

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
Petitions for Rulemaking Regarding the Citizens)	RM-11788
Broadband Radio Service)	RM-11789

COMMENTS OF NOKIA

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TABLE OF CONTENTS

I.	INTRODUCTION AND SUMMARY	1
II.	THE COMMISSION SHOULD EXPLORE MOBILITY FOR THE ENTIRE 3 GHZ RANGE.....	3
III.	THE COMMISSION SHOULD INCREASE THE TERM FOR PALS, AS GREATER CERTAINTY WILL PROMOTE INVESTMENT.....	4
IV.	LARGER GEOGRAPHIC SCOPE OF PAL LICENSES WILL FACILITATE DEPLOYMENT	6
V.	ALL PALS SOUGHT AT AUCTION SHOULD BE ASSIGNED REGARDLESS OF THE NUMBER OF BIDDERS	8
VI.	SAS ADMINISTRATORS SHOULD PROTECT CBSD REGISTRATION INFORMATION.....	8
VII.	THE COMMISSION SHOULD RELAX EMISSIONS LIMITS TO FACILITATE OPERATIONS OVER WIDER CHANNEL BANDWIDTHS.....	9
VIII.	CONCLUSION.....	11

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Nokia submits these comments in response to the Public Notice issued in the above-captioned proceedings asking for comment on petitions for rulemaking to modify the licensing framework and service rules in the 3550-3650 MHz band.¹

I. INTRODUCTION AND SUMMARY

Nokia is an innovation powerhouse, offering unparalleled leadership in the technologies that connect people and things. We are weaving together the networks, data, and device technologies to create the universal fabric of our connected lives. Nokia works across ecosystems and is a trusted partner for our carriers, governments, and enterprises. Nokia has made pioneering advancements in reducing the footprint of mobile base station infrastructure, from compact yet full power macro sites down to the full range of small cell solutions, which are expected to be critical to enabling 5G deployment and the Internet of Things (IoT). Nokia also offers the industry's most comprehensive portfolio of services for integrating heterogeneous networks ("HetNets"), encompassing analysis, optimization, deployment, and management. Key to realizing the promise of the 3.5 GHz band, Nokia is a

¹ These Comments focus on the following submissions: CTIA, Petition for Rulemaking, GN Docket 12-354 (filed June 16, 2017) ("CTIA Petition"); T-Mobile USA, Petition for Rulemaking, GN Docket No. 12-354 (filed June 19, 2017); Letter from Dean R. Brenner and John W. Kuzin, Qualcomm, to Marlene H. Dortch, Secretary, FCC, GN Docket No. No. 12-354 (filed June 19, 2017) ("Qualcomm Proposal").

technology leader in sharing technologies. As part of our efforts to further spectrum sharing in the 3.5 GHz band, on March 28, 2017, Nokia submitted its “Proposal of Nokia to Operate as a Spectrum Access System (SAS) Administrator and Environmental Sensing Capability Operator.”²

As a technologist, equipment supplier, and proposed SAS administrator of the 3.5 GHz band, Nokia has seen tremendous interest and early activity in General Authorized Access (GAA) as well as Priority Access License (PAL) uses of the 3.5 GHz band. Nokia appreciates the balance that the Commission struck and notes that it is important to continue the momentum for the 3.5 GHz band. Therefore we urge the Commission to avoid actions that would delay this deployment timeline.

Nokia also appreciates that CTIA and T-Mobile seek changes to the PAL licensing terms that will provide greater stability and investment incentives for the 3.5 GHz band. Intensive use of the band by the carrier community will ensure a robust equipment ecosystem, creating economies of scale and driving down user device costs.

For these reasons, Nokia supports proposals to lengthen licenses terms for PALs and to institute an expectation for renewal. Nokia also agrees that geographic license sizes should be increased to support broader deployments, while also recognizing the importance of facilitating micro-deployments through secondary market transactions and other means. Nokia supports permitting all available PALs to be assigned (rather than the number of available PALs minus one, as well as proposals that SAS Administrators not be required under the rules to disclose Citizens Broadband Radio Service Device (CBSD) registration information). Nokia next supports relaxed emissions limits to permit wider channels in the band, so long as the rule change does not result in slowing down Commission authorization to commence service in the 3.5 GHz band.

² See GN Docket 15-319.

