

Submission on the Radio Spectrum Management Discussion Document “Preparing for 5G in New Zealand”

30 April 2018 – Public Version



INTRODUCTION

- 1 Thank you for the opportunity to comment on the Radio Spectrum Management (**RSM**) discussion document “Preparing for 5G in New Zealand”, released on 18 March 2018 (**discussion document**).
- 2 The Government has a bold and aspirational digital transformation policy. Key planks of that policy are to reduce the digital divide and to increase productivity and the economic benefits of the internet. The Government recognises that its digital objectives require it to be future-focused, modern and innovative. This may mean taking some risks, including moving away from old ways of doing things that are no longer effective.¹
- 3 High speed connectivity is driving digital transformation. We know that 5G networks will play a role in this transformation although, given its early development, there is uncertainty on both use cases and business cases.
- 4 It makes sense that RSM’s approach to spectrum allocation for 5G services supports the Government’s digital transformation objectives. With the right policy and regulatory settings, all of New Zealand can benefit from any new services that 5G may bring.
- 5 The discussion document focuses on two scenarios for the deployment of 5G in New Zealand – deployment by the three existing mobile network operators (**MNOs**) or a single national provider. We encourage RSM to think about whether there are other ways to approach 5G deployment to ensure better and more efficient utilisation of resources and capital, stimulation of competition and promotion of positive outcomes for consumers. We think it’s worth exploring the concept of shared open access infrastructure and coverage obligations further – both of these have been used with great success in the fixed-line market, where a great number of retail service providers are able to compete on a level playing field.
- 6 The chosen approach to spectrum allocation can reinforce existing competitive dynamics or seek to encourage different dynamics. We therefore encourage RSM to wait until the Commerce Commission has completed its mobile market study before it makes any final policy recommendations. The mobile sector has had little attention for many years and the Commission’s study is a good opportunity to consider whether mobile markets are delivering for consumers. We expect the Commission’s findings will offer a useful baseline of facts and state of the market analysis for RSM’s policy

¹ For example see the Minister’s keynote address to the Digital Nations 2030 conference outlining this approach and priorities: <https://www.beehive.govt.nz/speech/keynote-address-digital-nations-2030-conference>.

thinking and spectrum allocation plans. This would align with the Minister's thinking on a joined-up approach to achieve the Government's digital inclusiveness goals.²

THE 5G DEPLOYMENT CHALLENGE

- 7 The network economics for a 5G roll-out are challenging. It's estimated that delivering the promised performance improvements of 5G will require network performance to increase 10-fold over current levels across all network parameters, as measured by latency, throughput, reliability, and scale. To get there, the three existing MNOs will need to make significant investments in all layers of telecommunications infrastructure, including spectrum, radio access network infrastructure, transmission, and core networks.³ This is not a simple mobile technology upgrade.
- 8 As RSM points out, the existing MNOs are likely to take an evolutionary approach to infrastructure investment and upgrade the capacity of their existing 4G networks, focusing on 5G deployment in urban areas initially. When network upgrades are no longer sufficient to meet increasing data demand, the MNOs will need to move to building 5G small cells. Small cells will be required to utilise the large amounts of spectrum available at mmWave, which is needed to deliver many of the "fibre-like" 5G use cases. That point in time will vary by location, but simulations show most operators will need to embark on significant new build-out.⁴
- 9 Given these economics, there is likely to be limited deployment of the full range of 5G capabilities outside of major urban areas by the MNOs. This will increase the digital divide further. This could be further exacerbated as 5G deployment in dense urban areas reduces capital available for improving non-urban networks.
- 10 The discussion document does not meaningfully address the rural/urban digital divide. It notes that through average pricing rural consumers can benefit from competition in urban areas but it is unclear how they can benefit if there is no coverage or capacity to provide data services.
- 11 In addition it establishes an argument between either three MNOs or one nation-wide network but does not explore whether there are alternative ways of sharing active or passive infrastructure to derive the best benefit for consumers.

² Ibid.

³ McKinsey & Company, *The road to 5G: the inevitable growth of infrastructure cost*, February 2018.

