Renewal of Management Rights in the 1800 MHz and 2100 MHz bands

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Executive Summary

The pace of technology change in mobile telecommunications is rapid and increasing. The 1800 MHZ and 2100 MHz bands are important to the provision of mobile and mobile broadband services for all operators in the market. When this spectrum was first auctioned, the major use of the technologies in these bands was 3G. Now this spectrum is also used for 4G and its enhancements, and the bands have been identified for 5G.

Accordingly, spectrum renewal is a significant issue for rights holders. We have made significant investments in anticipation of renewed rights and need certainty of tenure and confidence in the renewal process to be able to continue to invest.

The expectation of rights holders is that all spectrum will be renewed where it is being used - subject only to specific circumstances such as a technology change which requires re-planning of the band – and that a notice of renewal will be given 5 years prior to existing licences expiring. This approach reduces uncertainty and ensures operators can invest efficiently in capacity and new services.

In this case, there hasn't been a technology change that requires re-planning of the bands, and the bands will remain in use as and after networks evolve to 5G. Failing to renew spectrum will also have a discernible impact on our ability to provide cost effective services to customers and speed at which we can offer new services to customers. In our view, the Crown should renew the full spectrum rights in the 1800 MHz and 2100 MHz bands.

We now have more understanding of how this spectrum will be used

Since the Ministry considered renewal options in 2016, we have increasing certainty relating to how these bands will be used over time:

- The 1800 MHz and 2100 MHz bands are used as 4G capacity bands and we are seeing commercial 4G deployments in both bands. Operators can more efficiently use spectrum through 4G technology enhancements such as carrier aggregation;
- 3GPP has also specified both 1800 MHz and 2100 MHz bands as 5G New Radio bands. A maximum carrier bandwidth is now specified as 30 MHz for band N3 and 20 MHz for band N1[1]. This gives us flexibility to either use the bands for 5G where balanced uplink and downlink capacity is needed (eMTC) or share with 4G by spectrum partitioning; and
- We are seeing significant growth in the demand for mobile data that all operators are seeking to efficiently provide capacity for.

These developments mean we can be confident about how these bands will be used – the bands will be used more intensively for capacity to meet data growth and in the transition to 5G.

If the Crown were to partially recover existing holdings, this will have a material impact on our ability to cost effectively meet demand and provide better services to customers.

Renewal options

1800 MHz/2100 MHz renewal was first considered in 2016 and this was premised on 20 MHz being the maximum carrier bandwidth for these bands. The role of these bands in a 5G world was also uncertain.

[1] 3GPP 38.104 section 5.3.5. N1 equates to the 2100 MHz band and N3 the 1800 MHz band.

Since then technologies have moved on and – with the widespread availability of CA and deployment of commercial 4G networks in these bands – these historic constraints no longer hold. The existing holdings in these bands will remain in use as even after networks evolve to 5G.

MBIE should therefore recommend full renewal of existing 1800 MHz/2100 MHz spectrum management rights for a 20-year period.

Introduction

1. Thank you for the opportunity to comment on the Ministry's *Renewal of Management Rights in the 1800 MHz and 2100 MHz bands* discussion document (**discussion paper**). Spark New Zealand currently holds management rights (**MR**) in both 1800 MHz and 2100 MHz bands being considered.

2. The pace of technology change in telecommunications is rapid and increasing. We've made significant investment in the 1800 MHz and 2100 MHz bands on the expectation that spectrum rights will be renewed, and they are important for providing services to our customers going forward. Accordingly, spectrum renewal is a significant issue for rights holders.

3. The expectation of renewal and predictable approach to spectrum planning and allocation is important because it provides certainty for investment and network deployment. Therefore, in a decision to re-plan in use rights, there needs to be material driver or reason to consider a re-plan.

