

**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

**COMMENTS OF 4G AMERICAS ON THE
FURTHER NOTICE OF PROPOSED RULEMAKING**

Introduction

4G Americas submits these Comments on the Commission's proposal for an Innovation Band at 3550-3700 MHz (3.5 GHz). 4G Americas is a leading wireless industry association in the Americas representing the 3GPP family of technologies, including LTE and LTE Advanced. 4G Americas promotes, facilitates and advocates for 3GPP technology adoption throughout the Americas.¹ The 3.5 GHz band has properties suitable for small cell and backhaul deployments and macro cell deployments where appropriate. Moreover 3.5 GHz could also provide a test bed for the introduction of innovative services. To maximize efficient use of reliable mobile broadband services in that band, mobile operators licensed as Priority Access Licensees require stable assignment of frequencies – not dynamically assigned spectrum.

¹ The 4G Americas Board of Governors members include Alcatel-Lucent, America Movil, AT&T, Cable & Wireless, Cisco Systems, CommScope, Entel, Ericsson, Gemalto, HP, Nokia Solutions Networks, Openwave Mobility, Qualcomm, Rogers, Sprint, T-Mobile USA, and Telefonica.

4G Americas recognizes that some bands, like 3550-3650 MHz, cannot be cleared in a time frame consistent with meeting the exploding demand for mobile broadband spectrum. Because of the existence of Navy radar at 3.5 GHz, that band will need to be shared. Spectrum sharing can effectively provide access to unused or underutilized spectrum. However, exclusively licensed spectrum is still the approach preferred by 4G Americas and its operator and vendor members. We therefore support the Commission's efforts to develop innovative approaches to share underutilized spectrum, where bands cannot be cleared to allow exclusive licensing in the near future, provided those approaches are structured in a way that will expedite commercial mobile access. 4G Americas reiterates in these Comments that innovation in the band should not jeopardize international harmonization, through existing standards, to the maximum extent possible.

The Commission requests more focused comments prior to establishing rules.² Specifically, in part, the Commission requests information on further developments that would enable a reduction in the size of the proposed Exclusion Zones.³

Discussion

Reducing the Exclusion Zones

4G Americas is pleased the Commission recognizes the need for further reduction of the original Exclusion Zones that were based on studies with macro base stations, and not the small cells now envisioned for the majority of the commercial mobile broadband use in the band. In

² See *In re Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Further Notice of Proposed Rulemaking at ¶ 3, (rel'd April 23, 2014) ("FNPRM").

³ *Id.* at ¶5.

order to reduce the Exclusion Zones, 4G Americas urges that the Commission work with the federal agencies on more realistic assumptions in their sharing modeling. 4G Americas notes that at the Commission's January 2014 workshop, the Commerce Department's Institute for Telecommunication Sciences noted the need to better understand LTE signal detection and to test LTE receivers and small cells – not just macro base stations.⁴ This suggests with further study, Exclusion Zones in the 3.5 GHz band can be reduced. Applying realistic assumptions in the sharing studies for clutter and terrain that reflect today's LTE technology could further reduce Exclusion Zones. Reduction in the size of the Exclusion Zones is a critical component to the acceptance of this band and the subsequent investment that can be realized for this band.

LTE standards also define functionality used for managing and operating these networks in an interference-limited environment. Therefore these functions can help support co-existence with incumbent operation. For instance, LTE devices have mitigation interference cancellation techniques embedded (eICIC), further facilitating spectrally efficient use through significant capacity gains. Advances in eICIC can help user devices co-exist with federal and satellite incumbents in the band.

The LTE standards now include Self-Optimizing Network (“SON”) technology, which reflects an evolution in network management that maximizes spectral efficiency. The self-organization of small cells in a single closed operator system allowed in the 3GPP standards through SON enables small cells to expand and contract their coverage areas as needed to avoid interference with one another, to instantly recognize new cells and incorporate them into the carrier's network, and to provide instant mobility with fallback to carrier networks where small

⁴ See Institute for Telecommunication Sciences' Power Point at 16, available at [http://www.its.bldrdoc.gov/media/50190/Radar-LTE_FCCworkshop2013\[sic\]Jan.pdf](http://www.its.bldrdoc.gov/media/50190/Radar-LTE_FCCworkshop2013[sic]Jan.pdf), discussing NTIA Technical Report 14-499.

cell connectivity is not available, resulting in more capacity and reliability than that offered by today's simple Wi-Fi off-loading.