⁴ Ibid, n3.

POLICY APPROACHES

- 12 As RSM points out, 5G is the next generation of the global broadband multimedia international mobile telecommunication (IMT) systems. We note that under the current spectrum allocation regime, the majority of spectrum used for IMT systems is concentrated in the hands of the three existing MNOs. We encourage RSM to think about whether there are other ways to approach 5G spectrum allocation, to ensure better and more efficient utilisation, stimulation of competition and promotion of positive outcomes for consumers.

Open access infrastructure

- 13 We think it's worth looking at the lessons from the UFB project, which has delivered great results for New Zealanders. An open access approach with upfront certainty on products, pricing and coverage has avoided wasteful duplication, supported innovative wholesale offerings and allowed retail competition to flourish:
 - 13.1 By 2022 we will have fibre to 87 percent - we expect this to put us in the top 5 OECD countries for fibre availability.
 - 13.2 In contrast, in 2017 the EU had 14 percent fibre to the home penetration; the US and Canada had 15 percent while we had 38 percent.
 - 13.3 At the same time consumers are paying 50 percent less for their broadband services than 10 years ago.
 - 13.4 Data consumption is growing by 50 percent year on year.
 - 13.5 The price of a 100 Mbps connection is 5 percent lower than the OECD average and 24 percent lower than Australia.
 - 13.6 Our network is allowing competition to flourish with over 90 retailers and is supporting all three mobile networks with high speed connectivity to mobile sites.
- 14 RSM could also consider applying an open access model to improve efficiency, in particular where 5G spectrum is controlled by a limited number of national providers (whether that is a single national provider or three MNOs).
- 15 There are a number of options RSM could consider. These go beyond the binary policy options identified in the discussion document. We mention some of these below as options to consider, not as endorsement of any particular approach. For example:
 - 15.1 Encouraging sharing active network elements through roaming. This can allow efficient use of network capital and capacity as MNOs use each other's networks in certain areas and mobile virtual network operators (**MVNOs**) also access capacity;
 - 15.2 Sharing of radio networks between MNOs, however such an approach raises competition concerns; and
 - 15.3 Passive sharing of physical infrastructure.

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- 16 There are numerous combinations of these approaches in other markets. Many of these are driven by the commercial pressures to reduce capital expenditure and improve profitability.
 - 17 Given that 5G deployment will require a step-change in capital expenditure and that a BAU approach to allocation is unlikely to address the Government's stated objectives we ask that RSM consider the role of infrastructure sharing as part of preparing for 5G spectrum allocation.

Flexible spectrum

- 18 There is a good case to explore setting aside some 5G spectrum for flexible access – this could be reserving some 5G spectrum for future use or a particular type of use or use in a specific location. Future 5G use cases are still developing and the challenge for RSM is to balance the desire to do 5G quickly with ensuring it does not lock out future innovation by new players.
- 19 Flexible spectrum, and its ability to enable future innovation, is being thought about internationally. In its report for the UK National Infrastructure Commission, Frontier Economics notes:⁵

...Ofcom might also consider whether some spectrum should be explicitly reserved for alternative (non-MNO) users. It is broadly accepted that without special protective measures (e.g. spectrum reservation), new entrants are typically outbid by the incumbents. While the UK mobile market is unlikely to see another 'traditional' new entrant which would roll out a national mobile network, alternative providers might want to acquire spectrum to test alternative business models and compete with the established MNOs. In order for these alternative providers to succeed, Ofcom might need to introduce special measures to enable their entry, including some post – entry remedies.

Overall, Ofcom should aim to make more spectrum available for future mobile uses (licenced, unlicensed and shared spectrum) – comparable with the amount of spectrum made available by other leading nations. When allocating spectrum, Ofcom should consider reserving some spectrum for non-MNOs to allow new innovative models to emerge.

A flexible spectrum policy is likely to enable innovation, reduce costs and address the sector's capacity needs.

- 20 We also note that the MNOs currently have underutilised spectrum and the technology that could be used to support their existing 5G use cases. Allocating all or most of

⁵https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/577941/Incentives_to_invest_in_5G_-_Frontier_Report_for_the_NIC.pdf.

the new 5G spectrum to the MNOs will simply allow them to 'bank' the spectrum for their own future use.

