



# Vodafone New Zealand

Renewal of Management Rights  
1800 MHz and 2100 MHz bands

Submission on MBIE Discussion Document

May 2018

## Public Version

### Public Version of Submission

This public version submission has had confidential information contained in square brackets [ ] removed. The confidential information removed is commercially sensitive and its disclosure would prejudice the commercial position of the Vodafone.



## Executive Summary

- (i) Vodafone welcomes the opportunity to comment on options for the renewal of 1800 MHz and 2100 MHz spectrum management rights in 2021. Access to, and long term certainty of, spectrum is essential to ensure that mobile network operators (MNOs) continue to develop and invest in networks to meet customers' needs.
- (ii) New Zealanders benefit from a competitive mobile market with three competing network operators. The Commerce Commission's Annual Telecommunications Monitoring Report for 2017 highlighted that mobile pricing in New Zealand is between 27% - 47% below OECD averages.<sup>1</sup>
- (iii) Vodafone's coverage has grown to reach 98.5% of the population, with 4G population coverage to 95%.<sup>2</sup> Vodafone fully utilises its 2x25 MHz allocation in both the 1800 and 2100 MHz bands to deliver our nationwide mobile voice and broadband network.
- (iv) The first phase of the Rural Broadband Initiative (RBI) has been completed, bringing high-speed wireless and mobile broadband to over 290,000 homes and businesses, many experiencing fibre-like speeds via 4G.
- (v) The second phase of the RBI (RBI2) was announced in 2017. The Rural Connectivity Group (RCG), a joint venture between Vodafone, Spark and 2Degrees, will extend rural broadband to a further 30,000 rural homes and businesses, provide mobile coverage to a further 1,000 kilometres of state highways and provide connectivity to at least 90 top New Zealand tourist destinations by December 2022.<sup>3</sup>
- (vi) Our ability to provide services is dependent on reliable, long term access to spectrum. This submission outlines our responses to MBIE's discussion document and recaps earlier recommendations to MBIE.

### ***Direct renewal should be offered for all existing 1800 MHz and 2100 MHz holdings***

- (vii) Vodafone supports a direct renewal offer of all 1800 MHz and 2100 MHz spectrum held by existing management rights holders. Vodafone efficiently utilises these spectrum bands nationwide to provide mobile capacity and speed. If renewal was scaled back, Vodafone would be forced to invest in additional cell sites simply to sustain our existing level of performance –

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<sup>1</sup> Commerce Commission, Telecommunications Monitoring Report 2017, [file:///C:/Users/soperc/Downloads/2017-Annual-Telecommunications-Monitoring-Report-20-December-2017%20\(1\).PDF](file:///C:/Users/soperc/Downloads/2017-Annual-Telecommunications-Monitoring-Report-20-December-2017%20(1).PDF)

<sup>2</sup> Vodafone, 2018 <https://www.vodafone.co.nz/network/coverage/>

<sup>3</sup> MBIE, Broadband and mobile programmes <http://www.mbie.govt.nz/info-services/sectors-industries/technology-communications/fast-broadband/broadband-and-mobile-programmes>



investment we believe is better spent increasing performance, coverage and in new technology like 5G.

- (viii) Reserving spectrum for potential future entry carries a significant risk of spectrum laying unused, or being inefficiently used on a limited geographic, rather than national basis as it is used today. Neither outcome would be good for New Zealand. Access to spectrum in the 1800 MHz and 2100 MHz bands is not a prerequisite for any future mobile entrant, with many other spectrum band options available. In addition, new entrants can access spectrum on a commercial basis through the secondary spectrum market.
- (ix) If the Government decides to allocate some spectrum for future entrants, a “use it or lose it” condition relating to national rollout must be imposed to avoid the risks that spectrum lays unused, is used for a limited rollout only, or is simply spectrum banked for arbitrage opportunities with existing users of spectrum. To ensure efficient competition, unallocated spectrum must be offered through auction with a minimum reserve price in line with renewal prices offered, with existing holders allowed to participate in the auction for unallocated spectrum.
- (x) Vodafone’s 2x25 MHz holdings in the 2100 MHz band should not be scaled back simply to equalise 2100 MHz holdings by Spark and 2Degrees. Carrier Aggregation technology means that holdings within an individual band do not impact a provider’s ability to compete. Rather, aggregate holdings across different bands is more relevant to providing an excellent network service. Scaling back merely for that purpose will not drive better competitive outcomes, but simply drive costs into Vodafone’s network.

***Renewal should be offered for a 20 year term***

- (xi) Vodafone recommends that renewal of management rights are offered as a 20 year term for both the 1800 MHz and 2100 MHz spectrum holdings. This will provide sufficient investment certainty over the long term. We do not support reducing the length of the proposed rights to align with the renewal of key sub-1GHz spectrum in 2031. This would create significant uncertainty around future supply, with a risk that ongoing investment is deferred in the lead-up to such a renewal, and causing significant disruption to the network if key spectrum did not get renewed.

