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

In the matter of	)	
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Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band	)	Docket No. 12–354
	)	
Commission Seeks Comment on Licensing Models and Technical Requirements in the 3550-3650 MHz Band	)	Public Notice, FCC 13–144

To: The Commission

COMMENTS OF ERICSSON IN RESPONSE TO THE PUBLIC NOTICE

Ericsson hereby submits these comments in response to the Commission's *Public Notice*,[1] which builds on the *NPRM* in this proceeding[2] and seeks comment on alternative licensing concepts, referred to as the Revised Framework. The Revised Framework describes an integrated approach to dynamically authorizing access to the Priority Access and General Authorized Access tiers of the 3550-3650 MHz band (3.5 GHz band).

I. INTRODUCTION

Ericsson supports the Commission's goal of permitting wireless broadband use of the 3.5 GHz band. The radio frequency spectrum identified in this proceeding represents an important opportunity to make underutilized spectrum available for commercial mobile broadband use by sharing the band with incumbent government users. However, dedicated spectrum is the lifeblood of today's mobile revolution which supports Quality of Service ("QoS") applications

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[1] Public Notice, *Commission Seeks Comment on Licensing Models and Technical Requirements in the 3550-3650 MHz Band*, FCC 13–144 (Nov. 1, 2013) ("*Public Notice*").

[2] *See Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, *Notice of Proposed Rulemaking*, 27 FCC Rcd 15594 (2012) ("*NPRM*").

for mass-market consumption, and therefore spectrum clearing should remain the policy priority for the Commission.

As stated in Ericsson's initial comments to the *NPRM*, further study of the exclusion zones outlined in the *NPRM* is necessary. [3] The analysis that appears in the *NPRM* is based on NTIA's Fast Track Report,[4] which analyzed the interference from Department of Defense ("DoD") radars based on commercial WiMAX technology deployed in a traditional macrocellular network without a Spectrum Access System ("SAS"). The *Public Notice* does not revisit or refine this preliminary analysis—specifically, it "does not discuss issues related to shared operations with incumbent federal and Fixed Satellite System (FSS) users, potential out-of-band interference issues, or any potential geographic restrictions on commercial use of the 3.5 GHz band."[5] As a result, there are a number of opportunities and issues that will require further study before resolution:

- Determination of which portion of the band should be used for Priority Access ("PA") licenses needs additional study.
- Some of the proposed solutions and technical values discussed in the *Public Notice* cannot be resolved without a further understanding of the sharing operations.
- In addition, the solutions seem to only support a single use case.

Therefore Ericsson supports the release of additional public notices to supplement the record on these opportunities and issues, as the *Public Notice* anticipates.[6]

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[3] Comments of Ericsson, GN Docket No. 12–354, at 4, 16 (filed Feb. 20, 2013) ("Ericsson Comments").

[4] 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. Oct. 2010) ("Fast Track Report").

[5] *Public Notice* at ¶ 3.

[6] *Id.* ("The Commission or Bureaus may release additional public notices to supplement the record on these or other issues. . . . we believe that the record may benefit from additional comment on specific rule proposals at a subsequent stage.")

As set forth in great length in our prior comments, Ericsson views the SAS as more than a database, although there certainly are similarities between the SAS and other spectrum databases, such as that used for TV White Spaces ("TVWS").[7] However, in the 3.5 GHz band, the SAS would take on a policy manager's role.

Ericsson proposes that the SAS be modeled using the principles of Licensed Shared Access ("LSA").[8] The SAS will not only have to take geography into account, but could manage and negotiate network deployment characteristics such as fixed *vs.* portable deployments, typical deployment heights of antennas on infrastructure, antenna gains, direction of sectorization, adaptability and time variability of antenna patterns, power levels, and the emission characteristics of different types of equipment. The SAS also could analyze interference statistics from various networks. Such statistics can potentially offer a basis for policy adjustments on an on-going basis. More information is available in Ericsson's comments to the *NPRM*.[9]

II. DISCUSSION

A. UNLICENSED GENERAL AUTHORIZED ACCESS SHOULD NOT BE PRIORITIZED OVER LICENSED PRIORITY ACCESS

The mobile broadband industry needs more spectrum to meet consumer demands, and the 3.5 GHz band has been positioned as a means to address capacity requirements. However, the Revised Framework proposal, while seeking to ensure efficient use of the 3.5 GHz band, may create a structure that is too fragmented and complicated with uncertainties for commercial mobile broadband. In the Revised Framework, the General Authorized Access ("GAA") tier's

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7 Ericsson Comments at 7-9.