- 21 In the past twenty years New Zealand has seen multiple wireless internet service providers (WISPs) established across the country providing over 40,000 regional, rural and remote areas of New Zealand with broadband through innovative solutions.⁶ We consider that spectrum should continue to be opened up for use by small operators such as WISPs and to enable continued supply of innovative solutions to rural and regional areas in particular. Reserving spectrum for small operators such as WISPs can go a long way in resolving digital divide issues in cost effective and pragmatic ways.
- 22 Some of the potential ways in which spectrum can be reserved include:
 - 22.1 Setting aside regional spectrum blocks;
 - 22.2 "Use it or lose it" provisions on underutilised nationally held spectrum (as discussed in coverage obligations below);
 - 22.3 Developing a "public park" approach to spectrum; and
 - 22.4 Factoring in rural and regional impacts in spectrum allocation policy and developing alternative payment models on reserved spectrum that factor in cost-effective use.

Coverage obligations

- 23 Coverage obligations are used in numerous jurisdictions as a way of ensuring that the operators granted use of this limited resource do so in a way that benefits everyone, rather than cherry picking profitable areas. Limited coverage obligations were implemented as part of the allocation process for 700 MHz spectrum in New Zealand.⁷
- 24 Coverage obligations are generally expressed as service availability to a percentage of the population. Coverage obligations are a useful way of addressing underutilisation of spectrum in non-profitable areas. For instance, they could be formulated in the following way:
 - 24.1 As both a national and regional coverage obligation, with the regional obligation requiring coverage obligations in a percentage of population per specific region, in order to ensure a fair spread of availability;

⁶ For example see the submission from WISPA NZ to RSM on 1 March 2017: <https://www.rsm.govt.nz/projects-auctions/completed/draft-outlook-2017-2021/folder-submissions-received/WISPA%20Spectrum%20Outlook%20Submission>.

⁷ <https://www.rsm.govt.nz/projects-auctions/pdf-and-documents-library/recently-completed-projects/digital-switchover-and-the-digital-dividend/700-mhz-auction/700-mhz-implementation-and-coverage-requirements-summary-139-kb-pdf>

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- 24.2 As both a national and local coverage obligation, with the local obligation being focussed on specific areas that is either lacking in service or where the business model for a rollout is the most challenging;
- 24.3 As obligations on specific spectrum bands. This is effective as it generally tends to place obligations on the lower bands that have lower bandwidth but reach further; and
- 24.4 As a bandwidth obligation which places minimum bandwidth.
- 25 Such obligations could ensure that rural coverage is a condition of a spectrum license. They could also include consequences for underutilisation, such as a “use it or lose it” policy. This will ensure that 5G can be deployed more broadly and that the incumbent providers don’t sit on unused spectrum, preventing alternative access and use.
- 26 5G in itself won’t solve coverage problems – it will increase speeds and capacity at existing sites but is unlikely to extend the geographic footprint of networks. This is confirmed by Ofcom in their recent report:
- Consumers are increasingly expecting near-ubiquitous coverage for their mobile devices. But currently, coverage often falls far short of this. Data from our Connected Nations 2017 report show that coverage indoors in homes and offices, on road and rail networks, and in less densely populated rural areas is particularly poor.*
- However, 5G deployment will not in itself solve these coverage problems. 5G is expected to play an important role in providing higher speeds and extending capacity at existing mobile sites but it is unlikely that 5G will extend the current geographic footprint of networks.⁸*
- 27 The discussion document does not consider whether coverage obligations applied previously have been successful or whether such approaches could be considered to meet the Government’s overarching objectives.
- 28 We encourage RSM to consider further policy analysis on the costs and benefits of using coverage obligations to achieve broader policy objectives. We have engaged Diffraction Analysis to do initial research on the range of coverage obligations internationally and their report is enclosed with our submission. The intent of the report is to consider the application of 4G coverage obligations and whether any lessons can be drawn from the application of those obligations. We hope this report will assist RSM with further policy analysis on whether and how coverage obligations can improve rural and regional connectivity outcomes with the advent of 5G.