***A five year extension of management rights is an appropriate short-term alternative***

- (xii) If full, direct renewal for a 20 year term cannot be immediately agreed to in this round of consultation, a five year extension for existing management rights holders is a second, appropriate option. This will allow more time for government to assess the impact and centrality of 1800 and 2100 MHz for both existing operators and new entrants. At that time, the 5G evolution and key 5G spectrum bands including 3.5 GHz and the mm Wave band will be understood. It will also give more time for existing operators to transition their services to new 5G technologies, reducing the negative impact of any spectrum reduction after the extension.



## 1 Introduction

1. This submission canvasses current use of 1800 MHz and 2100 MHz spectrum, different options for renewal of existing holdings, renewal terms and treatment of incumbent radio licences.
2. Vodafone welcomes the opportunity to continue our discussion with the Government regarding the renewal of existing management rights in the 1800 MHz and 2100 MHz bands.

## 2 Current use

### 2.1 1800 MHz band

3. Vodafone supports the full, direct renewal of existing holdings in the 1800 MHz band.

#### **Vodafone efficiently uses 2x25 MHz of 1800 MHz spectrum today**

4. Vodafone has invested significantly in technology to fully utilise our 2x25 MHz holding in the 1800 MHz band. This investment has seen our mobile network coverage grow to over 98.5% of the population, with 4G population coverage to 95%.
5. Full renewal of existing holdings for incumbents will ensure that Vodafone can continue to deliver market leading mobile and fixed wireless broadband services in a highly competitive mobile market.
6. A significant part of Vodafone's 4G network uses 1800 MHz spectrum. LTE1800 MHz technology now covers [ ] of New Zealand's total population and [ ] of New Zealand's urban and suburban land area (Zone 1, 2, 3).
7. LTE technology can combine multiple carriers in similar or different frequency bands to provide higher throughput that is broadly proportional to the total bandwidth being used. So while a single LTE carrier is limited to 20 MHz bandwidth, more than one carrier of similar or different frequency and bandwidth can be used at the same time using Carrier Aggregation (CA) technology.
8. Carrier Aggregation allows for significant enhancements of speed. For example, using 2x2 MIMO, Carrier Aggregation of 20+20 MHz would provide a peak speed of 300 Mbps – faster than mainstream current UFB fibre services.



9. Carrier Aggregation can combine carriers in similar or different frequency bands. For example, Carrier Aggregation can combine carriers in 1800 MHz and 700 MHz bands, and can also combine carriers in the same 1800 MHz bands.
10. Vodafone uses Carrier Aggregation extensively in our 4G network. In areas where LTE operates on 1800 MHz bands, [ ] This significantly increases customer service levels and network capacity. [ ]

**Figure 1: Vodafone 1800 MHz Usage**

[

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11. Vodafone also uses Carrier Aggregation to combine carriers [ ]. This further increases data speed and network capacity.
12. At present, [ ] cellsites in Vodafone’s network operate at 1800MHz with [ ]. If the renewal provides less than 2.25 MHz bandwidth, Vodafone will lose significant level of data throughput and network capacity.

**The rapid increase of mobile and fixed wireless data usage requires appropriate spectrum levels**

13. A mobile network’s capacity for data usage is proportional to the amount of spectrum used (given a particular service level and technology). As data usage increases, Vodafone needs to increase network capacity to maintain service levels and customer satisfaction.
14. Mobile data usage has been increasing rapidly, and is forecast to continue increasing at even faster pace in the future. Figure 2 shows the actual (red) and forecasted (blue) monthly total data usage on Vodafone’s cellular network for the ten years between 2012 and 2021. As shown in the graph, we expect a [ ] increase of data usage between now and 2021. To keep pace with



the continuing expected growth, Vodafone has made a significant investment rolling out 4G LTE using Carrier Aggregation technology, as well as network efficiency and capacity features.

**Figure 2: Vodafone Mobile Network Monthly Data Usage 2012 – 2021**

[

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15. Video is a key driver for network traffic growth. It is the largest component of traffic on the mobile network [ ], with total mobile data volume growth at [ ] year on year. It is driven by premium aggregated content e.g. Netflix, Google, as well as new services such as 4K television.



**Figure 3: Vodafone Technology to support long term Capacity and Service Growth**

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16. To support the required network capacity, it is vital that sufficient spectrum is available. Any reduction in current holdings will require additional cell sites and other physical network infrastructure to be built to compensate for the loss of spectrum. This will incur significant additional capital expenditure and increase ongoing operational cost.

**Vodafone provides increased service levels to rural customers through the RBI programme**

17. Vodafone is a key partner of the Government's RBI programme, where we provide wholesale and retail fixed wireless access (FWA) broadband services, as well as mobile services. Vodafone is also a joint venture partner in the Rural Connectivity Group (RCG). The RCG will extend rural broadband to a further 30,000 rural homes and businesses, provide mobile coverage to a further 1,000 kilometres of state highways and provide connectivity to at least 90 top New Zealand tourist destinations by December 2022.<sup>4</sup>
18. The RBI programme has been a great success, and customer demand has been increasing rapidly since the beginning of the programme, especially since we upgraded our sites to 4G technology. Vodafone's significant investment in the RBI has included both new build sites and upgrades of existing sites with the latest technologies.
19. At the beginning of RBI programme, Vodafone used 3G technology to provide a peak data speed of around 7.2 Mbps. Over the years, we have upgraded the network capable speed to 28 Mbps

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<sup>4</sup> MBIE, Broadband and mobile programmes <http://www.mbie.govt.nz/info-services/sectors-industries/technology-communications/fast-broadband/broadband-and-mobile-programmes>



using HSDPA, and then to 43 Mbps using 3G Dual Carrier technology, and to 150 Mbps using Cat4 LTE technology today.

