



Vodafone response to Radio Spectrum Management's discussion document on 3.3 GHz non-national broadband use in New Zealand

3 September 2021

Introduction

1. Thank you for the opportunity to provide our views on the Radio Spectrum Management's (RSM) discussion document on 3.3 GHz non-national broadband use in New Zealand.
2. Vodafone welcomes RSM's consideration of re-allocating the 3.3 – 3.41 GHz band for IMT use.
3. The 3.3 – 3.8 GHz frequency range has become the most important band for the rollout of 5G in most countries. This band provides a good balance of coverage and capacity due to its frequency and available bandwidth.
4. We have welcomed RSM's decision to allocate 3.41 – 3.8 GHz band for IMT use. However, there are strong reasons to extend this band to ensure it is sufficient to accommodate the mobile industry, WISPs and any future industry uses, all of which are predicted to need significantly increased access to this frequency in the future. Re-allocating the 3.3 – 3.41 GHz range for IMT use will therefore provide the much-needed additional bandwidth to realise the full potential of this frequency.



5. Vodafone New Zealand is one of Aotearoa's leading connectivity companies and we offer a range of broadband, mobile and technology products. We are focused on creating a better future for Aotearoa New Zealand through remarkable technology solutions that simplify lives and businesses, and operate New Zealand's largest 5G network. We maintain almost three million connections with consumer, business, public sector and wholesale customers via Vodafone and Farmside, New Zealand's rural broadband specialist. We're proud to help other Kiwi businesses to thrive by partnering with world-leading brands to offer best-in-class ICT services. Vodafone New Zealand is owned by Infratil and Brookfield Asset Management and we are a partner market in the Vodafone Group, one of the world's largest telecommunications companies. For more information, please visit www.vodafone.co.nz.
6. We have set out our responses to selected questions included in RSM's discussion document below.

Our position

Frequency range under consideration

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?

7. Vodafone strongly agrees that the 10 MHz between 3.40 – 3.41 GHz should be added to the 3.41 – 3.80 GHz band and be made available for national IMT use. This band is currently under-utilised and will provide additional bandwidth for the national 5G networks, consequently enabling additional capability to New Zealand's consumers.
8. The 3.4 – 3.8 GHz band should be allocated for IMT use on a long-term national basis and provide at least 100 MHz bandwidth for each of the existing MNOs who have already deployed 5G in New Zealand. If demand permits, RSM should consider allocating more than 100 MHz to MNOs who have the resources and technical capability to utilise the frequency and provide enhanced 5G capability using more than 100 MHz bandwidth. This would provide additional network capacity and improved user data throughput, supporting long-term demand of different 5G use cases.
9. We note that 100 MHz contiguous blocks in the 3.3–4.2GHz MHz range are being made available per operator in several leading countries. This target should be achieved in all markets. With the steadily increasing market adoption of a growing number of use cases with more and more requirements (higher throughput and lower latency in the first place), GSA believes that additional mid-band spectrum may therefore be required for



MNOs in leading markets by 2023–2025. RSM's proposal represents a valuable opportunity in this respect.

10. We support spectrum being allocated on terms that incentivises its effective use for greatest benefit. To this end, we would support any allocation method that gives certainty around IMT use – including in return for specific investment commitments within a consolidated 3.40-3.80 GHz band.
11. The 3.4 – 3.8 GHz range should not be allocated for regional use or for private/indoor networks in non-telecommunications industries, as such usage is likely to result in wasted spectrum (given the uncertain nature of this use case) and increased risk of interference due to long-term synchronisation requirements (in the event that use cases did eventuate).

New use cases and options

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

12. Vodafone supports allocating the 3.3 – 3.4 GHz band for regional, local, indoor, and private networks usage.
13. Our view is that the demand and use cases for local and private networks in this band may outstrip regional/WISP use significantly in the future. This will provide many new opportunities and benefits for the wider industry and New Zealand economy. However, this demand growth would also present additional challenges in terms of managing interference between this band and the national 5G band, as local and private networks tend to be in the same geographical areas as the national 5G networks.
14. To realise the opportunities and benefits of this band while effectively managing interference between usage in the 3.3 – 3.4 GHz band and those in the 3.4 – 3.8 GHz band, it is important that its allocation plan takes the interference risk into consideration.
15. Vodafone believes that the most effective way to manage spectrum in this band is to have full synchronisation of frame structures between all usage within the band. To achieve this, Vodafone proposes that synchronisation between usage in the full 3.3 – 3.8 GHz band is mandated by RSM before allocation, with a process to re-assess synchronisation in the future.
16. However, as technology advances and user needs evolve, it may become necessary to use a different frame structure for different use cases in the future, which would make synchronisation difficult or impractical. Hence it is necessary to maintain flexibility by



providing a guard band between the local/private use and the national use. In order to achieve this, we need to have built-in flexibility for the 3.3 – 3.4 GHz range. To achieve this, Vodafone proposes the following band plan for this range:

- a. Allocate 60 MHz between 3.30 – 3.36 GHz for regional and local/private network use; and
- b. Allocate 40 MHz between 3.36 – 3.40 GHz for indoor use only, with reduced/limited maximum transmit power, as illustrated in *Figure 1*.