⁸ See the Ofcom report “Enabling 5G in the UK” 9 March 2018, paragraph 5.3:
https://www.ofcom.org.uk/__data/assets/pdf_file/0022/111883/enabling-5g-uk.pdf.

THE COMMISSION'S MOBILE MARKET STUDY

- 29 We encourage RSM to wait until the Commerce Commission has completed its mobile market study before it makes any decisions on the allocation of 5G spectrum. We expect the Commission's study will help inform RSM whether there is any public policy reason to prevent the existing three MNOs from acquiring all or most of the available 5G spectrum. Waiting to be informed by the Commission's mobile market study, would align with the Minister's desire to take a joined up approach to the Government's digital transformation policy.⁹
- 30 With the advent of 5G we are likely to see more fixed and mobile technologies converging, and the spectrum allocation policy will need to recognise these market changes and not be designed in isolation of the broader market dynamics.
- 31 We think the mobile sector has had little attention for many years and this is a good opportunity to consider whether mobile markets are delivering for consumers. Our observations of the current status of mobile markets are:
- There is a significant pricing difference for mobile consumers as compared to fixed-wireless consumers (utilising the same current generation mobile capacity). We rank 10th out of 32, and 16th out of 31 in the OECD for 60GB and 500GB fibre broadband prices, respectively.¹⁰ Major mobile providers aggressively price their fixed-wireless broadband services to compete with fixed-line broadband services. One major provider offers the same price across all three services (i.e. fixed-wireless, copper and fibre broadband services) for a 120GB broadband plan.¹¹ Yet, we rank 31 and 33 out of 35 in the OECD for 1.5GB and 6GB mobile broadband plans, respectively.¹² This suggests that there may be cross-subsidisation between fixed wireless and mobile consumers which, in turn, raises questions about the competitive intensity in mobile services.
 - When compared with other developed economies, New Zealand appears underserved by MVNOs. There are six commercial MVNOs (excluding Skinny, a Spark subsidiary) holding less than 1% of the market.¹³ In contrast, MVNO market

⁹ For example see the Minister's keynote address to the Digital Nations 2030 conference outlining this approach and priorities: <https://www.beehive.govt.nz/speech/keynote-address-digital-nations-2030-conference>.

¹⁰ Commerce Commission, *2016 Annual Telecommunications Monitoring Report*, May 2017, pages 18.

¹¹ See Spark's broadband website <https://www.spark.co.nz/shop/internet/plans-and-pricing/>, last accessed 30 November 2017, where broadband prices across fixed-line services (copper and fibre, up to 100Mbps) and fixed-wireless services are offered at the same price per month.

¹² *Ibid*, n 10, page 29,

¹³ *Ibid*, n 10, page 22 states that "total number of MVNO subscribers increased in 2016 but remained low at

share in the United Kingdom is at 13%, and 9.4% in Australia.¹⁴ The reasons for this are not readily apparent. Given New Zealand's relatively generous spectrum allocations, network capacity would not appear to be a reason for the lack of wholesale agreements.

- Given there are over 90 RSPs the existence of three mobile network operators and six MVNOs indicates only some RSPs can offer fixed and mobile bundles. The two largest mobile network owners are also the two strongest RSPs and account for 80% of the retail broadband market.
- Mobile termination rates were set in 2011 for five years and have not since been reviewed. International evidence suggests that the cost of mobile termination is decreasing.¹⁵
- Coverage in rural areas remains lacking. While announcements were made for funding and infrastructure build into some rural areas through the Rural Broadband Initiative 2 and Mobile Blackspot Fund, the location, quality, reliability and price of those services is not yet transparent.

around 23,000". This includes Skinny and Digital Island, both owned and/or controlled by Spark.

¹⁴ IDC Opinion, *New Zealand Telecommunications: The Streets are Paved with Glass*, 2017, page 94.

¹⁵ Commerce Commission, *2015 Annual Telecommunications Monitoring Report*, 2016, page 30.

