

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Promoting Investment in the 3550-3700 MHz)	GN Docket No. 17-258
Band)	

COMMENTS OF ERICSSON

Ericsson submits these comments in response to the Commission’s Notice of Proposed Rulemaking (NPRM) seeking comment on changes to the rules governing Priority Access Licenses (PALs) in the 3550-3700 MHz band that will facilitate greater investment and development of the band. Ericsson has actively participated in the Commission’s and industry’s processes leading to the development of this much-needed spectrum band and looks forward to its availability.

I. INTRODUCTION

As we have stated previously,¹ Ericsson views mid-band spectrum as a crucial piece of the puzzle for meeting exploding demand for bandwidth in existing networks and providing capabilities needed for small cell deployment, wide-area networks, and next-generation services. The CBRS band is well situated to provide the range, indoor penetration, and capacity these services need. However, as Commissioner O’Rielly has observed, the Commission’s initial rules surrounding PALs were not conducive to supporting multiple use cases for the band. Short license terms, a lack of renewability, and the limited number of PALs available at auction serve

¹ See Comments of Ericsson, GN Docket No. 12-354, RM-11788, RM-11789, at 2 (filed July 24, 2017) (“Ericsson PN Comments”).

to hamper, not stimulate, investment in the band.² We support many of the proposals in the NPRM to address these concerns.

The Commission has, under the framework of Part 96 of its rules,³ embarked on an approach to freeing valuable mid-band spectrum for commercial use. The CBRS band has been positioned primarily as ideal for small-cell use, yet it can support a wide variety of use cases due to the band's propagation characteristics and the amount of spectrum to be made available. The framework for the band offers a combination of licensed shared operation with PALs and general authorization via General Authorized Access (GAA) that may also be used in tandem to fulfill the growing demand for spectrum—a demand fueled by traffic growth of 42% CAGR between now and 2023 according to the most recent Ericsson Mobility Report.⁴ The potential to aggregate spectrum into large blocks also makes the band suitable for 5G services.

Industry, through the CBRS Alliance, is driving LTE use in the band in multiple ways. For example, by establishing a product certification program for LTE equipment, multi-vendor interoperability in the band within the CBRS framework is ensured. In short, the CBRS band can and will provide new possibilities for operators of all sizes to enhance their network capacity to better serve their customers.

PAL spectrum offers a reliable anchor channel that may be augmented with GAA spectrum to cover a variety of use cases that include traditional wireless services as well as communications to enable the Internet of Things (IoT). While neither PAL nor GAA is comparable to traditional licensed bands in the degree of reliability and certainty offered, the

² See Statement of Commissioner Michael O'Rielly, *Promoting Investment in the 3550-3700 MHz Band*, Notice of Proposed Rulemaking, GN Docket No. 17-258, 32 FCC Rcd 8071, 8110 (2017) (NRPM).

³ 47 C.F.R. Part 96.

⁴ See Ericsson Mobility Report at 12 (November 2017), available at <http://www.ericsson.com/assets/local/mobility-report/documents/2017/ericsson-mobility-report-november-2017.pdf>.

availability of PALs makes CBRS more valuable to the entire wireless ecosystem. Ericsson favors strengthening the desirability of PALs to create new competitive approaches to offering wireless service, with the hope that CBRS will improve opportunities for applying broadband wireless to new and varied use cases.

Ericsson also recommends that the Commission encourage groups like the Wireless Innovation Forum and the CBRS Alliance to consider mechanisms for ensuring better quality metrics for GAA spectrum usage. Such metrics will better inform Citizens Band Radio Service Devices (CBSDs) about the relative differences in performance expectations from specific spectrum choices, and will make the SAS a more reliable facilitator of the use of GAA spectrum. Such mechanisms are fundamental to lowering entry barriers into wireless by entities that intend to use GAA spectrum even in areas where they lack access to PALs or other licensed bands.

II. CBRS USE CASES

Among others, Ericsson sees the following uses cases as the basis for technical and service rules in the band, based on what we might expect in the near term. We offer these examples to assist the Commission as it seeks to balance the competing interests in the structure of the band.

