

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

In the Matter of

Expanding Flexible Use of the 3.7 to 4.2 GHz Band

GN Docket No. 18-122

Petition for Rulemaking to Amend and Modernize
Parts 25 and 101 of the Commission's Rules to
Authorize and Facilitate the Deployment of
Licensed Point-to-Multipoint Fixed Wireless
Broadband Service in the 3.7-4.2 GHz Band

RM-11791

Fixed Wireless Communications Coalition, Inc.,
Request for Modified Coordination Procedures in
Band Shared Between the Fixed Service and the
Fixed Satellite Service

RM-11778

COMMENTS OF QUALCOMM INCORPORATED

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October 29, 2018

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Qualcomm commends the Commission for issuing this *NPRM* proposing to allocate additional licensed flexible use mid-band spectrum in the 3.7 to 4.2 GHz band.¹ Timely action by the FCC and industry incumbents to open hopefully all of this band as soon as possible for mobile use is needed so new mid-band spectrum can be incorporated into America's 5G mobile broadband networks. The Commission has led the world in allocating high band spectrum for 5G, but to realize the full potential of 5G technology to deliver multi-gigabit, ultra-low latency, and ultra-reliable connectivity on a ubiquitous basis, there is no question that additional sub-6 GHz spectrum is needed.

¹ See Expanding Flexible Use of the 3.7 to 4.2 GHz Band, *Order and Notice of Proposed Rulemaking*, FCC 18-91, GN Docket No. 18-122 (July 13, 2018) ("*NPRM*").

The pressure on existing spectrum bands is ever-increasing, driven by the universal adoption and ongoing growth of wireless technology, so enabling a steady stream of new spectrum — particularly mid-band spectrum — is critically important. Progress in this docket will support continued economic growth and United States 5G leadership, positively impacting every facet of American life.

INTRODUCTION & SUMMARY

The FCC *NPRM* appropriately recognizes the explosive growth in wireless communications services and the concomitant need to make additional mid-band spectrum available for wireless communications.² The use of 3.7 to 4.2 GHz mid-band licensed spectrum in conjunction with other mid-band spectrum, such as CBRS at 3.55-3.7 GHz and potentially 3.45 to 3.55 GHz, and with both low-band (sub-1 GHz) and high-band (millimeter wave) spectrum is crucial for enabling 5G. The federal government's activities to maintain a steady stream of exclusively-licensed flexible-use spectrum is essential to achieving and maintaining American leadership in 5G. Qualcomm strongly supports the government's and the industry's active efforts to open additional spectrum bands for wireless use, and encourages the agency and satellite industry incumbents to move forward in this docket.

The FCC should continue to examine means of opening up the entire 500 MHz band for flexible use because there is no other sizeable block of mid-band spectrum available. The U.S. is actually at a disadvantage in the sheer amount of licensed sub-6 GHz spectrum for 5G when compared to some other countries and regions.

It is imperative that the FCC allocate additional exclusively licensed spectrum for 5G services below 6 GHz. The agency should enact rules that support a variety of 5G use cases,

² See *NPRM* at ¶¶ 1-8.

including enhanced mobile broadband, ultra-low latency, ultra-reliable communications, and 5G-based massive Internet of Things-based devices, applications, and services. Qualcomm applauds the FCC for recognizing the dearth of mid-band spectrum for 5G and for initiating this rulemaking. A focused effort to open the 3.7 to 4.2 GHz band is one of the most significant steps the Commission can take to ensure continued U.S. leadership in the race to 5G.

DISCUSSION

I. Qualcomm Supports Opening The Entire 3.7 to 4.2 GHz Band For Exclusively Licensed Mobile Operations

The FCC should allocate additional mid-band spectrum below 6 GHz for licensed mobile services as soon as possible. 5G services need additional licensed mid-band spectrum because it offers very good coverage; it can support service inside buildings and to rural areas of the country, while providing a guaranteed Quality of Service (“QoS”). As the Commission recognizes, 5G deployments are capable of channel bandwidths as wide as 100 MHz even when operating at frequencies below 6 GHz.³ Thus, the FCC should look to repurpose a certain amount of spectrum nationwide, *i.e.*, hopefully the entire band, in order to create spectrum access opportunities for multiple licensees.⁴

In this regard, Qualcomm supports the FCC’s actions to obtain a comprehensive and accurate understanding of the current users of the band, including temporary fixed and transportable earth stations as well as Fixed Satellite Service (“FSS”) licensees, in order to develop a sound transition plan.⁵ In this regard, we support the Commission’s reexamination of

³ See *NPRM* at ¶ 165.

⁴ See *id.* at ¶ 64. Qualcomm concurs with the Commission’s assessment that co-channel sharing between mobile operations and current incumbents is not feasible. See *id.* at 55.