APPENDIX

CHORUS' ANSWERS TO DISCUSSION DOCUMENT QUESTIONS

Question number	Section of report	MBIE Question	Chorus' position
INTRODUCTION			
1	1.2	<i>What are the likely uses for 5G in New Zealand initially and in the longer term?</i>	<p>Initially 5G will provide an option to improve wireless capacity by providing additional spectrum to MNOs. Considering the large amount of spectrum already held by MNOs for 4G technology, it could take some time before 5G is widely deployed. As discussed in our submission, it is most likely that 5G will initially benefit urban areas.</p> <p>In the medium to long-term 5G is likely to be an enabler for innovation. However, at this stage the industry does not have sufficient understanding as to how this might manifest. Spectrum policy should maintain sufficient flexibility so as to enable, rather than preclude, any future innovation.</p> <p>Use cases highlighted by the industry (including at the recent annual Mobile World Congress in Barcelona) concentrate on industrial, farming and community use. For example:</p> <ul style="list-style-type: none"> • Private 5G networks in factories; • Private 5G networks on farms and in rural areas; • 5G networks developed by specific areas and municipalities to enable smart cities; • 5G networks on campuses to foster innovation; • Use of 5G as a backhaul technology for wireless internet providers; and • Use of 5G in the home and business as a wireless extension to the fibre network.

			All of these use cases require the availability of spectrum to be accessed and licensed in a flexible way. We encourage RSM to ensure that the spectrum policy enables these options by ensuring spectrum is available for such uses without the need for partnering with an established mobile provider in each case.
REGULATORY CONSIDERATIONS FOR 5G IN NEW ZEALAND			
2	2.1	<i>Do you consider competition should be encouraged at the infrastructure level or purely at the retail level for 5G? Why?</i>	<p>We do not consider the policy choices to be as binary as the question implies. In our submission, we propose policy approaches (for example, open access infrastructure options, flexible spectrum and coverage obligations) that RSM could consider to ensure better and more efficient utilisation of spectrum, stimulation of competition and promotion of positive outcomes for consumers.</p> <p>As discussed in our submission, the network economics for a 5G rollout are challenging. It is estimated that delivering the promised performance improvements of 5G will require network performance to increase 10-fold over current levels across all network parameters. Given the challenging economics of the rollout, the likely outcome is that there will be a limited deployment of the full range of 5G capabilities outside the major urban areas by the MNOs.</p> <p>Also as discussed in our submission, future 5G use cases are still developing and the challenge for RSM is to balance the desire to do 5G quickly with ensuring it does not lock out future innovation by new players.</p>
3	2.2	<i>What regulatory issues need to be considered from a 5G perspective in New Zealand?</i>	<p>The key regulatory issues RSM should consider are:</p> <ul style="list-style-type: none"> • Ensuring that spectrum policy can be clearly shown to meet overarching government policy objectives. • Introducing flexibility into spectrum policy settings so that future innovative models are supported. • Ensuring spectrum policy settings support increased competition in retail mobile markets. • Addressing the issues of the digital divide and rural coverage.

4	2.2	<i>What aspects of these regulatory issues are most significant for 5G?</i>	RSM should take all of these regulatory issues into consideration. These issues are equally significant and interrelated, so do not operate in isolation.
POSSIBLE FREQUENCY BANDS			
5	3.1	<i>Do you agree that the 3.5 GHz band is the top priority for allocation for 5G?</i>	<p>We agree that the global telecommunications industry is prioritising this band for 5G. Standardisation and development of technology is focused on 3.5GHz and this is backed up by large countries freeing and allocating this band for 5G.</p> <p>It is therefore imperative that New Zealand allows this frequency band to be used in a flexible and innovative way in the future. Spectrum allocation should not preclude its use by companies and organisation outside the main 3 MNOs.</p>
6	3.1	<i>Do you have any comments on reallocating 3587 to 3690 MHz for 5G?</i>	<p>Yes, it makes sense to reallocate 3587 to 3690 MHz for 5G, once the existing satellite services are moved off to other bands and the international standardisation body confirms this band for 5G.</p> <p>However, we encourage RSM to consider setting part of the band aside for unlicensed general access to enable innovation.</p>
7	3.2	<i>Do you agree that the 26 GHz band is a high priority for allocation to 5G in New Zealand?</i>	<p>26GHz is the second priority behind 3.5GHz.</p> <p>The industry is still considering ways to make mmWave spectrum useful. It would be most efficient to allow companies and institutions in New Zealand to use this spectrum for trials and proof of concept in the short term, before it is allocated for long term use.</p> <p>For example, Chorus and other organisations are free to experiment with the 60GHz spectrum band as it is available for unlicensed use. A</p>