20. In August 2016, Vodafone agreed new RBI commitments with the Government:
  - Improved minimum peak speeds of 30/5 Mbps (up from 5/0.5 Mbps on 3G)
  - Reduced latency of 100ms round trip (down from 2000ms on 3G)
  - Increased minimum data caps of 80GB on-peak and 50GB off-peak (up from 30GB and 50GB on 3G).<sup>5</sup>
21. This agreement requires that Vodafone keep increasing the data throughput and network capacity using all technologies and spectrum available. Global research and development in the fixed wireless space is rapid and ongoing; Vodafone has the vision, and the technology roadmap, to take rural services further and faster still. To deliver on this, we need to be confident in the security of our spectrum allocation.
22. As the network capability increases and customers' expectations and usage grow, Vodafone will continue to upgrade the RBI service using [ ]. To support such service levels it is essential to utilise our full allocation of 1800 MHz and 2100 MHz spectrum on RBI cell sites.
23. Vodafone continues to implement 4G using 1800, 2100, 2600 and 700 MHz on existing and new RBI cell sites. As of today, LTE 1800 MHz is operating on [ ] of the 541 official RBI cell sites. Vodafone plans to [ ].

## 2.2 2100 MHz band

24. Consistent with our recommendations for renewal in the 1800 MHz band, Vodafone supports the full, direct renewal of existing management rights of 2100 MHz spectrum allocations (Option 1).

### **Vodafone efficiently uses 2x25 MHz of 2100 MHz spectrum today**

25. Vodafone currently uses the full 2x25 MHz of our 2100 MHz spectrum allocation efficiently for 3G and 4G services in Frequency Division Duplex (FDD) mode. Renewal of existing holdings will ensure that Vodafone can continue to deliver these market leading mobile services in a highly competitive mobile market.

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<sup>5</sup> Minister of Communications, Hon. Amy Adams, Media Release, *4G RBI speeds lifted dramatically*, 16 August 2016





26. The historical, current and planned usage of 2100 MHz spectrum in Vodafone’s network is illustrated in Figure 5.

27. [ ]

28. [ ]

29. [ ]

30. [ ]

**Figure 5: Vodafone 2100 MHz Usage**





31. [

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32. [

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33. [

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#### **Treatment of the unused 'Telstra block'**

34. At present, the 2x5 MHz of 2100 MHz spectrum held by Telstra is unused, providing options in a secondary market for interested parties to purchase this block. To date no such commercial deal has been reached, suggesting no demand or requirement for extra spectrum in the 2100 MHz band by other parties.
35. Vodafone recommends that, as part of the renewal process, the 2x5 MHz spectrum currently owned by Telstra be made available at auction to provide all parties equal opportunity to buy the band at market price. This will ensure the most efficient use of this extra band.

#### **Treatment of Management Right 78**

36. Another little used part of the spectrum is Management Right 78 (1785-1805 MHz) owned by Blue Reach. While the technology has long been available to operate LTE on this band in Time Division Duplex (TDD-LTE) and support a true 4G service, the holding has not been used except for some tests.
37. This holding has the same expiry date as other 1800 and 2100 MHz management rights. Given the demonstrated lack of use of this band, and the overriding policy objective to ensure spectrum is used efficiently, we believe this holding should not be offered for renewal.

## **3 Renewal options**

### **Option 1: Renewal of all existing holdings to incumbents**

38. As demonstrated above, direct renewal of all existing holdings in the 1800 and 2100 MHz bands is the most effective, highest value use of spectrum. New Zealand's three MNOs have heavily



invested in purchasing the management rights to these bands, and continue to invest to upgrade network technology to meet ever increasing consumer demands for increased data and higher speed mobile broadband.

39. Direct renewal (especially for the preferred 20 year time period) of all existing holdings will provide sufficient investment certainty over the long term for these MNOs.
40. Frontier Economics, one of Europe's largest economic consultancies, explain the importance of predictability:

*[a]s mobile networks are underpinned by long term sunk investments which are dependent on spectrum availability, it is important that NRAs put in place an ALF [Annual Licensing Fee] regime which provides predictability and certainty for the level of payments over time – otherwise dynamic efficiency will be compromised.<sup>6</sup>*

**Full, direct renewal of existing holdings is the most efficient use of spectrum, providing long term certainty to investors and providing the best outcome for NZ.**

## **Option 2: Partial renewal of existing holdings to incumbents**

41. In the Discussion Document, MBIE has proposed that renewal offers for incumbents could be made at reduced levels, either 2x15 MHz or 2x20 MHz in the 1800 MHz band, and 2x15 MHz in the 2100 MHz band. The remaining spectrum "could be allocated later", likely closer to the expiry of existing management rights in 2021.
42. The justifications given for this approach are to ensure better understanding of the impact of 5G, and allow time for a new entrant to the mobile market. MBIE also goes on to assert that partial renewal would provide certainty to incumbents, while allowing flexibility for the government to respond to changes in the mobile market over the next few years.
43. Vodafone strongly disagrees with this approach. Reducing existing holdings for incumbents in the 1800 MHz and 2100 MHz bands does not provide certainty for MNOs. Instead, it will require immediate and significant investment in simply to provide current levels of service. This diversion of funds would at best delay, or at worst prevent, investment in future network technologies.

