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3.3 GHz use in New Zealand
Radio Spectrum Management Policy and Planning
Ministry of Business, Innovation and Employment
PO Box 2847
WELLINGTON 6140

Email: Radio.Spectrum@mbie.govt.nz

1 Introduction

Qualcomm Incorporated (Qualcomm) welcomes the opportunity to provide input to Radio Spectrum Management (RSM) regarding the *3.3 GHz Regional & non-national use in New Zealand* discussion paper (the discussion paper).

Qualcomm is the world's leading wireless technology innovator and the driving force behind the development, launch, and expansion of 5G. When we connected the phone to the internet, the mobile revolution was born. Today, our foundational technologies enable the mobile ecosystem and are found in every 3G, 4G, and 5G smartphone. We bring the benefits of mobile to new industries, including automotive, the internet of things, and computing, and are leading the way to a world where everything and everyone can communicate and interact seamlessly. From our homes to airports, campuses, and the enterprise, Qualcomm's Wi-Fi solutions build on our world-class engineering capabilities to connect users and devices.

Qualcomm Incorporated includes our licensing business, Qualcomm Technology Licensing (QTL), and the vast majority of our patent portfolio. Qualcomm Technologies, Inc., a subsidiary of Qualcomm Incorporated, operates, along with its subsidiaries, substantially all our engineering, research, and development functions, and substantially all of our products and services businesses, including our Qualcomm CDMA Technologies (QCT) semiconductor business. One of our major areas of focus is the development of advanced wireless technologies, including 5G and Wi-Fi-based technologies.

Qualcomm supports the development of a forward-looking plan for the 3300 – 3400 MHz band such as that proposed by the RSM. These types of plans are an important tool for industry to understand the spectrum and timeline priorities of the government. This in turn allows the industry to provide input on the suitability of the plan, the market readiness of technology, the state of development of product ecosystems, and allows prospective licensees of the radio spectrum to plan their future spectrum and network investments.

2 Responses to RSM consultation questions

In this response, Qualcomm provides information related to the potential use of the 3.30-3.41 GHz band in order to provide the greatest value and benefit for New Zealand's users. Qualcomm strongly supports the use of this range for mobile services as part of a broader goal of enabling robust 5G deployments across the C band (3.3-3.8 GHz) and its extension (3.8-4.2 GHz). The C band is considered a key band for 5G deployment, with increasing interest and support from different stakeholders. As such, plans to leverage the 3.30-3.41 GHz range for 5G services are timely and appropriate for maximizing the potential of all New Zealand stakeholders to benefit.

2.1 Do you agree that the 10 MHz between 3.40 – 3.41 GHz should be included with the 3.4-3.8 GHz band (the 3.5 GHz band) that will be made available for national use?

Qualcomm strongly supports the RSM proposal to allocate 3.40-3.41 GHz for national use in combination with the existing plan to make the 3.41-3.80 GHz band available for nationwide use. This approach will not only add an additional 10 MHz for use by wireless broadband providers but will also increase harmonization with 3.4-3.8 GHz band providers around the world. The harmonization of the 3.4-3.8 GHz band, or portions thereof, for mobile is increasing across the globe. Europe has taken decisions to pioneer the use of the 3.4-3.8 GHz band for 5G; China and various other Asian countries have designated the 3.4-3.6 GHz band; Korea (Rep.), Australia, Hong Kong, and some countries in the Americas are targeting the 3.4-3.7 GHz for 5G; Canada recently awarded licenses in the 3.45-3.65 GHz range; and the United States has authorized use of the 3.55-3.7 GHz band, among others.

Based on these developments, Qualcomm believes the C band will be widely used for mobile broadband and that many of the initial 5G deployments will occur in this band, which will also later drive the use of its extension in the 3.8-4.2 GHz range.

2.2 What is your view on using the 3.3-3.4 GHz band for regional broadband and/or private networks? Are there other use cases of this band that should be considered?

5G is driven by heterogeneous services with vastly different requirements – from very low energy sensors, wearables, and new form factors, to new mission-critical applications with high reliability and low latency (e.g., smart city and critical infrastructure, medical and emergency response, sensing, and remote control), to very high data rate backhaul and access transmissions across wide bandwidths for ultra-high capacity broadband. It provides a platform with the scalability and adaptability to cost-efficiently support new wireless applications, services, and deployment models for 2019-2030 and beyond, and this includes national, regional, and private networks.

Qualcomm supports enabling the deployment of wireless broadband technologies and networks in this range, including the potential for private networks or regional broadband. The 3.3-3.4 GHz band, as part of the wider 3GPP band n78 (3.3-3.8 GHz), is an ideal mid-band range for the provision of 5G services. In addition, the replanning of a currently underutilized band in New Zealand may serve as a model for other countries in the region facing similar scenarios with their use of the same range.

2.3 Do you agree with our assessment of current spectrum use and potential impacts?

No comment.

2.4 Do you agree with the assessment that regional and local use will not be able to co-exist in the same geographic area on the same frequency? If not, why?

2.5 Do you agree that both regional and indoor use as well as local and indoor use could be manageable in the same geographic area on the same frequency? If not, why?