			similar short term approach should be adopted for 26GHz until its uses are better understood.
8	3.2	<i>Would this band be of interest to your organization for trials for 5G services in New Zealand?</i>	<p>Yes. While we do not see 26GHz as a priority for wide area deployment, we would be interested to see if this technology can be leveraged for last "metre" connectivity alongside similar experiments for 60GHz.</p> <p>In rural communities and in some urban situations, customers may not want their property disturbed for fibre installation. It may also be an option for private use in factories and on farms once fibre is installed to a central location.</p> <p>Spectrum allocation and timing should not preclude the option to experiment with the very new concept of utilising mmWave spectrum for telecommunications use.</p>
9	3.3	<i>Do you agree that the 31.8 to 33.4 GHz, 40.5 to 42.5 GHz and 42.5 to 43.5 GHz bands are a low priority for allocation to 5G in New Zealand?</i>	Yes, we agree that the 31.8 to 33.4 GHz, 40.5 to 42.5 GHz and 42.5 to 43.5 GHz bands are a low priority for allocation to 5G in New Zealand.
10	3.3	<i>When do you think equipment is likely to become available in the bands identified in 8?</i>	Suppliers to the telecommunications industry are starting to produce trial equipment for mmWave bands after recent research and development and lab experimentation. We expect it will take some time for this equipment to mature sufficiently for large scale deployment with respect to both technology and price point.

11	3.3	<i>Do you have any comment on the possible allocation of 27.5 to 29.5 GHz to IMT?</i>	We think the allocation of 27.5 to 29.5 GHz to IMT is logical if use of the spectrum is widely supported internationally.
12	3.4.1	<i>Is there demand for alternative uses other than IMT of the 1400 MHz band? If so, what uses?</i>	<p>Yes, there is demand for alternative uses of the 1400 MHz band other than IMT. The 1400 MHz band is currently used to provide fixed voice services in rural areas to meet TSO obligations.</p> <p>If this band is to be used for IMT, RSM needs to consider the need to replace the systems currently in place and the TSO obligations to provide fixed voice services.</p>
13	3.4.1	<i>When is the demand likely to require consideration of reallocation of the 1400 MHz band for IMT, if at all?</i>	We do not expect demand to be a factor for use of the 1400 MHz spectrum. New Zealand MNOs already have access to a generous pool of spectrum resources.
14	3.4.2	<i>Is there a need for more sub 1 GHz spectrum for IMT/5G?</i>	<p>We do not think there is an immediate need for more sub 1 GHz spectrum for IMT/5G.</p> <p>There are more coverage related issues than capacity related issues in the mobile market. This indicates there is sufficient spectrum in the sub 1GHz band and the challenge is one of investment to deploy service in current bands.</p> <p>The recent allocation of 700 MHz spectrum is sufficient for coverage of rural areas if investment is prioritised.</p>
15	3.4.2	<i>If so, how should we deal with radio microphones in the 600 MHz band?</i>	There is no urgent need to use the 600 MHz band for IMT.