8 *See* Ericsson, *Spectrum Sharing: Fast-Track Capacity with Licensed Shared Access*, White Paper Uen 28 423-3205 (Oct. 2013), http://www.ericsson.com/res/docs/whitepapers/wp-spectrum-sharing.pdf; *see also* Radio Spectrum Policy Group 2011, *Report on Collective Use of Spectrum (CUS) and Other Spectrum Sharing Concepts*, RSPG11-392 Final (Nov. 2011), http://rspg-spectrum.eu/_documents/documents/meeting/rspg26/rspg11_392_report_CUS_other_approaches_final.pdf.

9 Ericsson Comments at 7-10.

purpose has been modified to guarantee that the 3.5 GHz band has been assigned the role of ensuring that the 3.5 GHz Band is used consistently and productively.[10] This is done by ensuring that a "significant GAA 'floor'"[11] is maintained in all geographic areas where commercial use of the 3.5 GHz band is permitted, regardless of the number of licensed PA tier users in the area. Therefore, commercial PA operation is limited to what is not required to meet the "floor." The perverse result is that PA, which should be considered higher priority, is effectively rendered secondary to GAA usage, which should be the lower-priority usage.

If there is significant interference to PA from GAA users, the commercial value of the spectrum will diminish. The commercial viability of a market for shared spectrum will not be realized if operators and premise owners do not have the ability to ensure a managed interference environment. This should include the ability to specify a desired coverage area, permissions to use authorized power levels, antenna gains, as well as the ability to specify external interference limits based on a desired rise-over-thermal. For this reason, it is incumbent on the Commission to prioritize the rights of users who have applied for PA licensed use.

B. THE REVISED FRAMEWORK CREATES UNCERTAINTIES THAT MAKE 3.5 GHZ BAND LESS SUITABLE FOR COMMERCIAL MOBILE BROADBAND

1. GAA "FLOOR" NEEDS CLARIFICATION

The "floor"—the minimum spectrum reservation for GAA—requires clarification. It is unclear how the "floor" will be determined, given that every geographical market will have varying requirements, amounts of spectrum that may be used, and differing demands. The GAA floor, if there is one, should reflect the demands of the marketplace in each market. The *Public*

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[10] *See Public Notice* at ¶ 34.

[11] *Id*.

Notice, however, appears to envision using some pre-established percentage such as 40 or 50%,[12] which would not reflect market forces.

It is also not clear how assigning a floor would "encourage widespread deployment of base stations and handsets that would operate opportunistically in the band under the control of the SAS."[13] The "floor" will significantly reduce the amount of spectrum available to PA licensees ("PAL"). As a result, the 3.5 GHz band will be less attractive to PALs.

In addition, allowing critical users to receive interference protections, akin to Priority Access users, within a limited portion (*e.g.*, 20 MHz) of the GAA pool inside the confines of their facilities[14] could translate into higher demands by GAA on opportunistic access for PA spectrum and thereby require employment of interference mitigation techniques to ensure a properly interference-limited environment. This would have the impact of reducing the amount of spectrum available to PALs and fragmenting the equipment market.

2. THE REVISED FRAMEWORK WILL COMPLICATE GLOBAL HARMONIZATION AND IMPLEMENTATION OF LSA

The GAA "floor" will also reduce the ability to align this band with existing 3GPP specifications. It is expected that LTE devices deployed globally in this spectrum could benefit the U.S. device ecosystem in general. The LTE standard allows for macrocell, small cells (also known as microcells, picocells, or femtocells), and fixed deployment specified as Bands 42 and 43 in 3GPP. Fragmentation of the spectrum would limit the ability to support higher bandwidth type services, which require more and contiguous spectrum.