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<sup>6</sup> Frontier, *Revising Annual Licence Fees, A Report prepared for Vodafone*, December 2013, p.25.



44. MBIE recognises the value of spectrum to our economy, stating in the Five Year Outlook that “[R]adio spectrum is a vital infrastructure resource that enables New Zealand’s digital connectivity of its people and businesses. It underlies and supports a vast array of economic activities, contributing to New Zealand’s economic growth, innovation and global competitiveness.”<sup>7</sup>
45. Reducing spectrum holdings for incumbents will only damage MNOs ability to provide this important function in the economy. It will damage the capability and capacity of existing providers, and significantly increase costs simply to provide the same level of network service. It is not necessary for, and will not result in, the emergence of further efficient entry into the highly competitive mobile market.
46. Should the Government decide to offer only a partial renewal of existing holdings (which we do not support) then:
- i. unallocated spectrum must be offered by auction with a minimum reserve price in line with renewal prices offered;
  - ii. existing holders must be allowed to participate in the auction for unallocated spectrum;
  - iii. The auction must be carried out immediately after the renewal decision is made; to minimise uncertain period for existing MNOs; and
  - iv. a ‘use it or lose it’ condition must be attached to future management rights to ensure an outcome that will deliver national coverage.
47. These conditions are necessary to ensure that the withheld spectrum is allocated, used and its price reflects efficient, and not artificially subsidised, entry.

#### **Partial renewal runs a significant risk that spectrum goes unused**

48. It is unclear from the Discussion Document whether a contestable mechanism will allow existing rights holders to participate in an auction. If existing holders were excluded from participating in the auction, there is a real possibility that no genuine bidders will emerge, and no subsequent guarantee that any new network will be built.
49. If existing rights holders are excluded from participation and no new entrant emerges at that later date, closer to the expiry of management rights, the Government must then decide to accept spectrum laying fallow or belatedly open up the allocation to existing management rights holders. At this point in time, MNOs will have already invested in refarming their reduced 1800/2100 MHz holdings. It is difficult to imagine that any MNOs will relish the opportunity to spend even more money to simply return to the level of holdings they previously held.

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<sup>7</sup> MBIE, 2017, <https://www.rsm.govt.nz/online-services-resources/pdf-and-documents-library/publications-and-guides/rsm-annual-reports-and-business-plans/rsm-outlook-2017-2021.pdf>



50. Should spectrum remain unallocated in this partial renewal scenario, the policy preference for assisting a new entrant may inadvertently result in unused holdings – a direct contrast to MBIE’s interest in ensuring the highest value use of spectrum.

**Partial renewal will almost certainly create market inefficiencies**

51. If current spectrum allocations are scaled back ahead of renewal, the only outcome will be an inefficient one – driving additional costs into existing national mobile providers to simply sustain the same network capability.

52. Frontier Economics, in looking at spectrum allocation in the UK noted that:

*Where spectrum is returned and lies fallow, even for a small period, there will be a significant and persistent impact on society’s welfare. A recent report for the Department of Culture Media and Sport found that public mobile communications were worth £30.2bn in 2011, and that 80% of this value (about £24b) derived from **consumer surplus** generated from its use. In practical terms, this would mean that mobile users would face higher prices and reduce quality of service and content, and service providers would have a smaller addressable market.<sup>8</sup>*

53. Given New Zealand’s small market size and physical geography, further nationwide mobile entry is unlikely. New Zealand is already well served by three existing MNOs; both MBIE and the Commerce Commission recognise the extent of mobile competition and the benefits it brings to consumers. New Zealand consistently benchmarks well on international mobile infrastructure comparisons.
54. Globally, mobile networks in developed markets are not experiencing new entrants, but rather consolidation. For example, Australia, a market five times the size of New Zealand, has consolidated from four to three mobile providers.
55. These local and global market conditions suggest there is no guarantee that any spare spectrum will be taken up by a new entrant, and it is improbable that more than one bidder would emerge if existing management rights holders (Vodafone, Spark and 2Degrees) were excluded from bidding. This would result in inefficient outcome for spectrum renewal, as outlined below.

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<sup>8</sup> Frontier Economics, *Revising Annual Licence Fees - A report prepared for Vodafone*, December 2013, p.25



Scenario	New Zealand consumers	Government	Entrant	Renewing holders
Auction: No bid received by new entrant	Higher costs result in higher retail prices	Lost management rights revenue	n/a	Increased costs to deliver same service (additional build)
Auction: New entrant acquires spectrum but fails to rollout service	Higher costs result in higher retail prices	No benefit. Failure to ensure spectrum used efficiently	Arbitrage opportunity on secondary market	Increased costs to deliver same service (additional build and/or acquire additional spectrum from entrant)
Auction: New entrant acquires spectrum but has limited rollout	Additional retailer providing limited service availability. Higher costs result in higher retail prices	Fourth entrant providing limited coverage	Significant capital investment, limited to network rollout area.	Increased costs to deliver same service (additional build)
Auction: New entrant acquires spectrum and delivers national rollout	Additional retailer in national market	Additional retail MNO in the market	Significant capital (and ongoing) investment	Increased costs to deliver same service (additional build)