16	3.4.2	<i>When is the demand likely to require reallocation of the 600 MHz band to IMT, if at all?</i>	There is no urgent need to use the 600 MHz band for IMT.
SPECTRUM ALLOCATION			
17	4.1	<i>Which allocation methodology should be used for allocating spectrum bands identified for use with 5G? Why?</i>	<p>As discussed in our submission, we think there is a good case to explore setting aside some 5G spectrum for flexible access. Future 5G use cases are still developing and the challenge for RSM is to balance the desire to do 5G quickly with ensuring it does not lock out future innovation by new players (or require new players to purchase the service from one of the 3 MNOs).</p> <p>For example:</p> <ul style="list-style-type: none"> • Reserving some 5G spectrum for future use; • Setting aside regional spectrum blocks; • “Use it or lose it” provisions on underutilised nationally held spectrum; • Developing a “public park” approach to spectrum; and • Factoring in rural and regional impacts in spectrum allocation policy and developing alternative payment models on reserved spectrum that factor in cost-effective use. <p>We also think the 26 GHz spectrum should not be allocated in the short term and should first be made available for experimentation.</p>

18	4.1	<i>Should different allocation mechanisms be used for rights for regional providers and national providers? Why?</i>	As discussed in our submission and in our answer to question 17, we think there are a number of policy options open to RSM. Under the current allocation regime the majority of spectrum is held nationally and for the long-term. This may lead to inefficient use and underutilisation of spectrum in certain geographic areas (mainly rural) and in certain bands.
19	4.2	<i>Should deployment of 5G technology be specified for some or all bands? If not, why not?</i>	<p>5G technology should be specified for the 5GHz and 26GHz bands. These bands are the clear areas of focus by international standards and industry.</p> <p>However, we think the 26 GHz band should not be allocated in the short term. The 26 GHz band is less mature than the 5GHz band and could first be made available for experimentation.</p>
20	4.2	<i>What implementation requirements should be specified and how should these be expressed? - time, extent, etc.</i>	<p>We have discussed in our submission how different coverage obligations or conditions on use (such as “use it or lose it” for volume and geographic areas) can ensure better and more efficient use of spectrum.</p> <p>For instance, making spectrum available for neutral host and open access use can ensure efficient use both for 3.5GHz and mmWave bands. Such requirements can enable multiple parties to be able to apply for use of spectrum on a case by case basis, allowing innovative use where efficient.</p> <p>Also, making the services available on an MVNO basis at regulated wholesale prices could ensure a simple and cost effective way to make the most of what 5G can offer. Given the tendency for fixed and wireless convergence, it is likely that 5G will be only a part of any network in the future.</p> <p>Requirements may also include service level agreements, quality of service reporting and downtime reporting. For example, fixed line services (both copper and fibre) are subject to reporting and oversight to ensure the customer receives a ‘congestion free’, consistent service experience. This will also be a possible outcome on a 5G wireless</p>

			network if the service is designed and capacity managed in a way that enables this.
21	4.2	<i>What should be the consequence of non-implementation - lose spectrum, additional payment, other?</i>	Where the spectrum is not implemented, the rights to use it ought to be lost and a mechanism that allows it to be made available to others for use should be in place.
22	4.2	<i>Should the implementation requirements be different for regional and national providers? What should these be and why?</i>	As discussed in our submission, there are different ways this could be approached, including different types of coverage obligations. For instance, national allocation could come with rural and regional coverage obligations.
23	4.3	<i>Should acquisition limits be imposed on 5G bands? If so, what should these be and why?</i>	As discussed in our submission, some limits could ensure that the spectrum is efficiently used. These include reserving spectrum for future use, or placing limits on the amount of spectrum that one party can acquire.
24	4.3	<i>Should acquisition limits be imposed for regional providers? If so, what should these be and why?</i>	Yes, the same acquisition limits should apply unless the operator intends to run an open access network.

25	4.4	<i>What term should be used for management rights suitable for 5G? Why?</i>	The term for management rights might depend on other policy conditions related to the allocation of spectrum. When considering the term for management rights, RSM should take into account the balance to be struck between certainty for providers and the evolving needs of consumers, ensuring that efficient use and innovation are not stifled.
MANAGEMENT RIGHTS FOR 5G			
26	5.1	<i>Should the 5G bands be replanned as TDD bands or some bands or parts of bands be retained as FDD? Why?</i>	Yes, New Zealand should follow international standards.
27	5.2	<i>What bandwidth should be used as the basis for allocation? Why?</i>	<p>We agree with RSM that the allocation lot size be 20 MHz as it is the minimal usable bandwidth for 5G at 3GHz to 6GHz.</p> <p>We think an allocation lot size of 100MHz is appropriate for 24 GHz and above as this is the bandwidth needed to make 5G meaningful at that band.</p>
28	5.3	<i>What out of band emission limits should apply to management rights when first created for allocation? Why?</i>	Out of band emission limits on the management rights should be created for the maximum possible transmission bandwidth to ensure the most efficient use of spectrum.
29	5.3	<i>Should out of band emission limits be different if the band is technology neutral? If so, what out of band emission limits should be applied?</i>	We support that 5G bands should only be used for 5G.

