

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

In the Matter of

Amendment of Parts 2 and 90 of the
Commission's Rules To Create a
New Frequency Allocation for Wireless
Broadband Services

RM-11715

COMMENTS OF QUALCOMM INCORPORATED

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QUALCOMM Incorporated is pleased to comment on the Mimosa Networks, Inc. petition to establish a new spectrum allocation at 10.0 to 10.5 GHz for wireless broadband services.¹ It is critically important that the Commission continue to look for additional opportunities to provide spectrum for wireless broadband services given the surge in demand for mobile broadband connectivity over the past several years and the expected 1000x growth in demand over the coming years. The 10.0 to 10.5 GHz band identified in the Petition may be used to support wireless backhaul links, as Mimosa describes, but the band may be better suited to directly support mobile operations, as discussed herein. Moreover, to the extent the band is not available for mobile broadband use on a coast-to-coast 24/7 basis, the FCC has at its disposal spectrum sharing tools like small cells and Authorized Shared Access ("ASA") to allow the band to support extensive mobile operations when and where incumbents are not operating.

¹ See FCC Consumer & Governmental Affairs Bureau Reference Information Center Petition For Rulemaking Filed, Report No: 3002, Dkt No RM-11715 (Mar. 11, 2014) seeking comment on Mimosa Networks, Inc., Petition for Rulemaking, Amendment of Parts 2 and 90 of the Commission's Rules To Create a New Frequency Allocation for Wireless Broadband Services (the "Petition").

INTRODUCTION AND SUMMARY

The FCC should consider the opportunities that the 10.0 to 10.5 GHz band can offer to support licensed mobile operations in addition to the wireless backhaul uses Mimosa identifies.² First and foremost, the FCC should determine the extent to which this band can be cleared of incumbents. If the band can be completely cleared in a reasonable timeframe, particularly in those areas of the country that are experiencing high demand for mobile broadband data, the FCC should clear the band. If clearing is not possible — at least not in a reasonable time frame which could well be the case here³ — the FCC should consider using Authorized Shared Access (“ASA”) to allow the spectrum to be shared with licensed mobile operations when and where incumbents are not operating.

Qualcomm and its wireless technology partners are encouraging the Commission to implement ASA in the 3.5 GHz band to enable licensed mobile broadband access using small cells.⁴ ASA can similarly allow the 10.0 to 10.5 GHz band to be integrated into mobile networks

² See, e.g., Petition at 9-11. Mimosa asks the FCC to use the regulatory framework that currently governs 3.65 to 3.70 GHz band operations in Part 90 of the FCC Rules for the 10.0 to 10.5 GHz band. The FCC, however, is looking to revise its 3.65 to 3.70 GHz band rules when it promulgates rules for the 3.5 GHz band. See FCC Public Notice, Commission Seeks Comment On Licensing Models And Technical Requirements In The 3550-3650 MHz Band, FCC 13-144, GN Docket No. 12-354 at ¶ 51 (Nov. 1, 2013); 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, 15620-22, ¶¶ 77-82 (2012).

³ It appears that portions of the 10.0 to 10.5 GHz band are used by the U.S. military for weapons control radar systems onboard aircraft and by the National Oceanic and Atmospheric Administration (“NOAA”) for radar systems onboard meteorological satellites. In addition, the band is used for amateur operations, and there are approximately 53 active private land mobile radiolocation service licenses on the FCC’s Universal Licensing System.

⁴ See Comments filed in Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Docket No. 12-353; see generally Comments of Qualcomm, Comments of Nokia Solutions and Networks US LLC, Comments of Ericsson and iconectiv (filed Jan. 3, 2014); Comments of 4G Americas (Dec. 5, 2013).

and provide a predictable quality of service when and where incumbent users are not operating. Carrier aggregation technology also can allow mobile operations in the band to be combined with other bands to enable increased data speeds and an improved user experience.