56. Under all these scenarios (except where an entrant competitively acquires spectrum, and delivers a nationwide network rollout, an outcome we consider highly unlikely) the costs will outweigh the potential benefits.
57. In its review of the OFCOM licence fees, Frontier Economics noted that “the existence of sunk costs means that current holders who have invested in equipment dependent on their spectrum allocations will generally be the most efficient users of this spectrum on a forward-looking basis. To the extent that re-allocation of spectrum could increase efficiency, operators will have incentives to trade spectrum between them independently of the annual licence fee”.<sup>9</sup>

### **Efficient new entry using 1800 MHz or 2100 MHz spectrum is unlikely**

58. The absence of parked spectrum within the 1800 MHz and 2100 MHz bands does not impede future entry into the mobile market. As a result of Carrier Aggregation technology, historic benefits of access to specific bands is significantly less important for entry today. A new entrant

<sup>9</sup> Frontier Economics, *Revising Annual Licence Fees - A report prepared for Vodafone*, December 2013, Executive Summary



- can use multiple bands to provide services, which are available both through other band allocations, and also through secondary transactions with existing management rights holders.
59. Further, any new entrant to the market is unlikely to invest in legacy technology, preferring instead to compete over 5G. While final decisions regarding international band planning for 5G spectrum have yet to be made, it is likely that the 3.5 GHz band will be prioritised for initial deployment. 1800 and 2100 MHz appear unlikely to be used for 5G networks.

### **Reducing holdings will create significant network costs**

60. Without the reallocation of our current 2x25 MHz holding of 1800 MHz, Vodafone's existing 4G LTE network performance will reduce. As mentioned previously, to simply maintain our current level of network performance will require significant additional investment in new cell towers. To reduce allocations in the 1800 MHz band from 2x25 MHz to 2x20 MHz or 2x15 MHz means that [
- ] The capacity of the network at any given level of SLAs will also reduce proportionally with the spectrum reduction.
61. In order to make up for this lost capacity, Vodafone will need to immediately start building new cell sites and other capacity enhancement solutions ahead of existing management rights expiring in 2021. Immediate start is required given the lengthy time to acquire suitable cell site locations and obtain various consents and permissions. The capital cost to build such solutions and the additional operational cost to maintain them will be significant.
62. This outlay is CAPEX and OPEX that could be much more efficiently spent further enhancing network coverage, capacity and performance, rather than investment to stand still.
63. If the amount of 2100 MHz spectrum available for renewal in 2021 is to be reduced, we will need to [
- ] We will also need to immediately start building new cell sites and other capacity solutions in order to make up for lost capacity when the bandwidth is reduced.
64. This will significantly impact Vodafone's ability to provide New Zealanders with a world class wireless communications service.

### **Unequal holdings of 2100 MHz do not impact competition or a potential new entrant**

65. As discussed previously, 4G/LTE and future mobile technologies use Carrier Aggregation technology to combine a number of carriers in different frequency bands for the same service. This means the amount of spectrum in any individual frequency band is not of significant importance compared to total spectrum holdings across different mobile frequency bands. Where the total amount of bandwidth available for Carrier Aggregation is comparable, the service



level able to be offered by different operators will be similar, regardless of the individual amount they hold in any particular frequency band.

66. When the ratio of spectrum to customer number/demand is maintained, Carrier Aggregation technology means that unequal holdings of 2100 MHz have little impact on the service level when compared to the total spectrum holdings across different bands.

**Figure 6: Mobile Network Operators Holdings of Spectrum for Mobile Broadband**

	Vodafone		Spark		2Degrees	
FDD Total:	FDD DL 95MHz	FDD UL 95MHz	FDD DL 95MHz	FDD UL 95MHz	FDD DL 60MHz	FDD UL 60MHz
FDD Spectrum	700 15MHz	700 15MHz	700 20MHz	700 20MHz		
	900 15MHz	900 15MHz	800 15MHz	800 15MHz		
	1800 25MHz	1800 25MHz	1800 25MHz	1800 25MHz	700 10MHz	700 10MHz
	2100 25MHz	2100 25MHz	2100 15MHz	2100 15MHz	900 10MHz	900 10MHz
	2600 15MHz	2600 15MHz	2600 20MHz	2600 20MHz	1800 25MHz	1800 25MHz
					2100 15MHz	2100 15MHz
TDD Spectrum	3500 28MHz		3500 14MHz			
	3500 28MHz		2300 35MHz			
			2300 35MHz			
TDD Total:	56MHz TDD		84MHz TDD		0MHz TDD	

67. Vodafone holds 2x25 MHz of 2100 MHz spectrum, while Spark and 2Degrees each hold 2x15 MHz. The 2100 MHz band is just one of many spectrum bands capable of delivering mobile broadband.
68. As shown in Figure 6, Spark has an equal amount of FDD spectrum, and 28 MHz more TDD spectrum than Vodafone. While Spark has less spectrum in the 2100 MHz band, this does not affect its capability to offer equal service levels or network capacity as it can use other frequency bands using Carrier Aggregation.