II. THE COMMISSION SHOULD EXPLORE MOBILITY FOR THE ENTIRE 3 GHZ RANGE

The 3.5 GHz band is an innovation band that will create new opportunities for carriers, enterprises and communities across the U.S. The band offers low total cost of ownership compared to more traditional auctioned bands with the potential for greater certainty, security, and quality of service than traditional unlicensed bands. The 3.5 GHz also serves as a valuable anchor for 5G services in the entire span of the 3 GHz band. For years, Nokia has been actively exploring opening the 3.7-4.2 GHz and the 3.1-3.55 GHz portions of the band for terrestrial mobile broadband services. Nokia has been urging the Commission to commence a proceeding to unlock the spectrum on either side of the 3.5 GHz band which, when combined with the 3.5 GHz band, can provide more than 1 GHz of contiguous spectrum for mobility, as well as investigate additional mid-band spectrum. Mid-band spectrum offers the promise of wider channels than can be found in low-band spectrum and better propagation characteristics than in millimeter Wave (mmW) spectrum.

The 3.7-4.2 GHz band is particularly promising for fixed and mobile terrestrial broadband applications in the near term as it is already allocated to commercial use.³ Nokia appreciates that the Commission has circulated a draft Notice of Inquiry (“NOI”) including that spectrum range and several other mid-band spectrum blocks for consideration.⁴ Nokia urges that the Commission move forward with its NOI on an expedited timeframe so that the 3.7-4.2 GHz band is quickly made available for more intensive terrestrial use.

³ See Commissioner Michael O’Rielly, “Mid-band Spectrum Win in the Making,” July 10, 2017, available at <https://www.fcc.gov/news-events/blog/2017/07/10/mid-band-spectrum-win-making>.

⁴ *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Inquiry (circulated for tentative consideration), FCC-CIRC1708-04, GN Docket 17-183 (rel. July 17, 2017).

III. THE COMMISSION SHOULD INCREASE THE TERM FOR PALs, AS GREATER CERTAINTY WILL PROMOTE INVESTMENT

Nokia supports CTIA's and T-Mobile's proposals to lengthen PAL terms to 10 years and to include a renewal expectation.⁵ Under the current rules, PALs are available for three-year, non-renewable terms. The Commission instituted this shorter than normal licensing term, believing it would encourage investment and quick build out of the band better than longer term licenses.⁶ Nokia respectfully disagrees.

As the Commission recognized in the early stages of developing service rules for the 3.5 GHz rules, 10- or 15-year terms are the norm associated with wireless service licenses.⁷ Not only are these license terms considerably longer than what the Commission adopted for the 3.5 GHz band, but those 10-to-15-year licenses typically include an expectation of renewal, providing even greater contrast to the Commission's rules where there is no renewal expectation.

These longer time horizons and renewal expectations are in place for good reason. Nokia agrees with CTIA that the band will be deployed for a number of use cases, including as part of carrier-grade outdoor wide-area networks.⁸ In Nokia's experience, it generally takes several quarters to standardize a new frequency band, another year to develop infrastructure equipment and certify it, and over a year to deploy a network. As such, it is a barrier to investment if a PAL carries with it uncertainty of termination after only three years (or even six years). Furthermore, large-scale deployment of a new frequency band over much of the United States often costs billions of dollars.

⁵ CTIA Petition at 6-9; T-Mobile Petition at 11-12.

⁶ *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Order on Reconsideration and Second Report and Order, GN Docket No. 12-354, FCC 16-55, at ¶¶43-45 (rel. May 2, 2016) ("*3.5 GHz Reconsideration Order*").

⁷ See Public Notice, *Commission Seeks Comment on Licensing Models and Technical Requirements in the 3550-3650 MHz Band*, GN Docket No. 12-268, FCC 12-148, at ¶13 (rel. Nov. 1, 2013).

⁸ See CTIA Petition at 8.

The small cell deployments envisioned for the 3.5 GHz band will add a greater layer of complexity to roll-out. Small cell deployments involve a relatively large number of sites and can take advantage of a far wider range of locations for deployment (street lights, billboards, sides of buildings, etc.) than can macrocells. As such, in contrast to historic, initial roll-outs of new frequency bands that could leverage existing macrocell sites, deployments in the 3.5 GHz band will require new sites with new power and backhaul services that are not shared with equipment operating in earlier frequency bands. Add to that the bureaucratic barriers inherent in many state and local permitting processes, and service providers face a daunting climb to reach widespread deployment of small cells in any band, let alone first deployment of 3.5 GHz-band equipment in the United States.⁹

Apart from the business case to justify deployment, it routinely takes two or more years from acquiring spectrum at auction to the first networks being deployed. While the Commission accounted for this to some degree by permitting winners of the first 3.5 GHz auction to stack two three-year terms, an auction winner might need most of its first three-year term just to begin realizing value from the spectrum. The Commission should incorporate these practical deployment lead-times into any new licensing framework for the 3.5 GHz band.