Deploying small cell technology at 10 GHz may be a perfect means of enabling mobile broadband connectivity in this band given that these higher frequency signals have higher propagation losses than the sub-3 GHz bands that traditionally have been used for mobile broadband connectivity via macrocells. Opening access to the 10 GHz band using ASA and small cells should be given serious consideration because it can enhance and expand mobile broadband network capacity and help meet the expected 1000x mobile data traffic growth.

DISCUSSION

I. There Is No Question That Additional Wireless Spectrum Is Needed To Handle The Impending 1000x Surge In Demand For Mobile Broadband Data

Wireless data usage has been doubling annually over the past several years, and if this trend continues for the next ten years, the level of usage in a decade will be more than 1000 times today's level. Based on this extraordinary growth trend, Qualcomm has set a corporate goal to meet what we call the "1000x Challenge"— to support this growth by expanding the wireless capacity of today's mobile broadband networks by 1000 times.

The most important means of meeting the 1000x Challenge is by bringing much more spectrum on line. This includes the 600 MHz band spectrum that the FCC is working hard to repurpose for mobile broadband via the voluntary incentive auction process. Completely clearing bands for mobile use by a date certain and auctioning the spectrum for licensed use is of utmost importance to the wireless industry. The 10.0 to 10.5 GHz band, while higher in frequency than the bands that traditionally have been used for mobile operations, can be used to

meet the surging mobile data demands.⁵ And, even if the 10 GHz band cannot be cleared coast-to-coast, tools such as small cells and Authorized Shared Access can allow the band to be used for mobile broadband when and where incumbent users are not operating, as explained below.

II. Small Cells Also Will Play A Key Role In Supporting 1000x Growth In Data Demand

A key piece of supporting 1000x more capacity will include the deployment of very-low power cellular base stations, *i.e.*, small cells which are comparable in size to a deck of playing cards, much closer to user devices and the seamless integration of these small cells into the larger macro-cellular networks. Small cells will have connectivity similar to that of a typical macrocellular base station. But, unlike a typical base station, small cells will operate with very low transmit power levels.

Small cells can be unobtrusively placed indoors or just outside buildings — places where lots of wireless traffic originates — and work in concert with larger macrocells to create self-organizing, heterogeneous networks.⁶ In this way, small cells that incorporate the 10 GHz band identified in the Petition can be particularly useful. Indeed, given that wireless signals at 10 GHz have higher loss than the sub-3 GHz signals used by macrocells today, small cells deployed nearer to users, where the signal propagation path is much shorter, offer a technically viable option that can take increased advantage of spectrum reuse opportunities.

⁵ Qualcomm thus agrees with Mimoso that the band should be allocated for Fixed and Mobile Operation in ITU Region 2, as it is currently allocated in Regions 1 and 2. *See* Petition at 16.

⁶ The use of carrier aggregation in LTE would enable this band to be combined seamlessly with other bands to provide users with enhanced capacity and an improved user experience.

III. Authorized Shared Access Should Be Considered For The 10.0 to 10.5 GHz Band If The Band Cannot Be Completely Cleared In A Reasonable Timeframe

To the extent the 10.0 to 10.5 GHz band cannot be completely cleared of incumbent users in a reasonable timeframe by a date certain, ASA offers a particularly attractive option for opening the band up for mobile operations sooner rather than later. As noted above, a number of wireless technology companies, including Qualcomm, are encouraging the FCC to use ASA to support exclusive licensed access to the 3550 to 3700 MHz band using mobile broadband small cells when and where federal incumbent users are not operating.⁷ Implementing ASA at 10 GHz would similarly allow the band to be integrated into networks that support mobile operations and provide a predictable quality of service when the band is available for such use, and therefore greatly enhance and expand mobile broadband network capacity to meet 1000x mobile data traffic growth. Implementing carrier aggregation in LTE would enable this band to be combined seamlessly with other bands and provide users with a greatly enhanced user experience.