69. 2Degrees have less total spectrum than Vodafone and Spark. However it has significantly smaller customer numbers and usage, and as such, it is able to provide sufficient service levels with the amount of spectrum it holds now. This assertion is backed by 2Degrees's own actions; in the past they have declined opportunities to acquire more spectrum even at low cost. In the 700 MHz auction, 2Degrees chose to only purchase 2x10 MHz instead of the 2x15 MHz available at the reserve price.

**Partial renewal of both 1800 MHz and 2100 MHz is inefficient, will create significant expense for incumbents, and is unlikely to ensure any new market entrants.**

### **Option 3: No renewal of existing holdings to incumbents**

70. In the Discussion Document, MBIE proposes a third option; offering no direct renewal to incumbents and instead allocating spectrum on a first principles basis. Spectrum could be allocated either through a competitive allocation process or the government may choose to make a direct offer to a new user.
71. The rationale behind this mechanism is twofold; to allow a new entrant to gain access to the 1800 MHz and 2100 MHz bands, and to allow the market to determine the optimal spectrum use and price.
72. This renewal option provides no certainty to existing management rights holders over their long term supply of spectrum. A competitive allocation process has the potential to artificially inflate the price of spectrum, diverting available funds from ongoing technology investment. Direct offer to a new user without clear guidance on the treatment of existing management rights holders, would indicate a policy preference for artificial competition at the expense of efficient use of spectrum.
73. Vodafone strongly object to this renewal option.

### **No renewal for incumbents will not guarantee new market entry**

74. As demonstrated above, New Zealand's mobile market is already well served by its three competing nationwide MNOs. A fourth entrant is unlikely given the size of our local market and global trends toward consolidation.
75. In addition, access to specific spectrum holdings in the 1800 MHz or 2100 MHz bands is not a condition for market entry. Any historic benefits associated with holdings in these bands have dissipated with the uptake of Carrier Aggregation.



76. Further, any new entrant is much more likely to look to compete on new 5G technology rather than investing in legacy 3G and 4G technology. While the band plans for 5G have not yet been finalised, it is likely that they will initially settle on the 3.5 GHz frequency.

#### **No renewal for incumbents will create massive financial uncertainty**

77. As mentioned above when discussing partial renewal, anything less than direct renewal of all existing holdings will create uncertainty for MNOs.
78. In the Discussion Document, MBIE acknowledges this point and goes further, stating: “[I]t may be a disincentive for MNOs to invest in their networks at a time when significant new investment will be required to roll out 5G.” We echo these sentiments, pointing out that all MNOs have indicated their commitment to bringing 5G to New Zealand and that both Vodafone and Spark have already begun trials with their respective technology partners. Removing certainty of existing holdings while simultaneously looking to MNOs for further investment in new network technology may create difficult expectations.
79. MBIE asserts that a competitive allocation process is an opportunity for the market to determine the optimal spectrum use and price. However, there is also a risk that the process is gamed by participants without any genuine interest in utilising spectrum holdings. This would artificially inflate the price of spectrum, diverting investment away from future technologies.

#### **No renewal for incumbents runs the risk of spectrum lying unused**

80. If the government ultimately decides to reallocate all 1800 MHz and 2100 MHz spectrum on a first principles basis, then Vodafone recommends a reallocation condition ensuring spectrum will be made available for use (purchase) in the event that no new entrant emerges. Putting in place such a protection mechanism will allow existing national mobile providers to utilise the unwanted spectrum and avoid an outcome where spectrum lies unused.

#### **The Government must carefully balance priorities of competition and efficient spectrum use**

81. In the event that there was a bidder, an auction process excluding existing management rights holders, would unfairly advantage an entrant and risk promoting inefficient entry. This risk could be mitigated by setting the auction reserve price on the same basis as the renewal for existing holders.
82. Vodafone does not support an allocation approach where a new entrant would receive spectrum management rights at no cost. This is not competitively neutral and would disadvantage existing networks who had sunk investment, and now faced additional costs to deploy further towers as a result of the loss of existing spectrum holdings.



**No renewal for incumbents will ensure devastating uncertainty over long term spectrum supply, it may artificially inflate spectrum prices, it will not necessarily deliver a new market entrant and it could result in biased policy decisions.**

## **4 Term of new management rights**

### **Option A: Five year term (expiring 2026)**

83. MBIE has suggested that a five year term for management rights may allow for the future of the bands to be reconsidered once there is greater certainty over 5G spectrum allocations and 5G standards.
84. Vodafone agrees that there will be greater certainty on 5G standards and spectrum requirements around 2026. Vodafone recommended that existing management rights be extended by a five year period, for a pro-rata charge, if the government decided against full renewal for a 20 year duration.
85. A five year term, as a partial renewal rather than an extension, would provide little long-term certainty if decisions are made prior to 2021 cutting back existing spectrum holdings. It asks that management rights holders commit significant investment in the purchase of spectrum, without providing sufficient time for a return on investment.
86. However, Vodafone does support a five year extension of all existing rights, to provide continuity for management rights holders until 2026. At that time the government could determine an appropriate renewal process ensuring the most efficient use of these spectrum bands with greater certainty on 5G technologies and spectrum being deployed internationally.
87. Finally, while 5G spectrum standards have not yet been ultimately agreed, it is unlikely that 1800 MHz and 2100 MHz will be the primary band for 5G use. As signalled at WRC-15 and within our recent submission, "Preparing for 5G in New Zealand," 3.5 GHz is considered the most likely frequency for the initial deployment of 5G.

