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NZART Response to RSM Discussion Document: 3.3 GHz Regional & non-national use in New Zealand

Introduction

On behalf of NZART, I would like to thank you for the opportunity to comment on your consultation document **3.3 GHz Regional & non-national use in New Zealand**.
We note the following ITU allocations:

- Region 2 the Amateur Service is allocated 3,400 MHz – 3,475 MHz on a secondary basis
- Region 3 the Amateur Service is allocated 3,300 MHz – 3,500 MHz on a secondary basis
- In Regions 2 and 3 the Amateur-Satellite Service is allocated 3,400 MHz – 3,410 MHz, on a non-interference basis to other users (ITU footnote 5.282).

While there is no Amateur Service allocation in Region 1 the European Common Allocation Table footnote EU17 allocates 3,400 MHz – 3,410 MHz to European amateurs on a secondary basis.
RSM suggest limited historic use of the band by amateurs but the need for the consultation document is itself evidence that technological progress makes past frequency band usage an inadequate measure of future potential.

The spectrum range 3,410 – 3,800 MHz (3.5 GHz band) is considered a pioneer band for the deployment of 5G systems internationally and is set to become important commercially.

This is reflected in the amateur community where the terrestrial experimentation usage of this spectrum dating back to the 1970s is soon to be expanded with the linking of emergency communications sites

Q1. 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?

As an observation making use of contiguous common frame structure and timing (synchronisation) would make use of the 3.3GHz band expensive. Regional infrastructure costs would increase significantly and deployment in some rural areas could be practically impossible.
If the 3.3-3.4 and 3.41-3.8 GHz bands are not synchronised, lowering the overall cost to future network operators.
The 3.4-3.41GHz may required as part of a guard band between the two bands.
The Amateur Radio Service could continue using 3.4-3.41GHz, operating as a secondary user on a strictly non-interference basis.

Questions Q2 and Q3 are answered together.
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?
Q3. Do you agree with our assessment of current spectrum use and potential impacts?

While recognising the importance of 3.3-3.4GHz for regional and local broadband to the country NZART wishes to point out that there are other worthwhile users of the spectrum in question. Such as the Amateur Radio Service.

Amateur Radio operators operate in many radio bands on a Secondary basis under the condition that they do not cause interference to Primary users. Amateur Radio Operators can continue to operate under this condition without additional restrictions.

If TDMA technologies such as 5G were deployed then Amateur Radio Operators would become immediately aware of these transmissions. Amateur Radio Operators check to make sure the part of the spectrum that they wish to use is clear of signals prior to transmitting. If a signal were to be present then frequency agility would be used to move to a clear part of the spectrum where communications can be established without causing, or suffering from, interference.

Amateur Radio Operators should be authorised to continue to operate as Secondary uses on a non interference basis in a repurposed 3.3-3.41GHz band. Any restrictions detailed should only be considered in the event there are cases of reported interference from Amateur Radio Operators.

Additionally as an allied activity NZART is aware of Radio Astronomy activity in New Zealand. Radio Astronomy plays an important part in education and furthering our understanding of the nature world. The ability to continue this activity should be protected to the greatest extent possible.

Also please note the comments in our submission to Technical Arrangements of the 3.5GHz Band as follows:

Amateur Radio Operation
Long distance narrow band Amateur communications take place in the in the range 3,400 – 3,401 MHz including both terrestrial and ‘moon bounce’ also known as EME (earth-moon-earth) communications. This frequency range is used on a world-wide basis for EME and retaining international interoperability is important as the station being communicated with is usually a different country.

It is also important that the present General User Radio Licence for Amateur Radio Operators (Amateur GURL) maximum power of 30 dBW is maintained for these operations given the tremendous path losses involved for the weak signal modes. However, these operations occur using highly directional antennas and very sensitive receivers. It is unlikely that services above 3,410 MHz will be affected by the highest EIPR stations for EME as these will typically be directed at high elevations.

(In addition, as detailed above, the extremely sensitive receivers used would alert the amateur operator immediately to the presence of a primary user and the need to move frequency to a clear part of the spectrum)

The upper end the amateur allocation, particularly 3,400 – 3410 MHz is free of interference from the ubiquitous wideband services (Wi-Fi network devices) operating under GURL that interfere with amateur operations in the shared 2,396 – 2,425 and 5,650 – 5,850 MHz bands. This makes

preservation of access to this range of vital importance to amateurs. Since March 2009, the International Amateur Radio Union (IARU) has maintained a policy to seek upgrading of the Amateur service allocation status of 3,400 – 3410 MHz to primary with some success, reference [1].