A. ASA Is Being Standardized In Europe And Elsewhere

There are very active efforts in the European Telecommunications Standards Institute (“ETSI”) to implement ASA in Europe, where ASA is referred to as LSA for Licensed Shared Access (“LSA”). ETSI’s extensive work to standardize ASA/LSA in Europe can be leveraged here.⁸ Thus, the FCC should continue to monitor the progress of ASA/LSA in Europe (and elsewhere) and leverage that work where possible, such as in regard to the 10 GHz band.

⁷ See n.4, *supra*.

⁸ See Qualcomm Dec. 5, 2013 Comments in GN Docket No. 12-354 at 9-10.

B. ASA Enables Interference-Free Spectrum Sharing With Incumbents

ASA is a two-tier spectrum sharing means that allows private licensees to operate within the interstices of a spectrum band where and when incumbent users are not operating, and to quickly vacate the spectrum when incumbents need to operate. In this way, ASA prevents interference to and from incumbent users and supports coast-to-coast mobile broadband operations where and when the spectrum is available.

C. ASA Provides A Secure Interface To Protect Sensitive Information Such As When And Where Military Operations Are Occurring

For purposes of sharing spectrum with government users such as the U.S. military, ASA provides a secure interface between incumbent federal users and ASA rights holders, and the ASA framework thus protects sensitive information, such as where and when incumbent federal users are operating. Because ASA is a binary system where the ASA spectrum rights holder has an exclusive right to use a given portion of the spectrum when it is not used by the incumbents, the entity using the spectrum at a given place and point in time is well known.

D. Implementing ASA Requires No Special Changes To User or Network Equipment

Furthermore, implementation of ASA is completely transparent to the end user device. From the end user device's perspective, operating at 10 GHz under ASA would be no different from operating on any other band and would not require any changes to the device or the underlying cellular technology. The base station would tell the device when and where it is able to operate on the 10.0 to 10.5 GHz band.⁹ When the band is cleared for use, a user device that supports the band would operate just as it does today on any other band.

⁹ ASA uses a database to which the ASA rights holder's Operations, Administration, and Maintenance ("OA&M") network system connects to determine the interference limits within which operations can occur within a particular channel at a given time and location. The ASA

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E. ASA Supports Predictable QoS And Flexible Licensing Frameworks

Because ASA rights are exclusive, they support the delivery of a reliable and predictable quality of service and guarantee interference-free spectrum sharing between incumbent systems and the ASA rights holders' networks. Making ASA rights exclusive helps to prevent interference to incumbent users, and should any interference occur contacting the entity that may be causing the interference is straightforward.

Finally, spectrum rights under ASA may be awarded by geographic area (similar to licenses awarded today via auction) or in some other manner (such as a licensed-by-rule framework), or perhaps both, each in discrete portions of the 10.0 to 10.5 GHz band. Thus, the mode of licensing can be carrier-driven, consumer-driven, or some combination of the two.

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Qualcomm is excited about the potential of opening the 10.0 to 10.5 GHz band for mobile use. The Commission should study closely the options presented herein for putting this spectrum to its best and highest use.

database need only know the aggregate power level that the incumbent federal users can tolerate at a given location, time, and frequency. Once a small cell is cleared for communications by the ASA licensee's OA&M, operation occurs within the small cell service area within the acceptable power levels, just like it would within a macro-cell. In this way, the spectrum can be used for carrier aggregation or supplemental downlink to provide the best possible user experience.

CONCLUSION

Countless innovations are fueling the unprecedented growth of the mobile broadband ecosystem, and the increasing consumption of mobile data by businesses and consumers is driving the need for additional spectrum to sustain continued growth throughout the 21st century. Accordingly, Qualcomm supports studying the opening of the 10.0 to 10.5 GHz band for mobile broadband operations. Qualcomm agrees with Mimosa that unleashing additional spectrum will promote the FCC's goal of providing broadband access to all Americans, benefit wireless service providers and equipment manufacturers, and, most importantly, benefit consumers and our national economy.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I, John W. Kuzin, certify that on April 10, 2014, a copy of the foregoing COMMENTS OF QUALCOMM INCORPORATED was sent via First Class mail to the following parties:

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