Based on the foregoing practical considerations, Nokia is concerned that a number of potential bidders for PALs will simply stay away from this band if the only method of entry is short-term, non-renewable licenses. Thus, the Commission can encourage greater competition and more robust deployment by increasing the term of the licenses to 10 years.¹⁰

⁹ See generally, *Accelerating Wireless Deployment by Removing Barriers to Infrastructure Investment*, Notice of Proposed Rulemaking and Notice of Inquiry, WT Docket No. 17-79 (rel. Apr. 21, 2017).

¹⁰ Nokia agrees with T-Mobile that, if the Commission institutes longer term licenses, it would be appropriate for the Commission to impose performance requirements on PAL holders. See T-Mobile Petition at n.48.

Nokia also supports proposals to include a renewal expectation, as is common for other auctioned spectrum.¹¹ Indeed, loss of access to the band could devastate a business plan built on the 3.5 GHz band if comparable GAA spectrum is not available. Stepping down to the GAA tier *may* suffice once a PAL is lost, but there is no guarantee of availability of GAA spectrum featuring the amount of bandwidth and quality of service required. Just as a renewal expectation has been deemed to serve the public interest in other auctioned bands, a renewal expectation should be included for PALs in the 3.5 GHz band.

IV. LARGER GEOGRAPHIC SCOPE OF PAL LICENSES WILL FACILITATE DEPLOYMENT

The geographic scope of PALs should serve the needs of micro-targeted deployments as well as larger deployments. In agreement with the CTIA Petition and T-Mobile Petition,¹² Nokia believes that while larger geographic areas could help spur deployment in the band, managing 74,000 census tracts could be burdensome. And, assuming each census block targets to a population of approximately 4,000 people, serving urban areas would be especially burdensome. For example, by that count, one would need more than 150 licenses just to serve within the borders of Washington, D.C. Rather than requiring aggregation of hundreds of micro-targeted geographic licenses to achieve larger geographic scope, it would be more desirable to offer larger license area sizes.

Nokia also recognizes the potential for micro-deployments by operators, as well as government, enterprise and other types of users that desire the interference protections that come with a PAL. It is therefore important that the Commission also explore the desirability for smaller geographic license sizes as part of its rulemaking proceeding and determine how best to support a diversity of deployment scenarios through a diversity of

¹¹ CTIA Petition at 6-9; T-Mobile Petition at 11-12.

¹² CTIA Petition at 9-11 (raising concerns regarding using census tracts as geographic license size); T-Mobile Petition at 16-19 (same).

geographic scope offered at auction as well as through secondary markets. It would be consistent with previous Commission auctions, for example, if the Commission offered PALs of two sizes, recognizing the needs of larger carriers as well as smaller entities. Larger geographic licenses (such as Partial Economic Areas as proposed by CTIA and T-Mobile) would support larger deployments, while retaining a subset of PALs in each market at the census tract or other smaller geographic level would allow entities with micro-deployment needs to acquire one or more licenses at auction that meet their smaller geographic scope.

A robust secondary market would also support a diversity of deployments. For example, while CTIA recognizes that secondary market rules allow leasing of partial PAL areas, CTIA also asks the Commission to consider “revising its rules to allow for PAL partitioning and disaggregation in secondary market transactions.”¹³ T-Mobile similarly recognizes the desirability of more robust secondary market rules.¹⁴

Nokia recommends that all parties holding PALs take full advantage of the flexible rules regarding secondary market trading of PAL rights. The rules would allow service to targeted areas, which in turn are supported by the technical specifications being developed by the Wireless Innovation Forum (“WinnForum”) to support the development and advancement of spectrum sharing technologies based on the 3.5 GHz rules. The WinnForum has described various market mechanisms available to PAL licensees and lessees in order to take advantage of the PAL spectrum.¹⁵ For instance, a PAL licensee can register specific PAL Protection Areas (PPAs) within a PAL which allows the original PAL licensee to break up the service area within one PAL or within a number of contiguous PALs

¹³ CTIA Petition at 10.

¹⁴ See T-Mobile Petition at 18.

¹⁵ Requirements for Commercial Operation in the U.S. 3550-3700 MHz Citizens Broadband Radio Service Band, Version V2.0.0, 3 February 2017, *available at* http://www.wirelessinnovation.org/assets/work_products/Specifications/winnf-15-s-0112-v2.0.0%20cbrs%20operational%20and%20functional%20requirements.pdf.

into smaller, “used” portions. The PAL licensee may then allow others (lessees) to coordinate and use other unused areas within the PAL by claiming new PPAs for the lessees’ own use within the same PAL. By leasing the PAL rights, other designated parties may establish these independent PPA claims associated with their own CBSD deployments.

