracts and Permitting Partitioning and Disaggregation Will Simplify the Licensing Scheme and Reduce Interference Risks

The current framework provides for PAL licensing on a census tract geographic basis, which could lead to an unmanageable auction and management of 500,000 separate PAL licenses. The framework is overly complicated, will create administrative burdens for the Commission and licensees, and will lead to increased interference risks between adjacent PALs.

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[9] 47 C.F.R. § 96.25(b)(3).

[10] 47 C.F.R. § 96.27.

[11] *3.5 GHz Order,* 30 FCC Rcd at 3996 ¶ 109.

The Commission instead should authorize PALs on a PEA basis, of which there are a manageable 416 in the United States. The Commission's stated goal in crafting geographic license areas in the 3.5 GHz band was to promote "intensive and efficient use of the spectrum," while "also allowing easy aggregation to accommodate a larger network footprint."[12] Modifying the PAL license area to PEAs will accomplish both of these goals. And while the existing secondary market rules already allow PAL licensees to lease portions of their spectrum outside their PAL protection areas and provide GAA users access to any PAL spectrum not in use, the Commission should also revise its rules to allow for partitioning and disaggregation in secondary market transactions. Partitioning and disaggregation will ensure that any unused PAL spectrum can be assigned on a market-oriented basis to other users who desire access to PALs on a smaller geographic basis and will further ensure against concerns that spectrum will lay fallow in the band.

C. At the Time Of Relicensing, if There Is Sufficient Interest, at a Minimum Make Available at Auction the Number of Currently Licensed PALs for Each Geographic Area to Ensure That PAL Licensees Can Continue to Receive Needed Interference Protection

The Commission should modify the PAL licensing framework to make available the same number of PALs as applied for in a given geographic area, instead of the current rule requiring the Commission to make one less PAL available than applied for.[13] Modifying this rule would ensure that parties seeking interference protection and certainty regarding access to 3.5 GHz spectrum can obtain PALs, even if no other applicants apply for PALs in a given area. Additionally, in the event the Commission does not modify its rules to provide a renewal expectancy for PALs, the current framework would risk phasing out PALs with each subsequent

[12] *3.5 GHz Order*, 30 FCC Rcd at 3991 ¶ 96.

[13] 47 C.F.R.§ 96.29.

auction. For example, if two PAL licensees hold a total of seven PALs in a geographic area and both apply for the same number of PALs that they currently hold, only six PALs would be awarded in the auction and one licensee would have less access to PAL spectrum than it did before the auction. The Commission can prevent this illogical result by making available the same number of PALs as applied for in a given geographic license area.

D. Permitting PAL Applicants to Bid on Specific Frequency Blocks Will Ensure Access to a Stable and Predictable Frequency Environment

The 3.5 GHz framework provides that PAL licensees will obtain rights to a certain amount of spectrum in the band, but not particular frequencies within the band.[14] A Spectrum Access System ("SAS") Administrator will then assign PAL licensees particular frequencies within the band consistent with the amount of spectrum for which the entity is licensed. However, carriers require access to a stable and predictable spectrum environment to plan network deployments, which is not supported by the current framework. The Commission should not deviate in the 3.5 GHz band from its usual practice of assigning access to specific spectrum blocks along with spectrum access rights.

E. Eliminating the SAS Requirement to Make CBSD Registration Information Public Will Reduce Security Risks and Protect Competitively Sensitive Deployment Information

SAS Administrators should not be required, or permitted, to make CBSD registration information public.[15] In addition to concerns about competition and consumer privacy, the Commission should take into account cybersecurity and national security risks. Disclosing CBSD registration information to the general public will not serve any useful purpose, and the harms outweigh any purported benefits. SAS Administrators will already be required to

[14] 47 C.F.R. § 96.25.

[15] *See* 47 C.F.R. § 96.55.

coordinate with each other, and members of the public can therefore work with a SAS to determine where they can deploy CBSDs on a GAA basis. The Commission's requirement that SAS Administrators obfuscate licensees' identities will not address security concerns, and is insufficient to address privacy and competitive concerns. Given that PAL auction information will be publicly available, determining which deployments belong to which PAL licensee may not be difficult. The Commission should eliminate the requirement that SAS Administrators make CBSD registration information public, and should instead prohibit such disclosures.

III. THE COMMISSION SHOULD MODIFY EMISSION LIMITS TO FOSTER WIDER CHANNELIZATION AND NEW PRODUCTS IN THE 3.5 GHZ BAND.

The Commission should reevaluate the emission limits in the 3.5 GHz rules in light of the global shift in thinking towards 5G in the 3.5 GHz band. Some 5G operations will depend on using wider channels, which in turn will require higher emission limits. Ericsson has consistently advocated for emission limits that do not unreasonably discriminate against wider channels,[16] and again urges the Commission to ensure that its rules will permit innovative offerings using wider channels here.

In crafting the 3.5 GHz rules, the Commission based its assumptions on "the capabilities of the equipment and services likely to be deployed in the band."[17] But at the time the *3.5 GHz Order* was adopted in 2015, the Commission did not contemplate 5G operations in the band. Now that the importance of the 3.5 GHz band for 5G is clear and the type of equipment and services likely to be deployed in the band has changed, the Commission should reevaluate the

[16] *See, e.g.*, Comments of Ericsson, *Use of Mobile Spectrum Bands Above 24 GHz for Mobile Radio Services, et al.*, GN Docket No. 14-177, *et al.*, at 15-16 (filed Jan. 26, 2016).

[17] *3.5 GHz Order*, 30 FCC Rcd at 4018 ¶ 184.

emission limits to ensure that innovative 5G solutions are not excluded from the band based on outdated regulatory assumptions.

IV. CONCLUSION.

The Commission should revise the PAL framework as set forth above to strengthen investment incentives in the 3.5 GHz band. The Commission should also revise the emission limits to allow for use of wider channels required by some 5G services.

Respectfully submitted,

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