4. The Ministry proposal includes options that won't see all our spectrum renewed – this is most concerning. Management rights holders have a legitimate expectation that spectrum will be renewed where it is being used. If the spectrum is not being used or if technology changes require a material change of use and a band re-plan, then we accept that there may be circumstances that justify a change to spectrum allocations. There is no clear technology change being considered for either of these bands and Spark is using, and intends to fully utilise, its spectrum in the 1800 MHz and 2100 MHz ranges. In these circumstances, we consider there is no reason not to renew our spectrum rights in these bands in full.

5. In our view, the Ministry should require compelling reasons to even consider not renewing all of the spectrum rights in this range which, in the absence of a reallocation, are expected to remain in current usage. Further, we think that it would provide useful guidance to industry for the Ministry to clarify that, as a rule, its preference is to renew rights and that the preference for renewal will be given weight in any analysis. Consideration of renewal shouldn't be a fine balancing of benefits – there should always be a preference to renewal where the spectrum is being efficiently used. We are not aware of any compelling reasons not to renew management rights in either of the 1800 MHz or the 2100 MHz bands.

6. Further, any future cost benefit analysis would need to be comprehensive, considering: current market, future feasible market structures, future technology trajectories, potential alternatives for achieving any policy outcome; and the dynamic efficiency implications and signalling that failing to renew spectrum that is expected to be used delivers.

7. In considering allocation options, the Ministry's objective shouldn't be to determine a specific number of operators for the market, this will be determined by relative efficiencies in markets. Government subsidy or competitive bias should be avoided in the absence of clear market failure.

Planning for capacity and transition to 5G

8. Since the Ministry first considered renewal options in 2016, there has been significant technology development and increasing certainty relating to how these bands will be used in the future.

9. The 1800 MHz and the 2100 MHz bands are currently used for different purposes in New Zealand. The 2100 MHz band is currently used in NZ and in most parts of the world for UMTS. The 1800 MHz band has emerged as a "core band" for the deployment of LTE.

10. 3GPP has identified 2100 MHz for LTE deployment and services. Accordingly, while the 1800 MHz band remains the core LTE capacity band, we expect the 2100 MHz band and capacity will increasingly be used for LTE applications. The GSA reports that over 50 LTE commercial networks have been deployed using the 2100 MHz band. Operators can more efficiently use spectrum through 4G technology enhancements such as carrier aggregation (**CA**).

11. 3GPP has also specified both 1800 MHz and 2100 MHz bands as 5G New Radio bands with 30 MHz carrier bandwidth for the former and 20 Mhz carrier bandwidth for the later. Therefore, looking ahead, we expect to transition these bands to 5G services. 5G networks use multiple bands, including the 1800 MHz and 2100 MHz bands. The low, medium and high bands complement each other to provide overall coverage and capacity. In the 5G context, the 1800 MHz and 2100 MHz bands will be used differently to 3.5 GHz and mmWave bands.

12. The IMT-2020 (5G) standard is designed to complement LTE with new service capabilities, providing three generic classes of service: enhanced mobile broadband (eMBB), massive machine type communications (eMTC), and ultra-reliable and low latency communications (uRLLC). These use cases have significantly different service requirements and will not necessary be supported within the same band. For example, while eMBB has significant data requirements and may be implemented in the C band and higher frequencies, eMTC and uRLLC requires less spectrum and could potentially be deployed in existing LTE bands. In other words, we expect to use the 1800 MHz and 2100 MHz bands for eMTC related applications where balanced uplink and downlink capacity is required, i.e. for machine to machine applications.

Current use

13. A key challenge faced by operators in transitioning the network to new technologies is how to continue providing for existing customer demand while making spectrum available to deploy new technologies. For example, the availability of 5G from say 2020 does not mean use of prior generation technologies will cease and we still need to meet that demand. GSM is a second-generation mobile technology but is still extensively used worldwide. UMTS is a third-generation mobile technology but is still extensively used both in NZ and worldwide.