The amateur radio service is also embracing digital voice modes on many bands, particularly at VHF and UHF. Amateurs, through the Amateur Radio Emergency Communications group, are building a national network of UHF linked DMR repeaters designed to provide high quality and resilient communications when commercial services have failed. This network presently utilises both commercial Internet as well as 5.8 GHz links operating under the Fixed Radio Link Devices GURL. Both of the current linking services have significant drawbacks and AREC intends to expand the use of low cost linking technology into the 3,300 MHz – 3,400 MHz band, replacing the reliance on commercial Internet connectivity. These facilities will usually be located at prominent sites but the EIRP of these links will be similar to the Fixed Link GURL limit, typically no more than 23 dBW EIRP. An introduction to this application is included in reference [2].

Lastly, we bring to your attention the recent launch of a geostationary amateur satellite transponder, a joint project between the Qatar Satellite Company (Es'hailSat), the Qatar Amateur Radio Society (QARS), and the German amateur radio satellite group AMSAT Deutschland (AMSAT-DL). The transponder is onboard Es'hail-2, a commercial broadcast satellite owned by the Es'hailSat Qatar Satellite Company in orbit at 25.9° E. The amateur radio transponder is approximately 8 MHz wide in the Amateur Satellite Service spectrum with the uplink at 2,400 MHz and downlink at 10,490 MHz. In future we expect similar arrangements to occur in other parts of the world making use of other Amateur Satellite Service spectrum such as 3,400 MHz – 3,410 MHz but it is too early to assess the interference effect that will be experienced from services in the 3.5 GHz band. The band is most likely to be considered for uplink (earth to space) purposes with only modest amateur transmit power levels.

Radio Astronomy

NZART also note that Footnote 149 to the Table of Frequency Allocations states that "administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference" in consideration of the ranges 3,332 – 3,339 MHz and 3,345.8 – 3,352.5 MHz which, while not allocated to the Radio Astronomy Service, are important spectral line observation bands for the carbon-hydrogen CH ion. The study of interstellar CH is considered to be extremely important in understanding the chemistry and biological potential of the interstellar material. Amateur stations voluntarily avoid using these frequencies when in geographic proximity to a radio telescope such as the Warkworth Radio Astronomical Observatory operated by the Institute for Radio Astronomy and Space Research, Auckland University of Technology.

While MBIE has decided not to continue participation in the Square Kilometre Array (SKA) project, excessive emissions from 5G equipment in the CH molecule line spectrum located within the amateur band below 3,410 MHz would make any potential future decision to participate extremely difficult as the necessary radio quiet zones need to protect SKA receivers would be almost impossible.

It is difficult to assess the protection offer by the mask because the interference power experienced by the various services using spectrum below 3,410 MHz is not limited to a single base station but to the cumulative affect of thousands of base stations. The additive effect of low level interference raises the noise floor across much of the spectrum today.

Q4. Do you agree with the assessment that regional and local use will not be able to coexist in the same geographic area on the same frequency. If not, why?

NZART has no comment on this question.

Q5. 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?

NZART has no comment on this question.

Q6. 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 (synchronisation)? If not, why not?

By way of observation NZART notes that the use of a contiguous common frame structure and timing (synchronisation) will add an additional infrastructure cost and management complexity to commercial operators that may be undesirable for Regional and Local Services.

Q7. 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?

Refer response to Q2 and Q3

Q8. How much spectrum is required for regional and uses and how much is needed for local Use ?

NZART has no comment on this question.

Q9. What equipment options and standards should we consider for the 3.30 – 3.30 GHz band?

NZART has no comment on this question.

Q10. If we adopt multiple standards how should we manage potential interference issues between the technologies while minimising inefficient use of spectrum?

NZART has no comment on this question.

Q11. 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?

NZART has no comment on this question.

Q12. What authorisation 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?

NZART has no comment on this question.

Q13. What are sort of rules should be applied to the authorisation mechanisms to ensure compatibility and fair access?

NZART has no comment on this question.

Q14. 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?

NZART has no comment on this question.

Once again, thank you for the opportunity to comment on your consultation document.

Regards

Stuart Watchman Richard Harkett
NZART Administration Liaison Officers

References

[1] Wireless Institute of Australia 30 July 2014 submission to Australian Communications and Media Authority IFC 24/2014 *Making the most of the 3.5 GHz band in future*
[2] Bern, D. and Elkin, K., 2014 ARRL TAPR Digital Communications Conference, *High-Speed Wireless Networking in the UHF and Microwave Bands*