V. ALL PALS SOUGHT AT AUCTION SHOULD BE ASSIGNED REGARDLESS OF THE NUMBER OF BIDDERS

As T-Mobile highlights in its Petition,¹⁶ the Commission’s rules indicate that the Commission will make available one fewer PAL in a licensed area than the total number of PALs applied for, up to a maximum of seven and, as such, all seven PALs would be made available only if there were eight or more bidders. Nokia agrees with T-Mobile that the Commission should amend this rule to allow for all qualified bidders to obtain PALs regardless of the number of competing bids. Applicants for PALs are seeking guaranteed spectrum with interference protection from GAA users. It would not serve the public interest to deny the benefits of a PAL to a qualified applicant – whether a carrier, industrial complex, hospital, etc. – simply because there was not enough demand by others to compete for PAL rights. The Commission’s current rules create artificial scarcity for PALs. Instead, the Commission should amend its rules as T-Mobile proposes so that all available PALs can be auctioned regardless of the number of qualified applicants.

VI. SAS ADMINISTRATORS SHOULD PROTECT CBSD REGISTRATION INFORMATION

Nokia agrees with CTIA and T-Mobile that SAS administrators should protect CBSD registration information.¹⁷ While Nokia agrees with the Commission’s rule for SAS administrators to exchange certain information with other SAS administrators in order to better coordinate operations of CBSDs, we do not see any justification for disclosing CBSD

¹⁶ See T-Mobile Petition at 13-14.

¹⁷ See CTIA Petition at 11-12; T-Mobile Petition at 19-20.

registration to the public. WinnForum has defined the standards to support information exchange between SASs that can protect CBSD registration information.¹⁸

Therefore, we support the request for the Commission to eliminate Section 96.55(a)(3) of its rules,¹⁹ which requires SAS administrators to make CBSD registration information available to the public.

VII. THE COMMISSION SHOULD RELAX EMISSIONS LIMITS TO FACILITATE OPERATIONS OVER WIDER CHANNEL BANDWIDTHS

Nokia supports Qualcomm's request that the Commission relax the emission limits that apply to 3.5GHz band.²⁰ Qualcomm's proposed changes would enable the operation of 4G LTE and 5G New Radio ("5G NR") devices with channel bandwidths greater than 10 MHz without power backoff that could impact coverage and quality of service for mobile operations in the band. This is aligned with Nokia's previous Petition for Reconsideration.²¹

Moreover, it is Nokia's judgment that, because Qualcomm's request does not modify the -40 dBm/MHz additional protection level in Section 96.41(e)(2) of the rules (which protect users outside the 3550-3700 MHz band), the suggested changes could be done in an expedited manner without any negative impact to incumbents. That said, Nokia's paramount concern is moving forward without delay. If the Commission determines that the requested change to emissions would cause delay in deploying in the band, then Nokia would not support the change.

¹⁸ See WinnForum Release Schedule, 24 May 2017
https://workspace.winnforum.org/higherlogic/ws/public/download/4194/WINNF-17-SSC-0004-V9.0.2%20SSC%20Release%20Schedule.pdf&wg_abbrev=SSC.

¹⁹ 47 C.F.R. § 96.55(a)(3).

²⁰ Qualcomm Proposal at 1-3.

²¹ See Nokia Petition for Reconsideration, at 10-12 (filed July 23, 2015) (requesting the FCC to align its rules with the emissions levels in 3GPP standards).

Considering the suggested changes, the Commission should revise FCC Rule 96.41(e)(1) as Qualcomm proposes:²²

(e) 3.5 GHz Emissions and Interference Limits:

(1) *General protection levels.* 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 emission outside the fundamental emission (whether in or outside of the authorized band) for a 10 MHz operating channel 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 greater than 10 MHz below the lower SAS assigned channel edge for a 10 MHz operating channel, the conducted power of any emission shall not exceed -25 dBm/MHz. For a 20 MHz operating channel, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-20 MHz above the upper SAS-assigned channel edge and within 0-20 MHz below the lower SAS-assigned channel edge; at all frequencies greater than 20 MHz above the upper SAS assigned channel edge and greater than 20 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed -25 dBm/MHz. For a 40 MHz operating channel, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-40 MHz above the upper SAS-assigned channel edge and within 0-40 MHz below the lower SAS-assigned channel edge; at all frequencies greater than 40 MHz above the upper SAS assigned channel edge and greater than 40 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed -25 dBm/MHz.

Nokia proposes that no change be made to Section 96.41(e)(2), which stays as

follows:

(2) *Additional protection levels.* Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

²² See Qualcomm Proposal, at 2-3.

VIII. CONCLUSION

For the foregoing reasons, Nokia urges that the Commission commence a rulemaking proceeding consistent with these Comments.

Respectfully submitted,

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