SON may help reduce the originally proposed Exclusion Zones, and could help realize many of the Commission's goals toward more efficient spectrum use and consumer satisfaction of applications relying on mobile broadband technology. Mobile broadband licensees using SON and other techniques could more efficiently move off the spectrum when incumbents need to operate, falling back to other spectrum bands if needed. 4G Americas supports rules that would allow negotiations on the size of Exclusion Zones between eligible operators and incumbents, since SON could help reduce those Exclusion Zones.

Role of the SAS

The role and responsibility of the Spectrum Access System (SAS) as envisioned in the FNPRM is complex and is unprecedented. The SAS licensing framework will require significant development, extensive testing and refinement. All three tiers of users must be comfortable with the assumptions and methodology made by SAS administrators with respect to both interference management and operation parameters. 4G Americas proposes that the Commission adopt a *transitional licensing approach* that initially provides greater segregation between the various tiers of users, limiting the potential for interference. As confidence is gained in the operation of the SAS, sharing can be increased to maximize the use of the spectrum. The transitional licensing framework should provide spectrum users with the certainty and stability needed to invest and deploy innovative services. During the transition period, the Commission should take steps to prevent and mitigate interference among the various tiers of users, including dividing the

band between Priority Access Licensees and General Authorized Access users during the transition.

Once deployed, the SAS will need to be a highly sophisticated system that manages the numerous complexities in the band to avoid harmful interference among three tiers of users deploying different technologies. The role of the SAS must be a careful balance between allowing tiers, particularly Priority Access Licensees (PALs), to deploy systems that continue to meet service requirement demands while providing equitable access to the spectrum. Specifically, the SAS should serve to closely and reliably manage the use of spectrum at any given moment as well as any restrictions. It may be appropriate to more actively manage GAA users, but here again, a transitional approach, where the complexity of the environment managed by the SAS is more limited, would help build confidence and experience with the SAS and will help drive investment in use of the band. As experience is gained, it may be appropriate to increase the complexity of the environment managed by the SAS to maximize dynamic sharing. In any case, the SAS will need to manage its role with the same level of spectral efficiency and latency that is expected from current and future LTE networks.⁵ This prerequisite is necessary to provide incentives to wireless operators to utilize the 3.5 GHz spectrum and help to build the new ecosystem.

The FNPRM envisions that the SAS will dynamically assign channels to PALs.⁶ Such an approach would add significant complexity to network implementation and management and should not be adopted at this time. 3GPP standards are designed for static spectrum channels. The mechanisms therein for operationalizing the networks such as network frequency setup, configuration and management of neighbor listing for handoffs to support mobility, are complex

⁵ See, e.g., FNPRM at ¶66.

⁶ See *id.* at ¶103.

and require careful tuning. These mechanisms would need to be redesigned, standardized and tested for the dynamic channel assignment envisioned in the FNPRM. In order to facilitate rapid adoption by mobile broadband operators of the 3.5 GHz band, Commission rules should support use of existing standards. This will also ensure that equipment can be quickly deployed in the band. For mobile broadband operators to operate as PALs at 3.5 GHz, it is essential that they be assigned static frequencies within their service area. The technologies required for dynamic frequency assignment in a carrier's network should be the subject for a study item in 3GPP and other related standards bodies before implementation is required. Once a solution is devised and confidence is gained in the operation of the SAS with this functionality, the Commission can evaluate whether it is appropriate for the frequency assignments to be dynamically managed by the SAS.

The Commission requests comment on interoperability across the band.⁷ 4G Americas supports interoperability for the entire band, in order to promote economies of scale. This will address the Commission's concern that implementing a transitional framework will create Balkanization within the band. For the same reasons, 4G Americas supports the Commission establishing uniform certification requirements for both the GAA licensees and the PAL equipment.⁸

Internationally Harmonized Spectrum Preferable

As the Commission and many others have noted in recent years, internationally harmonized spectrum provides global economies of scale and scope benefitting U.S. consumers.⁹

⁷ See *id.*, e.g., at ¶64.