### **Option B: 10 year term (expiring 2031)**

88. A ten year term will see 1800 MHz and 2100 MHz management rights expire in 2031, aligning with the renewal dates of key sub-1 GHz spectrum.
89. We do not support this alignment of renewal dates as it will create significant uncertainty leading up to the renewal date in 2031. While expiry of all key bands at one time would allow for efficient market clearing (for example, using a combinatorial clock auction to identify the optimal



combinations of spectrum most valued by individual carriers), there are two major risks for MNOs:

- (i) Significant uncertainty driven as a result of all spectrum being renewed / auctioned at the same time. There is a risk that further investment is delayed during this period of uncertainty.
- (ii) Significant capital payment is required at time of renewal for all key spectrum – rather than periodically through phased spectrum renewals over time.

90. This option does not provide MNOs with sufficient certainty regarding their long-term supply of spectrum. It places in doubt their holdings in not just two, but multiple bands, while also placing considerable financial strain on capital expenditure.

#### **Option C: 20 year term (expiring 2041)**

91. Vodafone supports a 20 year term as optimal in providing sufficient certainty of spectrum supply for MNOs.

92. A 20 year term allows operators an appropriate amount of time to receive a return on their initial investment while also encouraging investment in the bands. It ensures that MNOs have time to allow for appropriate network planning to utilise changing technologies and keep pace with increasing customer demands. It also provides certainty for MNOs regarding their ability to meet obligations to the Government regarding the RBI (for Vodafone alone), RBI2 and MBSF initiatives.

#### **Option D: custom term**

93. We do not support a custom term, instead preferring that management rights holders have clear information regarding the duration of their investment up front.

## **5 Incumbent licences**

94. As outlined in the Discussion Document, when the current 1800 MHz management rights were issued in 2001, some were encumbered by spectrum licences to users that had previously held radio licenses in the band.

95. As the current 1800 MHz management rights expire in 2021, those incumbent spectrum licence holders will have had 20 years of benefit from their pre-2001 licences. In fact, there have been significant effort by those incumbent licence holders to replace those legacy systems with new ones using other technology or frequency bands. As a result, the number of incumbent licences have been reduced significantly, and it is expected that most, if not all, of these licences will be redundant before the current 1800 MHz rights expires.



96. We do not believe that there is a need to extend current incumbent spectrum licences beyond 2021. For those radio users who want to use spectrum in these bands, there is a well-established process for negotiation with management rights holders. We believe that this is sufficient for the needs of radio licence holders.

#### **Response to specific questions raised in Discussion Document**

***Q1: Which renewal option is most suitable for the 1800 MHz and 2100 MHz bands? Is the most suitable option different for each of the two bands? Why?***

Vodafone recommends that existing management rights holders are offered full, direct renewal for existing spectrum holdings in both the 1800 MHz and 2100 MHz bands.

Vodafone fully utilises our 2x25 MHz in both 1800 MHz and 2100 MHz to provide nationwide mobile services. Should the current allocation for MNOs be reduced, we will face significant additional investment simply to stand still. We consider that investment to be much more efficiently made in increasing our network's future capacity.

***Q2: Is your organisation interested in acquiring 1800 MHz and 2100 MHz bands? If so, what radiocommunication service would you use it for and how much spectrum would your organisation require?***

Vodafone seeks to retain its full, current allocation of 2x25 MHz in both the 1800 MHz and 2100 MHz bands. We use spectrum in the 1800 MHz band for 4G network provision. We use 2100 MHz to provide 3G and 4G services.

Our investment in these bands goes beyond the initial purchase of management rights, into the technology required to deliver ever-changing and improving services for our customers. The 1800 MHz and 2100 MHz bands play a pivotal role in enabling Vodafone to deliver a reliable, high-speed mobile network across New Zealand.

***Q3: Are the 1800 MHz and/or 2100 MHz bands the most appropriate band(s) for your organisation's use? Why? What alternative bands are suitable for the intended service you expect to provide?***

With a nationwide mobile network using industry standard, 3GPP-compliant 2G, 3G and 4G technology, we certainly believe these bands are the most appropriate for our use.

In addition to our holdings in the 1800 MHz and 2100 MHz bands, Vodafone has invested in spectrum in the 700/900/2600 and 3500 MHz bands. With varying characteristics providing different coverage opportunities, these investments are all critical components of our current mobile network. They also represent our commitment to continuing to invest in the technologies that maximise the services available to New Zealanders.



***Q4: Is a competitive allocation process appropriate to assign some (or all) the 1800 MHz and / or 2100 MHz bands? If not, what other allocation process (excepting direct offer to incumbents) would be more appropriate? Why?***

As mentioned earlier, Vodafone believes that the most appropriate renewal of the 1800 MHz and 2100 MHz bands is by direct offer to existing management rights holders. Direct offer of renewal to incumbents provides certainty of investment, allowing for efficient expenditure in new and/or maintenance infrastructure, provides the best market conditions for allowing MNOs to plan for new 5G networks, ensures no wastage of spectrum for hypothetical market entrants, while ensuring the bands are fully utilised and not laying fallow.