Figure 1: Vodafone proposal for 3.3 - 3.8 GHz band allocation

3300 MHz	3360 MHz	3400 MHz	3800 MHz
Regional use	Indoor use with reduced/limited transmit power	National use	
Local/Private Network			

17. The main benefit of this band plan is that allocating the 40 MHz adjacent to the national band to low powered indoor use only creates an effective guard band between the national and regional/private use. This arrangement may not completely eliminate potential interference if any of these systems are not synchronised. However, it will significantly reduce the likelihood of interference occurring in the real world. This allocation model would also reduce the severity of interference if it did happen, making interference management much easier.
18. In the early stages of Vodafone's 5G deployment, we found that a 40 MHz guard band is very effective in preventing interference between our 5G network and other unsynchronised networks in the 3.5 GHz band.
19. We believe the band plan that we propose above provides the optimal balance between efficient spectrum usage and interference management, while meeting potential demand of spectrum in this band.
20. In addition to this proposed band plan, we believe mandatory synchronisation between the regional/local/private/indoor use and national use is required from the time of allocation, absent much more careful consideration of real-world interference management. Further research should be carried out on the effectiveness of the 40 MHz indoor band in preventing interference between the regional/local use and the national use in the future as usage in this band increases. This needs to take place before any potential relaxation or removal of the synchronisation requirements in the future, should that become necessary.
21. Further options for effective spectrum management would include RSM moving Dense Air or Māori Spectrum Working Group's allocation from the 3.4 - 3.8 GHz band to 3.30 -



3.36 GHz band. This would help ensure that the optimal 3.4 - 3.8 GHz frequency is as close to full utilisation as possible by national MNOs who are committed to further investment in the national 5G rollout. If both Dense Air and Māori Spectrum Working Group were relocated, this would leave 400 MHz in the 3.4 - 3.8 GHz band for the rollout of national 5G networks with associated innovation and productivity benefits that are inherent in the deployment of these networks. As we note below, 60 MHz between 3.30 – 3.36 GHz is sufficient for shared use between regional uses and local/private network uses – and this could align well with the intended use cases of both regional use and the Māori Spectrum Working Group.

22. We also note that in previous 5G spectrum Working Group Meetings DenseAir have stated that their use cases are mostly indoor usage, and that they are willing to be allocated a frequency band between national use and regional use, and become the effective guard band between the two usages.

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

23. Vodafone agrees with RSM's assessment of current usage in the 3.3 – 3.41 GHz range. Our view is that the current actual usage in the 3.3 – 3.41 GHz range is minimal and re-allocating this band to IMT use will have no material impact.

Q4: 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?

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?

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?



24. Vodafone agrees that the most effective way to manage spectrum in this band is to have full synchronisation of frame structures. However, as technology advances and user needs evolve, it may become necessary to use different frame structures for different user cases, making synchronisation difficult or impractical in the future. Hence it is necessary to maintain flexibility by providing a guard band, or semi-guard-band, between the local/private use and the national use. The band plan Vodafone proposed in *Figure 1* make this possible.

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?

25. As outlined above, we believe that the band plan proposed in *Figure 1* provides the optimal balance between efficient use of spectrum and interference management.
26. From the three band plans proposed by RSM, we believe Scenario 2 may be better for preventing interferences in cases where synchronisation is not possible if the regional use can be geographically separated from the national use band.

Q8: How much spectrum is required for regional uses and how much is needed for local use?

27. Vodafone believes that a total of 60 MHz between 3.30 – 3.36 GHz is sufficient for shared use between regional uses and local/private network uses, while 40 MHz between 3.36 – 3.40 MHz is sufficient and best suited for indoor use with limited power. This arrangement also provides isolation between the regional/private band and the national band (as outlined in *Figure 1*).

Q9: What equipment options and standards should we consider for the 3.30 – 3.30 GHz band? If we adopt multiple standards how should we manage potential interference issues between the technologies while minimising inefficient use of spectrum?

28. Vodafone strongly proposes that only 3GPP-compliant 5G or later technology be allowed to be used in the 3.3 – 3.4 GHz band. If different multiple standards were allowed to use this band, interference management may become very difficult, which could significantly impact network quality and user experience in both local and national 5G networks.



Q10: If we adopt multiple standards how should we manage interference issues while minimising inefficient use of spectrum? –

29. The problem with adopting multiple standards is that we don't know what those standards would be, which means we are unable to manage interference between those standards and the 3GPP ones. As such, our view is that multiple standards should be avoided. Applying a single standard (as outlined in section 28) will help to ensure interference is managed and efficient spectrum use is maximised.

Making the 3.3 GHz band available for new uses

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?

30. As outlined above, our view is that the band plan we proposed in *Figure 1* provides the optimal balance between all such usages, while minimising interference between them and the national 5G networks.

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?

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

31. Vodafone proposes the following authorisation mechanisms:
 - a. Localised licences should be attached with deployment obligations;
 - b. It should include technology parameters, location and deployment timeframes; and
 - c. A reasonable licence charge should be applied as a one-off cost or on an annual basis. The charge should be comparable to the cost of the 3.4 - 3.8 GHz range on a per use or per areas-covered basis. Alternatively, RSM may consider applying a number of different charging methods for different types of spectrum usage. For example, MNOs may be charged per customer/per revenue, while private networks may be charged per device/UE basis. This will ensure there is a level playing field across industry and support competition.



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?

32. The deployment obligation and licence charge as detailed in response to Q12/Q13 will help to prevent spectrum denial/hoarding/speculating.
33. RSM may also consider imposing rules to prevent use from profiting by selling or transferring licences or usage rights. We regard it as critical that any party allocated spectrum that could be utilised for high value IMT use should be subject to a clear requirement to utilise that spectrum to deliver network services. These requirements are expressed most logically in network investment obligations. Importantly, Government should ensure consistency in the obligations across all parties to whom spectrum is allocated and should remove any question that obligations can be negotiated or extended (such arguments previously being made in connection with 2.6 GHz commitments).

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