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[12] *See id.* at ¶ 28.

[13] *Id.* at ¶ 34.

[14] *See id.* at ¶ 38.

In addition, under the Revised Framework, when PA spectrum is not actually in use by a PAL, the SAS would automatically make that spectrum available for GAA use locally.[15] This would make it difficult to implement LSA, which is the preferred approach to spectrum sharing for mobile broadband usage since it caters to controlled, coordinated binary use by either the PAL or the incumbent. If a portion of the band is used opportunistically by GAA, it is unavailable for PA use. This impacts agreements with the incumbent based on an agreed sharing framework that is negotiated between PAL and GAA which also provides accountability and therefore enforcement.

The Commission should take steps to facilitate implementation of LSA, consistent with global reliance on LSA techniques. For example, the Revised Framework does not appear to adequately address usage by multiple PALs in a given market. While it is possible that two priority access users (operators) may be able to coordinate their network operations and synchronize their use of the spectrum for mobile broadband, the SAS should account for adequate geographical separation as well as guard bands between networks that are likely to interfere with each other. Implementation of LSA will allow for finer-grained management of the spectrum resource.

LSA is currently specified to enable a contract for binary sharing between an operator and an incumbent, often mediated by a regulatory authority. Under this definition, the presence of uncontrollable and unpredictable interference from GAA users would make it difficult to ensure protection of PALs, and would create unenforceable agreements between the incumbent and a single authorized user. Consequently, Ericsson urges the Commission to implement

[15] *Id.*

mechanisms to limit GAA users' access to the PA portion of the band and ensure sufficient protection to PAL from GAA operations.

3. THE REVISED FRAMEWORK WILL COMPLICATE IMPLEMENTATION OF CARRIER AGGREGATION

The "GAA floor" concept would complicate alignment with existing global operating bands defined by 3GPP, and lead to fragmentation of the spectrum as noted in Section II.B.2, *supra*. Nevertheless, the SAS would assign GAA users and PALs shares of the band but the exact spectral location of a given transmission authorization, within the band, would not be fixed. For example, the SAS would dynamically assign available frequencies which will be determined based on availability. Requests for larger bandwidths could be granted in non-contiguous blocks. The allocated blocks could belong to the different bands, *i.e.* Band 42 or band 43. However, from a device perspective, this fragmentation would necessitate support of a larger number of Carrier Aggregation options: intra-band contiguous Carrier Aggregation, intra-band non-contiguous Carrier Aggregation and inter-band Carrier Aggregation. This would increase the device complexity and cost.

4. THE UNTRIED DYNAMIC AUCTION APPROACH CREATES CONSIDERABLE UNCERTAINTY

Based on the proposed number of licenses and the short license term, flexible and dynamic auction mechanisms may be a necessity. But this centrally mediated dynamic spectrum auction mechanism is untried in a band that has a significant amount of spectrum that could serve mobile broadband use. It is also difficult to see how such a framework provides the predictability for infrastructure investment certainty and QoS, which typically require multi-year planning and deployment horizons (*e.g.*, to obtain site permissions, ensure coverage, provide contiguous

mobility) and additional time thereafter to yield reasonable returns to long-term infrastructure investors.

Moreover, the implementation of this untried approach for an extremely large number of licenses—74,000 geographical units, 10 or more frequency blocks, and one-year cycles—presents even greater complexity. The Commission may wish to consider, as an intermediate step, a somewhat simpler initial plan where larger blocks of spectrum (such as 60-80 MHz) are licensed for PA use across all 74,000 areas for a longer term, such as 10 years. That will more closely resemble the clarity traditional licensing provides, and the dynamic control of spectrum usage will be considerably simplified. The Commission could then assess the strengths and weaknesses of dynamic auctions during the initial 10 year term, and develop further refinements as warranted.

III. CONCLUSION

For all the foregoing reasons, Ericsson submits that further study is required to ensure that commercial mobile broadband providers using PA will have access to sufficient spectrum in the 3.5 GHz band.

Respectfully submitted,

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