14. A particular challenge, in this case, is that at the same time as we plan to evolve the network to 5G, mobile data demand is increasing by over 50% year on year and this growth is expected to continue for the foreseeable future. We aim to provide capacity to meet this demand, while also deploying a 5G network. To do this we need access to the bands to efficiently serve current and emerging demand, and transition to future state capability.

1800 MHz band

15. The 1800 MHz band is currently used to support both existing point to point radio links (operated by Transpower and Chorus) and LTE (4G) mobile broadband services. The network is planned so that these services co-exist within the MR. In practice, this means that we adjust the lower and upper boundary of frequencies used for LTE services on a regional basis so that service coexists with fixed link services. In other words, while we typically only use 2x20 MHz of 1800 MHz spectrum in any one area, the specific frequency range used in each region can differ, depending on where in the band localised Transpower and Chorus fixed links sit.

16. This means that all Spark's 2x25 MHz of 1800 MHz spectrum is in use in some parts of our country. We expect the fixed links in the band to relocate to fibre over time. However, at present we must work around existing point to point radio links.

17. We expect that over the renewal period, we will make more intensive use of the 1800 MHz band to meet demand for mobile data and transition to 5G services. We plan to add capacity by, for example, deploying **[ ]SPK Confidential** LTE two band carrier aggregation would allow us to use the full 25 MHz holding for mobile broadband purposes by, for example, 15+10 MHz or 20+5 MHz aggregation. **[ ]SPK Confidential**

2100 MHz band

18. Spark currently uses the 2100 band for UMTS based (3G) services, but we also expect to use this band for LTE capacity expansion. We anticipate that over time this band will become a core part of operators' LTE spectrum portfolio.

Transitioning to 5G in practice

19. Today we know that over the longer-term it is intended that technology will transition to 5G. However, the migration to 5G will depend on the specific situation for each operator: end user demand, the device population, desire to ensure a seamless customer transition and spectrum availability. For example, many operators will prefer to initially deploy 5G eMBB in a new frequency leaving the 4G frequency usage unchanged.

20. For Spark it is important to retain at least 2x25 MHz of 1800 MHz spectrum as this provides flexibility to transition to 5G and the ability in the long term to more efficiently meet 5G demand by fully utilising the entire 25 MHz as a single carrier. This option to add capacity to our existing LTE network to meet demand and deploy new 5G services will benefit end-users significantly.

    For example, we could divide our 1800 MHz allocation into two sub bands, a sub band for LTE, and a sub band for 5G - 20 MHz for LTE and 5 MHz for eMTC. Alternatively, we could divide the allocation into two sub bands with each providing a different 5G service (say eMBB and eMTC). This is possible as the 5G standard will adopt new waveforms based on mixed numerologies OFDM that enable adjacent band 5G and LTE co-existence, i.e. sub carrier bandwidths and time slot intervals are flexible and can be configured to suit different applications.

21. Further out, we will allocate the entire 25 MHz as a single carrier which is possible with 5G as the 20 MHz carrier size limit for 4G is relaxed to allow carriers up to 30 MHz wide in Band N3[2]. All of the above options are potential ways for us to use the full 25MHz spectrum. The maximum carrier remains 20 MHz for N1.

22. We want a relatively quick 5G deployment in order to attract and retain customers. However, if Spark's access to spectrum is constrained (relative to the size of our customer base and investment commitment) the capacity and speed of delivery of new services will have a negative impact on end users.

23. Spectrum planning needs to recognise existing investment and customers served by the spectrum, and operators requirements as they transition between technologies. These trends will occur over the life of renewal licences. Further, if there is an intention to apply allocation limits within a band, regard should be had to the 3GPP specifications where practicable.

[2] See 3GPP 38.104 section 5.3.5

Renewal options

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?

24. As noted in the paper, the Ministry should base decisions on the current and expected use of the 1800 MHz and 2100 MHz bands rather than how it has been used in the past.