One use case for CBRS is to enhance the capabilities of current mobile networks in both indoor and outdoor scenarios. The combination of good propagation characteristics and the amount of spectrum available makes CBRS a good candidate for augmenting capacity needs in existing and new mobile broadband networks. For traditional operators, PALs are useful in areas where operators may require protection from interference and additional spectrum to augment their networks. LTE is supported globally in frequency ranges that overlap the Commission's assignment of 3550-3700 MHz for CBRS, which will speed products to market once the band is

opened for commercial mobile use. For new entrants, PALs are particularly useful for signaling and control in heavily populated urban and suburban areas. Such operators may use GAA to augment capacity when there is sufficient abundance of GAA spectrum.

Another use case for CBRS spectrum is as a fixed wireless access (FWA) solution. As Ericsson envisions FWA, a radio base station delivers internet and voice/video services from a radio base station to a residence or enterprise via a rooftop-mounted directional antenna and LTE modem. That device is connected to Customer Premises Equipment (CPE), delivering digital services throughout the home at a fraction of the cost of laying hundreds of feet of fiber to the home from a neighborhood node. One base station connected to high-bandwidth fiber or microwave backhaul can serve multiple premises, thus lowering the cost of offering broadband, and speeding the time of deployment of broadband service to urban, suburban, and rural neighborhoods. The speeds that can be delivered with CBRS can meet or exceed the current definition of broadband. Furthermore, because CBRS is mid-band spectrum, the combination of signal propagation and spectrum capacity make it well-suited for both rural and suburban use.

CBRS also enables private LTE networks. Industries, utilities, and enterprises place a high demand on mobile connectivity for specific coverage, performance, security, and reliability requirements to support business critical communications and to enable IoT applications throughout their business processes. Ericsson offers products and services that support business critical communications which often demand greater certainty and reliability of access than that which can be provided using unlicensed spectrum. In the public safety realm, for example, officials could rely on mission-critical infrastructure for one-on-one or group communications and deploy LTE-equipped video cameras to monitor trouble spots. The LTE ecosystem is diverse

and continually evolving. As a technology, LTE has a robust link budget and services framework designed to provide highly flexible and reliable data connections.

III. PAL LICENSING RULES

A. License Terms

As Ericsson has stated earlier in this proceeding, we support the proposal to extend the license term to 10 years for PALs.⁵ To attract new investment, operators and other potential users of the band require certainty well beyond the three-year, non-renewable terms envisioned in the initial order. Ericsson's own experience belies the criticism that longer license terms⁶ will undermine standards development and support for a CBRS ecosystem of network and consumer devices. In the seven years since CBRS was announced,⁷ we have introduced products in the band,⁸ conducted trials,⁹ and actively participated in key CBRS industry bodies.¹⁰ We have observed strong interest in the band from multiple market segments, and one area of agreement among these potential users is support for longer license terms for PALs.

B. Performance Requirements

Based on what we foresee as the use cases for the CBRS band, imposing a traditional buildout requirement founded on today's expectations for spectrum use could stymie innovation.

⁵ See Ericsson PN Comments at 6.

⁶ See, e.g., Reply Comments of Open Technology Institute at New America and Public Knowledge, GN Docket No. 12-354, RM-11788, RM-11789, at 12 (filed Aug. 8, 2017).

⁷ NTIA identified the 3.5 GHz band (3550-3650 MHz) in its Fast Track report released in 2010. See NTIA, An Assessment of the Near-Term Viability of Accommodating Wireless Broadband Systems in the 1675-1710 MHz, 1755-1780 MHz, 3500-3650 MHz, 4200-4220 MHz, and 4380-4400 MHz Bands (rel. October 2010), available at http://www.ntia.doc.gov/files/ntia/publications/fasttrackevaluation_11152010.pdf.

⁸ See, Ericsson Radio Dot System, available at http://www.ericsson.com/ourportfolio/networks-products/radio-dot-system?nav=fgb_101_0561%7Cfgb_101_0516%7Cfgb_101_0526.

⁹ See, Ericsson and partners showcase first-of-its-kind CBRS demonstration, available at <http://www.ericsson.com/en/news/2017/8/first-ever-CBRS-demo>.

¹⁰ Ericsson is on the Board of Directors of the Wireless Innovation Forum and the CBRS Alliance.

In addition, GAA's opportunistic use of unused CBRS spectrum helps ensure that the spectrum will be used, not warehoused. Therefore it is our view that performance buildout requirements are not needed.