Yes, indoor use and regional or local use is possible in the same geographic area on the same frequency with appropriate planning or coordination measures in place. Qualcomm encourages RSM to adopt approaches that allow the deployment of local, regional, and indoor 5G networks in order to provide the greatest possible benefit to consumers, business users, and verticals as appropriate in all areas of New Zealand. We also encourage RSM to take a holistic approach to spectrum planning for wireless broadband connectivity, considering the appropriate use of sub-1 GHz, mid-band, and mmWave spectrum for various use cases.

2.6 Do you agree that the most effective way to manage spectrum in this band is to have contiguous services with a common frame structure and timing (synchronization)? If not, why not?

The issue of coexistence between different operators within the same band, or between operators in neighboring areas, must be analyzed on a case-by-case basis. The 3GPP standardization itself already foresees necessary mitigations depending on some case combinations, so various other technical possibilities can be implemented depending on the situation. Thus, Qualcomm believes that such coexistence should not be regulated in detail by RSM. The operators involved must have the flexibility to implement possible technical solutions, and RSM must only act in cases where a solution is not found.

2.7 What are your preferred options for a band plan for the 3.3 - 3.4 GHz band? Are there other options we should consider, if so please explain what these are?

The C band is an important mid-band range, offering a mix of capacity and coverage. It is especially useful for 5G deployment, bringing the potential to provide a large amount of contiguous spectrum that will support wide-bandwidth channels, which are ideal for 5G deployment. The band has already been an early focus of 5G development by equipment manufacturers and there is a rapidly developing ecosystem of devices that will be able to take advantage of the capacity offered by mid-band spectrum.

The 3.3-3.4 GHz band should be considered jointly with the 3.4-3.8 GHz band in order to ensure the provision of contiguous blocks of 80-100 MHz for each licensed operator. The provision of large amounts of contiguous spectrum is ideal for the efficient deployment of mobile services, notably 5G. The use of an assignment approach that allows operators to acquire contiguous lots is preferred because contiguous spectrum will allow easier implementation of higher-order carrier aggregation in an optimized manner.

In mid-range bands, blocks of spectrum of up to 100 MHz per operator are ideal. Enhanced mobile broadband (eMBB) offering data rates measured in multiple gigabits will require large, contiguous bandwidths of hundreds of megahertz. Approaches that enable operators to obtain exclusive, licensed spectrum in large, contiguous blocks will provide the greatest benefit for users.

2.8 How much spectrum is required for regional and uses and how much is needed for Local use?

No comment.

2.9 What equipment options and standards should we consider for the 3.3 GHz band?

As noted in the discussion paper, the ideal arrangement is for the 3.3 GHz band to employ a similar synchronization structure to that deployed in the 3.4-3.8 GHz band. We also note that the 3.3-4.2 GHz range is already gaining widespread adoption as a core mid-band range for the deployment of 5G networks around the world. As such, Qualcomm recommends the deployment of 5G NR in the 3.3 GHz band in the frequency ranges of bands n77 and n78, employing technology in line with relevant 5G NR specifications, such as ETSI TS 136 104 (Release 16) and ETSI TS 136 101 (Release 16).

2.10 If we adopt multiple standards how should we manage interference issues while minimizing inefficient use of spectrum?

No comment.

2.11 Do you agree that we should seek to permit all three use cases, indoor, local and regional uses in the 3.3 GHz band? Do you agree with our mix of use? If not which cases should we permit?

Qualcomm supports the development of a regulatory regime that would allow national and sub-national use of the 3.3-3.8 GHz range. The ideal arrangement for the 3.3-3.4 GHz band is one that maximizes the efficient use of the band to leverage the benefits delivered by 5G. Recognizing that potential users have varying use cases for mid-band spectrum, it is appropriate to offer authorization regimes that will permit a mix of all three identified use cases if there is a reasonable expectation of demand for each. We encourage RSM to take into account inputs from potential spectrum users to better gauge the near-term and medium-term demand for the various use cases.

2.12 What authorization mechanisms should we use for indoor, local and regional use cases non-national access in the 3.3 – 3.4 GHz band? Are there any other mechanisms that should be considered?

No comment.

2.13 What sort of rules should be applied to the authorization mechanisms to ensure compatibility and fair access?

No comment.

2.14 How should we prevent spectrum denial / hoarding/ speculating of licenses? Should we adopt one of the existing models that RSM already employs or what new model should we use in the 3.3 GHz band?

No comment.

3 Conclusion

Qualcomm is encouraged by RSM's continued focus on wireless broadband services and the importance of spectrum arrangements that will enable the deployment of 5G in New Zealand. In particular, we applaud RSM's intent to migrate an underutilized band to a higher-value use that will enable improved wireless broadband services for various user types.

We appreciate the opportunity to provide feedback to RSM and would be happy to provide further information that could help RSM to further develop its plans.

Should you have any questions or comments on this submission, please do not hesitate to contact me at +852 6901 0087 (mobile) or aorange@gti.qualcomm.com.

Sincerely,

A handwritten signature in black ink, appearing to read 'Alex Orange', with a stylized flourish at the end.

Alex Orange
Senior Director, Government Affairs, Southeast Asia, Taiwan & the Pacific
Qualcomm Inc.

CC: Alex Fernandez, Senior Director, Business Development, Australia and New Zealand