⁸ See proposed rule §96.39.

⁹ See, e.g., President's Council of Advisors on Sci. and Tech., Exec. Office of the President, *Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth*, § 5.6, at 61-62 (July

As the Commission has recognized, the amount of spectrum required to support faster, more ubiquitous mobile broadband services is expanding exponentially.¹⁰ In addition to taking advantage of economies of scale, spectrum harmonization enables global roaming, reduces equipment design complexity, facilitates cross-border coordination, and improves spectrum efficiency. All these benefits ultimately reduce costs for consumers. Widely supported spectrum bands and channels can lower the cost of radio frequency components – a significant factor in device cost.

Band planning includes determining the duplex mode of operation. Harmonizing the duplex mode with global preferences benefits U.S. consumers through spectral efficiencies and economies of scale. LTE standards and band plans today contemplate Time Division Duplex (TDD) mode in the spectrum bands considered in the Commission’s proposed rulemaking. 3GPP TDD Band 42 is 3.4-3.6 GHz and TDD Band 43 is 3.6-3.8 GHz. Today, there is no single 3GPP band that covers the entire 3550-3700 MHz range, but that band could be segmented into two blocks that would be covered by the existing 3GPP Bands 42-43 – the 50 MHz at 3550-3600 MHz is included in Band 42, and the 100 MHz in 3600-3700 MHz is in Band 43. A TDD option would also support expansion of the band upwards to 3700 MHz in the event the Commission adopts enabling rules, while still being covered by 3GPP Band 43. Permitting mobile access to the entire 150 MHz would expedite operators’ access, given the global harmonization with Bands 42 and 43. U.S. consumers would benefit from global harmonization of technical parameters with the 3GPP Band 42 and 43, which would enable as large an eco-system as possible in the bands.

2012) (noting the benefits of internationally harmonized spectrum to reduce interference, enhance interoperability and roaming, improve spectral efficiency and cross-border coordination, as well as enabling new products to achieve market economies of scale) (“PCAST Report”).

¹⁰ Ericsson Mobility Report, June 2014; <http://www.ericsson.com/news/1790097>

In order to enable an innovative ecosystem of LTE devices and applications, the final rules adopted in this proceeding should not preclude the deployment of TD-LTE at 3550-3700 MHz¹¹. Permitting mobile operators to provide TD-LTE broadband across the entire 150 MHz will lower device costs for U.S. consumers.

Service Rules for the 3.5 GHz Band

The existing LTE standards for deployment at 3.5 GHz allow for macro, metro, micro, and pico cell operations in TDD Bands 42 and 43 (3400 - 3800 MHz). The Commission's service rules should therefore allow for macro cell deployment where possible. While the Commission has proposed allowing higher-power service for rural areas, 4G Americas supports a broader rule to allow for macro cell deployment where possible, in order to make use of the band as efficient as possible in meeting demand for mobile broadband.

Conclusion

4G Americas commends the Commission in taking yet another step towards realizing America's broadband future. The mobile industry has invested hundreds of billions on broadband infrastructure, and is interested in using all viable bands for delivering innovative mobile broadband services to U.S. consumers. Mobile operator use of 3550-3700 MHz could be an important component of operators' ability to meet explosive demand, if spectrum policy can be developed in a way consistent with LTE standards and deployments that are in place to deliver quality-of-service broadband to consumers. For the 3550-3700 MHz band to meet consumer demand for reliable broadband services, mobile operators must have predictable stable

¹¹ Support for TDD in the band should also facilitate the use of the 3.5 GHz band for supplemental downlink through carrier aggregation with existing or future licensed bands.

access to the band with terms and conditions that are more suitable for longer-term investments. Accordingly, 4G Americas recommends a *transitional licensing* approach that addresses the experimental and uncertain nature of the proposed regulatory framework until more certainty and predictability can be supported.

Respectfully submitted,

A handwritten signature in cursive script that reads "Chris Pearson". The signature is written in black ink on a light-colored background.

Chris Pearson
President, 4G Americas

July 14, 2014