30	5.4	<i>How should interference between adjacent frequency 5G TDD networks be managed? Should this be the same for all frequency bands?</i>	We support the use of a guard band in rural areas and a requirement for synchronisation in urban areas.
31	5.4	<i>How should the interference between different technologies within the same band be managed, if bands are technology neutral?</i>	We support that 5G bands should only be used for 5G.
ACCESS TO SPECTRUM FOR REGIONAL PROVIDERS			
32	6	<i>Should regional uses be provided for in the 3.5 GHz band plan? Why?</i>	Yes, as discussed in our submission policy settings and conditions on use should be considered to ensure that spectrum allocation does not preclude services being provided in rural and regional areas.
33	6	<i>If allowed in the 3.5 GHz band, how could this be managed or facilitated?</i>	This could be managed by applying normal out of band emission rules.
34	6	<i>Which alternative bands may be suitable for regional allocation? Why?</i>	All bands may be suitable for regional use, and all should be considered in allocation policy. 5G is not only about macro cellular coverage, and as such each band has different propagation, coverage and capacity characteristics.
TIMING			

35	7.1	<i>Is early access to the 3.5 GHz band required for roll out of 5G networks prior to the expiry of existing rights in 2022? If so, why?</i>	<p>3.5GHz is the priority band for roll out of 5G networks in the near term, so it is likely to be required in a limited way prior to 2022.</p> <p>In saying that, we think RSM should not allocate all of the 3.5 GHz spectrum early. There is currently no clear use case that only 5G exclusively can meet. We also note that the MNOs currently have underutilised spectrum and the technology that could be used to support their existing 5G use cases. And, it is likely 5G will be used in different ways to existing technology. Setting aside spectrum for flexible and/or future use will preserve options for innovation as the technology develops.</p>
36	7.1	<i>How could early access to the 3.5 GHz band be achieved?</i>	<p>We think that a portion of the 3.5 GHz spectrum could be made available for trials and proof of concept where blocks of spectrum are unused. These could be allocated location by location to avoid any interference issues.</p>
37	7.1	<i>Should the government be involved in early access arrangements for the 3.5 GHz band?</i>	<p>Yes, the government should be involved in early access arrangements for the 3.5 GHz band. A controlled usage of the 3.5 GHz band is preferable in the short term.</p>
38	7.2	<i>Is early access to the 26 GHz band required for roll out of 5G networks prior to the expiry of existing rights in 2022? If so, why?</i>	<p>26 GHz is the second priority band for roll out of 5G networks. Its use is likely to be limited to small experimental roll out in the short term. However, innovation should not be restricted and therefore we think it should be available in a controlled way prior to 2022 to any organisation who wishes to use it.</p>
39	7.2	<i>How could early access to the 26 GHz band be achieved?</i>	<p>The 26 GHz band should be available for trials and proof of concept where blocks of spectrum are unused. These can be allocated location by location to avoid any interference issues.</p>

40	7.3	<i>When is demand for the bands above 30 GHz likely to eventuate?</i>	26 GHz is the priority mmWave 5G band in New Zealand. 60 GHz is available on an unlicensed basis and should remain so. This suggests demand for licensed bands above 30GHz may not occur in the short to medium term.
41	7.3	<i>When is demand for the 600 and 1400 MHz band likely to eventuate, if at all?</i>	Availability of the 700 MHz spectrum precludes any short term need for the 600MHz spectrum. We suggest that growth and coverage requirements should be monitored for the use of the 600 MHz spectrum in the future.