However, should the Government wish to pursue a different strategy, we consider that a competitive allocation process where all parties can participate is the next preferable option. Competitive allocation would allow all those who (in earnest) wish to use spectrum in these bands, the opportunity to bid for Management Rights.

To ensure bidders are fully informed of their rights and obligations when participating in a competitive allocation process, we see a number of issues that the Government must address:

- Successful bidders must use the spectrum – a 'use it or lose it' provision should be attached to both the 1800 MHz and 2100 MHz bands to ensure the auction attracts genuine bidders
- Secondary market – the Government authorises management rights holders to provide other users with licenses for spectrum within their own holding, providing these licence holders do not cause interference with other management rights holders
- Use of band and FDD/TDD provisions – we do not expect the Government to prescribe the nature of use of the 1800 MHz and 2100 MHz bands, but instead allow users to invest in the technology most appropriate for their use as long as this does not cause interference with other management rights holders

***Q5: Would your organisation participate in a competitive allocation process (e.g. a spectrum auction) for management rights in the 1800 MHz and 2100 MHz bands? If not, why not?***

If Management Rights in the 1800 MHz and 2100 MHz bands were not offered directly to incumbents, Vodafone would participate in a competitive allocation process. To continue delivering a reliable, high-speed mobile network for our customers, our existing services rely on retaining (or re-acquiring) 2x25 MHz in the 1800 MHz band and 2x25 MHz in the 2100 MHz band.

***Q6: What should the term of the new management rights be? Should they be the same for both bands?***

When setting the term limits for the Management Rights, it is important to balance competing concerns regarding the fast pace of changing technology with providing certainty to investors. It is also important



to prevent Management Rights across multiple bands expiring at the same time. Aligning them may be clean from a government point of view, but it creates considerable financial pressure to have to renew multiple bands of spectrum all at once, as well as creating uncertainty should any of those bands not be fully renewed.

With these competing concerns in mind, we believe that for both the 1800 MHz and 2100 MHz bands, the renewal term should be 20 years.

***Q7: Do you have a different preference for the management right term for each of renewal options outlined in Section 4? If so, what term should apply to each renewal option? Why?***

Regardless of the methodology employed to renew or reallocate management rights in the 1800 MHz and 2100 MHz bands, we believe 20 years is the appropriate amount of time to provide certainty for investors.

***Q8: Should pre-2001 incumbent spectrum licences be extended beyond 2021? If so, why?***

Vodafone believes that there is no need to extend current incumbent spectrum licences beyond 2021 as most, if not all, of them will become redundant by 2021. For those remaining, if any, there is a well-established process for negotiation with management rights holders. We believe that this is sufficient for the needs of radio licence holders.



## Additional recommendations regarding spectrum allocation for emergency services

*Within MBIE's 1800/2100 MHz renewal consultation in 2016, questions were asked regarding the potential allocation of spectrum for the use of emergency services. This section captures the key messages Vodafone outlined in our 2016 submission.*

### **Allocation of spectrum for Public Safety**

97. Vodafone recognises the importance of Public Safety and Emergency Services. We understand that consideration is being given to allocating spectrum for the purpose of creating a standalone network. We believe that MNOs working with Emergency Service providers, are together much better equipped to ensure network priority and stability in the event of emergencies.
98. In the 2016 Options Paper, MBIE discussed allocating specific spectrum for public safety purposes, for use by Emergency Services. From the Five Year Spectrum Outlook paper, Vodafone understands that this option is now narrowing in focus to consider portions of the 800 MHz band.
99. We wish to reaffirm our belief that allocation of 1800 MHz spectrum for Emergency Services is not the best use for the spectrum, nor would it meet the specific requirements for Emergency Services and other Public Protection and Disaster Relief (PPDR) related purposes.
100. One of the basic requirements for Emergency and PPDR service is nationwide deep coverage. To provide such wide coverage at reasonable cost, it is essential to use lower frequency bands, e.g. frequencies below 1GHz. The cost of providing nationwide coverage using 1800 MHz frequency or similar will be prohibitively expensive as the number of cell sites required will be many times that if a lower frequency is used.
101. To ensure New Zealand Emergency Services benefit from economies of scale, it is important that the Emergency Services/PPDR spectrum is aligned with other countries. WRC-15 have agreed on a revision to Resolution 646 that encourages use of the 694-894 MHz frequency band for such services. We also understand that RSM have considered using the 806-824/852-869 MHz for such a purpose, which, from a radio frequency propagation perspective, is much more suitable for providing national coverage.
102. The cost to create a dedicated nationwide resilient network for Emergency Services would be significant, and has not been the preferred approach internationally. We consider that a more consistent approach would be to leverage existing national networks through a wholesale partnership with mobile providers.
103. If dedicated spectrum is required for Emergency Services, additional spectrum in the 450, 600 or 800 MHz band has better propagation characteristics to meet nationwide coverage requirements.





Reducing existing spectrum holdings in the 1800 MHz band for allocation to Emergency Services would be both inefficient and costly.