⁵ See *id.* at ¶¶ 16-24, 41 (directing incumbent FSS earth station operators to certify the accuracy of information in IBFS, and requiring incumbent FSS space station operators to supply additional relevant operational information.). Qualcomm also supports the FCC’s proposal to

the full-band, full-arc coordination policy for FSS licensees to inform its study of enabling more intensive use of the band, particularly mobile services.⁶

Economical deployments. This band is adjacent to the 3.5 GHz band (3550-3700 MHz) that soon will be used for mobile services and potentially opens opportunities for sharing certain equipment components across bands, which can keep device costs low. The 3.7 to 4.2 GHz band also offers promising mobile deployment attributes — very good propagation characteristics to support broad coverage with less base stations than what high-band spectrum requires — and with 500 MHz total bandwidth it is possible to support much wider channels and higher throughput for which the 5G New Radio (“5G NR”) interface was designed.⁷

Benefits of international harmonization. The 3.7 to 4.2 GHz band also presents the potential for spectrum harmonization with other countries and regions, particularly parts of Asia and Europe, that have already made available, or are making available, all, or a portion, of this 500 MHz band in conjunction with other spectrum above or below this band for licensed mobile broadband services.⁸

Large geographic service areas and wide channelization. Qualcomm supports the FCC’s proposal to license this band on an exclusive, geographic basis under Part 27 of the Commission’s rules.⁹ In addition, the FCC should auction flexible use licenses with wide channelization — *e.g.*, 100 MHz for increased performance by leveraging 5G’s inherent ability

terminate earth station registrations unless earth station licensees certify their operations existing as of April 19, 2018. *See id.* at ¶ 34.

⁶ *See NPRM* at ¶ 39 (proposing to afford protection to earth station operators only for those frequencies, azimuths, and elevation angles and related parameters reported to be in regular use).

⁷ *See, e.g., NPRM* at ¶ 4.

⁸ *See id.* at ¶¶ 6, 56.

⁹ *See id.* at ¶¶ 133, 143.

to use wide channels — to allow licensees to deploy mobile, point-to-multipoint, and point-to-point operations over sizable geographic areas, such as Economic Areas or Partial Economic Areas.¹⁰

II. Band Clearing Should Be Fully Explored Before Resorting To Options That Will Result In The Repurposing Of Less Than The Entire 3.7 to 4.2 GHz Band

The FCC should explore all options to fully clear the band of satellite incumbents before resorting to options that will lead to the repurposing of less than 500 MHz. Qualcomm recognizes the importance of the services supported by C-band FSS operators, but there are other means these incumbent operators can rely upon to free up this band. For example, alternative transmission media and new technologies can ensure existing uses are met while repurposing spectrum in the 3.7 to 4.2 GHz band, as explained below.

A. Other Transmission Means And Bands Can Support C-Band FSS Needs

As important as C-band FSS services are, not all use cases have to be delivered via the 3.7 to 4.2 GHz band simply because they historically have been delivered that way. In this regard, the Commission should consider the extent to which fiber optic cables and Ka- and Ku-band satellite spectrum bands can serve certain C-band uses such as video content delivery.

Fiber can substantially replace services provided by FSS without significant disruption to customers. Fiber-based delivery of data traffic has important advantages over satellite links in terms of lower latency, greater capacity, enhanced security, and lower cost. Fiber is being increasingly deployed throughout the U.S. and thus is increasingly available in areas served today by FSS operators.

¹⁰ See *NPRM* at ¶¶ 135-39.

Ku- and Ka- spectrum bands. It also is possible for C-band licensees to port their operations to higher frequency bands, like the Ku- and Ka- spectrum bands, that support higher throughput and greater capacity.¹¹

Advanced coding and data compression technologies. In addition, advanced signal coding and data compression tools allow satellites to deliver the same amount of traffic using less transponders and bandwidth, which can free up additional spectrum. These technologies also can allow C-band licensees that migrate to fiber-based connections to provide improved levels of service when compared to their current means of transmission.

B. The FCC Should Sunset Point-to-Point Fixed Service Licenses In This Band

Qualcomm supports the FCC's proposal to sunset point-to-point fixed service licenses that are currently active in this band. As the Commission notes, there are only 115 active licenses in the 3.7 to 4.2 GHz band, and there are several other bands that can support these operations.¹² Also, if the entire band is not completely cleared of satellite downlink operations, these limited point-to-point fixed service operations should be relocated to the upper portion of the band that is retained for repacked FSS operations.

C. The FCC Should Not Allow Point-to-Multipoint Fixed Operations In This Band

Qualcomm believes it is premature to authorize fixed point-to-multipoint services in the 3.7 to 4.2 GHz band. The FCC should wait until more information is available on how the band will be transitioned to mobile use before enabling unaffiliated point-to-multipoint services.

¹¹ See, e.g., *NPRM* at 109.

¹² See *id.* at ¶¶ 9, 47-48.

