

31 August 2021

3.3 GHz use in New Zealand  
Radio Spectrum Management Policy and Planning  
Ministry of Business, Innovation and Employment  
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Dear RSM,

### **3.3 GHz Regional & non-national use in New Zealand – Discussion Document**

The comments below are in respect of the document ‘3.3 GHz Regional & non-national use in New Zealand’, [hereinafter referred to as the ‘Discussion Document’].

#### **Introduction**

The views expressed in this document are made on behalf of 4RF Limited, unless otherwise noted. Based in New Zealand with a large research and development facility, 4RF is a developer of high-performance radio communications equipment for critical infrastructure. We operate across the global and export our New Zealand designed advanced radio products to more than 150 countries.

4RF equipment including point-to-point, point-to-multipoint, and LTE UE/CPE equipment for cellular systems both public and private is used for utility and government radio networks. The company has a successful 4G LTE product shipping in bands from 600 MHz to 6 GHz with 5G product development ongoing. We have deployed systems in the 3.55 - 3.70 GHz mid-band spectrum available in the US and known as the Citizen Broadband Radio Service (CBRS). 4RF is an Advisor Member of the OnGo Alliance, the US industry body established to promote CBRS applications and technology.

4RF continues to be concerned at efforts to reduce Amateur spectrum allocations because of the undoubtedly impact that such reductions have on the nurturing of science interest in young people. New Zealand needs more scientists and engineers! Participation in science and technology activities particularly in radio needs to be engendered at an early age. We are often challenged in finding experienced radio engineers and other technical staff. 4RF does not want New Zealand to become a country where all radio technology is imported and experienced radio engineers rare. Self-training is an important purpose of the Amateur service, as articulated in the definition of the service in No. 1.56 of the ITU Radio Regulations (RR). Interest and participation in Amateur radio drives many of our more capable radio engineers.

#### **Q1. Do you agree that the 10 MHz between 3.40 – 3.41 GHz should be included with the 3.41 - 3.80 GHz band (the 3.5 GHz band) that will be made available for national use?**

No. 4RF believes that this relatively small 10 MHz of spectrum should be retained for the existing national use, that is the Amateur Radio service. In the previous June 2019 consultation round, *Technical Arrangements of the 3.5 GHz Band June 2019* NZART drew attention to the Amateur service usage in this small segment of spectrum.

A recent television advertisement by Spark NZ Ltd consisted of an animation based on a 1935 speech by Sir Ernest Rutherford, giving him a new voice for the Spark 5G campaign. This author congratulates Spark and Colenso BBDO for this exciting and thought provoking re-imagining, for Sir Ernest Rutherford was vice-president of the Cambridge University Wireless Society formed in the early twenties with Amateur radio callsign G6UW. The work by amateurs responsible for broadcasting at its inception, the development of SSB and FM, and television, have continued that early tradition.

As noted by the ITU Radio Communication Bureau, *The amateur service is the oldest radio service and pre-dates regulation of radiocommunication. In 1912, amateurs could use any frequency above 1.5 MHz, as these frequencies were regarded "of no value for marine, governmental and commercial communications" or "undesirable and scarcely useful". Having proved the frequencies useful a decade later, Amateurs made way for other services in bands above 1.5 MHz. The 1963 World Administrative Radio Conference (WARC) created Footnote 284A established the Amateur-satellite service. Since then scores of amateur satellites have been designed, constructed, and operated by amateurs. In addition, amateur radio has been used aboard manned space stations including MIR and the International Space Station. Most astronauts and cosmonauts are licensed amateur radio operators.*

The 3400 - 3410 MHz spectrum is allocated to the Amateur-satellite service (secondary) in ITU Regions 2 and 3, refer RR No. 5.282.

An Amateur built satellite, AMSAT-OSCAR 6, operating in the ITU defined Amateur-satellite Service bands, was used for the first proof of concept demonstrations of Emergency Locator Transmitter (ELT) tracking. Today's world-wide SARSAT program began as a conceptual investigation to determine the viability of using low-orbiting satellites to detect and locate emergency locator transmitters through the measurement of their Doppler shift [Levesque, D. (2010). *Cospas-Sarsat 1979-2009: a 30-year success story*].

It is easy to dismiss past Amateur involvement in technology innovation as ancient history. However, more recently enthusiasts exploring the limits of propagation bridged the Tasman with a 2,000 km two-way radio contact in the 3.4 GHz Amateur band using just 30W of RF and a 1m dish in late 2019. In the same year an experimental software defined LTE base station was tested by NZ radio Amateurs.

**Q2. 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**

4RF supports the development of regional broadband and/or private 4G/5G networks. We would strongly recommend something similar to the US CBRS model, with a mix of priority licenses established by auctioned (PAL) and free access (GAA) managed by a workable selective access mechanism. A hypothetical model might be as follows:

Band 52		
PAL	Auctioned spectrum licenses	
GAA	Free access but under control SA mechanism	
3300MHz		3380MHz 3400MHz

The are many advantages of such a model including support for multiple use cases (including full commercial cellular, regional networks, utility private 4G/5G), technical rule differentiation between auctioned licenses and free access users, the implementation of a guard band (30 MHz in this example with 3400 - 3410 MHz included), and reduced administration overheads.

**Q3. Do you agree with our assessment of current spectrum use and potential impacts?**

Broadly speaking 4RF concurs with the RSM position but we differ in two areas.

As noted in the Discussion Document, the Radios Astronomy service uses very sensitive receivers. While there are no licenses for radio astronomy in New Zealand, we are aware of the use of C-Band by the Warkworth Radio Astronomical Observatory operated by the Institute for Radio Astronomy and Space Research, Auckland University of Technology. Given the proven potential for trans-Tasman propagation at 3.4 GHz by amateurs in 2019 with relatively modest power, interference with Australian astronomers may occasionally be possible.

We accept that co-existence between Amateur radio operations and 5G use on the same or adjacent frequencies could be challenging. However, as the Discussion Document notes RSM *understand that this use is low*. It must follow that the potential for interference must be low. 4RF believes that the commercial 5G services operating above 3410 and below 3400 MHz can co-exist with an Amateur service allocation of 3400 - 3410 MHz.

We believe that it is entirely possible to manage the interference issues between 5G and Amateurs. This could be done with a combination of conditions:

- Amateur users of the band can accept interference as already required
- Where harmful interference to 5G services occurs, the power permitted Amateurs within the geographic boundaries of the affected 5G license could be lowered
- RSM and NZART jointly educate Amateur operators, to check the register of 5G allocations

Should a tiered approach to spectrum below 3400 MHz be accepted with controlled by otherwise free access to unused spectrum (GAA example as above) then the Amateur service may participate below 3400 MHz along with other GAA users and under such GAA rules.

4RF has no further comments to make on the Discussion Document, other than to note that a reasonably technology neutral position would be of benefit allowing both 4G (including NB-IoT) and 5G systems alongside proprietary systems. Operating rules should be based on the potential for interference rather than on second guessing technology developments.

Thank you for the opportunity to participate in this consultation process.

Yours faithfully



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