CBRS can deliver new and unexpected uses that do not lend themselves to traditional buildout requirements. For example, if networks that support enterprise and industrial uses dominate, a requirement based on the population served would force coverage for coverage's sake although the devices served could be concentrated in a few small areas.. The value of that coverage to a local community might be as great or greater than a traditional network aimed at connecting people to a network, but a buildout requirement mandating a certain percentage of the population be served by a network might bear little relevance to the benefits of the connectivity.

Perhaps a mix of services, such as IoT as well as fixed wireless access, will coexist in the band. In that scenario, two vastly different use cases (one providing service to connected devices and another providing a substitute for a wired connection to a home) might be covered by a one-size-fits-all performance requirement. While we would prefer the Commission refrain from imposing performance requirements in the CBRS band, we request that any mandates not dictate a single requirement, but rather allow for different requirements based on the multiple use cases expected in the band.

C. SAS Public Disclosure of CBSD Registration Information

Disclosure of CBSD registration information could, as the Commission has discussed, compromise the security of critical network deployments and be considered competitively sensitive.¹¹ Disclosing CBSD registration information to the general public does not serve any useful purpose, while the harms are demonstrable. Disclosure of radio configuration and location

¹¹ See NPRM at 15, ¶ 37.

are two examples of data that could harm commercial interests by indicating the licensee's strategies—both in terms of the planned use of the spectrum and the particular customers that are being targeted.

D. Competitive Bidding Procedures for PALs

1. Assignments of PALs

Ericsson supports the Commission's proposal to revise the current rules which make one fewer PAL available than sought by potential bidders in a market, and to prevent *any* PAL assignments in a market if only one applicant registers to bid. The protections afforded by PALs are of real value, and the fact that there might be limited interest in certain markets should not therefore dictate a policy that makes none available. Commercial interest (as indicated by bidding) demonstrates an actual intent to make use of the CBRS band to provide service, and so the Commission's policies should favor access to PALs.

2. Bidding on Specific PAL License Blocks

Ericsson supports some mechanism to allow for bidding on specific PAL licenses. The Commission asks whether it could mimic the procedure in the 600 MHz incentive auction by offering a separate, and voluntary, channel assignment phase. That process could be an effective means of offering more certainty to those who demand it, while also allowing some of the flexibility advocated by Vivint Wireless and Google.¹²

Many industry players interested in the CBRS band are coalescing around the use of LTE as the technology of choice. In the CBRS Alliance, agreements have already been reached on coordination of LTE TDD operation, with cooperation on using common frame timings and common uplink and downlink ratios. Such agreements will create the right environment for PAL

¹² See NPRM at 19, ¶ 48.

users to operate with static channel assignments. The coordination arrangements assist the use of contiguous spectrum assignments across multiple operators, without having to negotiate guard bands to protect against near-far interference for adjacent channel protection. Static channel assignments will make the radio environment more predictable, with known neighbors to CBSD installations. This offers potential approaches to interference mitigation more akin to conventional Commercial Mobile Radio Service (CMRS) deployments. Lastly, static channel assignments make it easier to provide end-user devices with a strong anchor for signaling and control, as well as a fallback for network control of mobility via known neighbor cell designations. A strong foundation for PALs makes it easier to accept the dynamic behavior of GAA assignments, as the PAL can be a stable channel when used in conjunction with carrier aggregation with GAA.

IV. EMISSIONS AND INTERFERENCE LIMITS

Ericsson is currently analyzing the proposals in the NPRM to adjust emissions limits in the CBRS band to make it more conducive for wider channels. 5G services in particular benefit from wider channels, and changes to the emissions mask to accommodate channels wider than 10 MHz will increase the utility of PALs. Additional analysis of the emissions masks is needed as each mask has its strengths and weaknesses.¹³

V. CONCLUSION

The CBRS band offers the promise for new wireless services, whether for adding capacity to networks, offering fixed wireless access, enabling the IoT, and other services as yet to be dreamed. The changes the Commission is considering to PALs will increase the utility of the band, making it an even more desirable slice of mid-band spectrum. We commend the

¹³ See NPRM at 20-21, ¶ 54.

Commission for this effort and stand by ready and willing to assist as the Commisison finalizes this rulemaking.

Respectfully submitted,

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