25. We support option 1, full renewal. Existing rights holders have an expectation that spectrum will be renewed when it remains in use and this spectrum will be used over the life of the renewal period:

    a. Operators currently use these bands to provide UMTS (3G) and LTE (4G and 4.5G) capacity;

    b. We are seeing significant growth in mobile data demand and expect to make more intensive use of the bands for 4G over time; and

    c. The bands will ultimately transition to 5G within the expected renewal term. The 1800 and 2100 MHz bands will be used for 5G capacity and to support the transition as operators support 3G/4G and 5G demand for an extended period.

26. Limiting spectrum available to operators will inhibit our ability to meet data demand and slow the network transition to 5G. Accordingly, for both bands, we support a direct renewal of our existing holdings.

27. We do not support the Ministry holding back capacity on the "off chance" that a high value alternative use will appear some time before 2021. There is already sufficient technology certainty to assess alternative users. In other words, the Ministry isn't required to mitigate technology risk by, for example, holding back spectrum until technology change becomes more certain.

28. Therefore, while it's unclear what option is being preserved, holding an option to allocate spectrum elsewhere comes at significant cost. We need certainty now so that we can invest in 4G enhancements such as carrier aggregation for growth and plan the network transition to 5G.

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

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?

29. Yes, these are premium bands used to provide 4G capacity.

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?

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?

30. We don't support a competitive allocation process to determine a renewal price. As has occurred in the past, this should be based on development of a renewal price for operators who are currently using their current spectrum holdings. For the recovered 5 MHz of unused spectrum at 2100 MHz, this should be allocated through an auction process.

31. If the Ministry seeks to partially recover and allocate spectrum, a competitive allocation process should be adopted for allocating recovered spectrum. The primary goal should be to ensure the spectrum is allocated to its highest value and is used - this maximises the value to society. A competitive auction process is most likely to achieve these goals.

32. However, this goal will not be achieved if existing holders are prohibited from participating. In this case, the allocation process wouldn't capture the value of the spectrum to existing operators and it is unlikely to achieve the desired efficiency and social outcomes. An administratively set price might be more appropriate. In all cases, the Ministry should ensure that pricing is not distortionary between operators. Use-or-lose obligations could be applied to any additional spectrum acquired to ensure that the highest value use was not to withhold spectrum from others.

33. We would participate in an auction for incremental 2100 MHz band spectrum.

Term of new management rights

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

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?

34. In New Zealand the current approach to setting the term for management rights has typically been for a 20-year period. In this case, we support renewal for a 20-year period.

35. We appreciate that, in determining the preferred term, the Ministry is considering the investment and planning benefits of a longer term against the risk that technologies and standards may not evolve as expected. For example, an overly short term is likely to deter not only investment in extending networks, but also in deploying new services, and reducing incentives for operators to compete for customers. Alternatively, the spectrum and band planning requirements for future mobile technologies can be uncertain and allocating long term rights can make reconfiguring a band more difficult.

36. In our response to the 2016 consideration we indicated that, on balance, consideration could be given to a 15-year term for the 1800 MHz and 2100 MHz bands. However, 3GPP has defined bands N1 and N3 and key technology uncertainties have now been resolved. Therefore, in our view, a 20-year term is now an appropriate renewal period.

37. We do not support a shorter term like 5 years as this will create unworkable investment uncertainty and result in substantial reductions in services that can be efficiently deployed. Further, we support aligning the renewal of management rights for both the 1800 MHz and 2100

MHZ band at the same time. As noted above, we expect that the bands will be increasingly considered substitutes of each other over the during the life of the renewal period. Given assumption that the Crown's current approach to the renewal process will continue unchanged, we can see no reason to do otherwise.

Incumbent licences

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

38. We support the Ministry's proposed approach – the incumbent license protections shouldn't be extended beyond 2021 when MRs rights expire and are renewed.

39. We believe this change will have little impact as we are working with current license holders to vacate the band in any case.

END