Opening this band for such Part 101 operations at this point in time would prejudice the potential uses for this band and curtail the full use of the 3.7 to 4.2 GHz band for mobile services.¹³

In fact, permitting fixed point-to-multipoint services in this band at this point in time is at odds with the FCC's April 19, 2018 decision to temporarily freeze new and modification applications for satellite earth station and fixed microwave licenses.¹⁴ Further encumbering this important band at this stage would be counterproductive to opening it for 5G mobile services.

D. Repurposing 3.7-4.2 GHz Will Satisfy The MOBILE NOW Act Mandates

Opening the 3.7 to 4.2 GHz band for flexible uses also will enable the FCC to satisfy the spectrum repurposing obligations in the MOBILE NOW Act. Qualcomm agrees that this 500-MHz wide spectrum band may be used to satisfy the 255 MHz requirement in the MOBILE NOW Act because there was no more than a *de minimis* amount of fixed wireless broadband and no mobile operations in the band prior to adoption of the Act. And, because IoT services are provided on a commercial mobile basis in licensed spectrum, they also qualify in Qualcomm's view under the separate MOBILE NOW Act mandate to identify 100 MHz below 6 GHz for exclusively licensed commercial mobile use.¹⁵

¹³ See *NPRM* at ¶¶ 116-124. Qualcomm agrees with the concerns raised by satellite providers on the challenges it would face in sharing the band with point-to-multipoint operators.

¹⁴ See *id.* at ¶ 16 n.32 (“On April 19, 2018, [FCC] staff froze applications for new or modified fixed microwave stations and earth stations in the 3.7-4.2 GHz band to preserve the current landscape of authorized operations pending action as part of the Commission’s ongoing inquiry into the possibility of permitting mobile broadband use and more intensive fixed use of the band through this proceeding.”).

¹⁵ See *id.* at ¶¶ 53, 133.

III. The Commission Should Adopt Service And Technical Rules That Support 5G Buildouts Consistent With International Deployments And Novel 5G Use Cases

Unpaired Spectrum Blocks. The 3.7-4.2 GHz band should be configured in an unpaired mode to enable Time Division Duplex (“TDD”) deployments, where the communications uplink is separated from downlink by the allocation of different time slots within the same transmission channel. This band is allocated in all other jurisdictions in an unpaired manner, and Qualcomm believes the FCC also should configure the spectrum blocks on an unpaired basis.¹⁶

License Term and Right of Renewal. Qualcomm supports the Commission instituting a 15-year license term with a renewal expectancy for flexible use licenses in this band.¹⁷ While the FCC has in general implemented ten-year license terms for wireless services, longer license terms have been adopted where, as here, time-consuming activities like band clearing, relocation, or repacking are needed to free up spectrum for mobile uses. Given that the opening of this band may involve clearing, relocation, and repacking, a 15-year license term with a renewal expectancy is warranted.

Transmit Power and OOB Limits. Qualcomm acknowledges that the proposed power limit of one Watt (*i.e.*, 30 dBm) often is sufficient for handheld devices and associated applications and services. However, the Commission should not preclude higher power, *e.g.*, 4 Watts, which will be important for novel 5G applications that require higher power. Certain 5G devices, applications, and services may need more than one watt of power and the Commission should not unduly restrict such uses by imposing a lower power level on all mobile and portable devices.¹⁸

¹⁶ See *NPRM* at ¶ 137.

¹⁷ See *id.* at ¶ 149.

¹⁸ See *id.* at ¶ 167.

Qualcomm also supports the FCC proposed limit on out-of-band emissions (“OOBE”) of -13 dBm/MHz at the authorized channel edge.¹⁹ This level is consistent with countless other wireless services and “has been used successfully to protect adjacent operations from harmful interference” in many other mobile bands, as the FCC recognizes in the NPRM.²⁰

Finally, when the Commission authorizes flexible use licenses in the 3.7 to 4.2 GHz band, it should revisit the stringent adjacent band emissions limits imposed on the Citizens Broadband Radio Service (“CBRS”) band, which limits CBRS equipment to -40 dBm/MHz at or beyond 20 MHz from the 3700 MHz band edge.²¹ When the FSS and FS services these limits were put in place to protect are moved away from the lower portion of the 3.7 to 4.2 GHz band, this -40 dBm/MHz limit should likewise be revisited and removed.

¹⁹ See *NPRM* at ¶ 168.

²⁰ See *id.*


²¹ See *id.* at ¶ 169.

CONCLUSION

Qualcomm encourages the FCC to move forward to open the 3.7 to 4.2 GHz band for flexible licensed wireless services in accordance with these Comments. There is no question that 5G networks will require additional licensed mid-band spectrum resources to support next generation enhanced mobile broadband, massive IoT, and mission critical services, and this band provides a critical component of such spectrum resources. The FCC and industry should proceed apace to explore all options to open as much of this band as possible within the quickest timeframe.

Respectfully submitted,

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Dated: October 29, 2018