Response To Draft Five-Year Spectrum Outlook 2017-2021

Submission | RSM - MBIE

1 March 2017

Contents

Executive Summary

1. Thank you for the opportunity to comment on the Ministry's Draft Five Year Spectrum Outlook.

2. As the Ministry knows, the key mobile sector trend occurring within the next five years is the shift from 4G to 5G. This shift will deliver a step-change in the performance and capability of mobile networks in New Zealand which will create the conditions for fundamental changes in multiple industries and sectors that will create productivity increases, new services, smarter cities and communities and safer, more sustainable transport and utility networks.

3. We would like to see this trend reflected at the centre of the Ministry's Five Year Spectrum Outlook. In particular:

    a. We encourage the Ministry as a priority to identify what the key 5G bands will likely be in New Zealand;

    b. What bandwidths it will target to have available for 5G services within those bands; and

    c. The likely timeframes for freeing that spectrum up and reallocating it to 5G service providers.

4. Certainty as to the Ministry's plans in these respects is important for mobile network provider such as Spark, who are planning now for the introduction of 5G, even if much of those plans will be just that - plans.

5. In the absence of this clarity, we are left to guess as to the Ministry's priorities for 5G spectrum.

6. Our priorities for 5G spectrum are:

    a. **C band 3.4 GHz-3.8GHz**: This band has been identified internationally as a key band for early 5G deployment, likely before 2020. Australia intends delivering its first 5G services using this band in 2018. Unfortunately, a key part of this band – 3.4-3.6GHz - is not due for reallocation until 2022, raising the prospect New Zealand will be unable to take advantage of the key band for 5G services for some years after our international peers.

    We request that the Ministry consult now on options for effecting an earlier reallocation of the full 3.4-3.8GHz band, with mechanisms in place to incentivise existing rights-holders to participate in that process, and receive appropriate compensation from doing so.

    b. **L Band 1427-1518MHz**: This band is ideal for New Zealand, and needs strong support from the Ministry in international fora to encourage development of an FDD band plan that can be implemented here;

    c. **Millimetre Wave bands 27-35GHz**; There are very promising trials of backhaul and mesh technologies utilising very high frequencies in these ranges, which are gaining significant international attention. The Ministry should consult with industry on the application of these bands in New Zealand and develop a very strong advocacy position within international fora to support the development of IMT band plans within them.

    d. **600MHz**: We strongly support the need to identify more spectrum for IMT use in parts of the band below 698 MHz. New Zealand advocated for this at WRC15, however we were not successful due to the unconventional methodology of getting neighbour approval at WRC15. Nonetheless there are a number of countries in region 3 who supported New Zealand. In the first instance those countries should be lobbied again to start work on a band plan for UHF 600 MHz

General Comments

1. Thank you for the opportunity to comment on the Draft Five Year Spectrum Outlook for the period 2017-2021 (**Draft Five Year Spectrum Outlook**).

2. There is no confidential version of this submission

Spectrum Trends Driving Change: Preparing for 5G

3. The single most important and defining factor for mobile network operators' spectrum use and planning in the next 5 years will be preparation for the shift to 5G mobile and wireless technologies. As RSM is well aware, there is an active international work program underway across government bodies, within international fora, in standards organisations such as 3GPP, and between vendors and operators in relation to 5G technologies with a view to their commercial introduction by 2020. It is expected that these 5G technologies will generate material demand for new wireless services with greater speed, and capacity and lower latency.

4. One of the key dependencies for 5G deployment will be spectrum availability. The two figures below illustrate a present assessment of the expected use cases and associated network considerations.

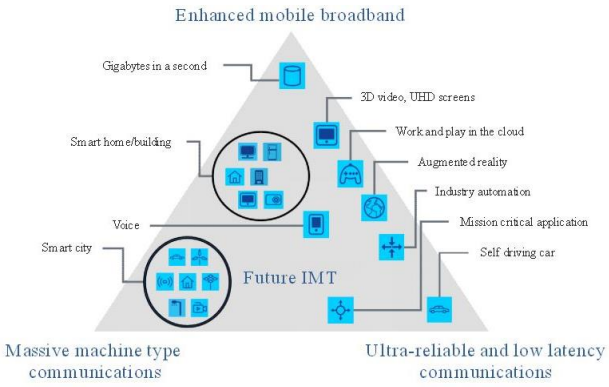
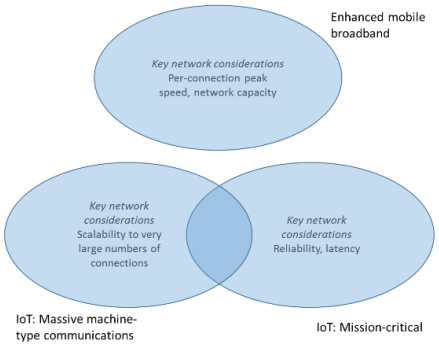


Figure 2: Classification of 5G applications



5. The development of 5G mobile and wireless technologies is progressing as a response not only to increased data demand, as is noted in the Draft Spectrum Outlook, but also as a result of the increased importance of machine to machine communication, and of the growth of demand for a range of new low-latency applications.

6. We acknowledge that elements of the 5G ecosystem are still developing. It does however seem to be clear already that 5G technologies will have a number of features that differentiate them from 4G technologies such as very low latency and high data rates of as much as 20 Gbps, and as a result, they are expected to be adopted as a ubiquitous and accessible technology capable of supporting multiple device M2M communications and the deployment of a wider implementation of the "Internet of Things.

7. Regulators around the world are determining key issues in their 5 year spectrum outlook and given the importance of the shift to 5G technologies, the international decisions on identification of spectrum for 5G and the clearance and allocation of that spectrum on a domestic basis is a key component of this outlook. While we know that MBIE is well aware of the importance of 5G within the outlook period, we would like to see greater recognition of this in the final spectrum outlook. If we had one request of MBIE it would be for MBIE, as the international position becomes settled, to identify as early as possible in this period the key 5G bands, the bandwidth within each band

that will be targeted for 5G, and the likely timetable and means by which these bands will be freed up, and reallocated, in New Zealand. .

8. We are concerned, for example, that there is no substantial mention of these issues in respect of the millimetre wave spectrum that will be discussed at WRC 19 for identification to IMT. This is a very important area that the Ministry has currently underweighted in the Draft 5 Year Spectrum Outlook. Both microwave and millimetre wave bands will be required to provide a full suite of 5G services. Minimum bandwidth per operator in the microwave bands is about 100 MHz and for the millimetre wave bands is about 1 GHz.

9. Attention to this area will be crucial for RSM to effectively achieve the Government's future needs in relation to social, cultural and economic objectives, and in maximising the use and value of radio spectrum as an input to New Zealand's social and economic development. As 5G technologies come closer to commercial introduction, we would think it likely that there will be increased Government policy engagement with the introduction of these technologies to ensure that both NZ consumers' needs, and key export and industrial sector requirements can be addressed. The successful introduction, and relatively high take-up of 4G mobile and wireless technologies in New Zealand provides supporting evidence for this.

10. Spark further notes with considerable concern that NZ did not support the traditional LMDS band (known as the 28 GHz band) for IMT identification at WRC 15. This was despite the knowledge that a strong eco system will exist in this band due to markets in the US and Korea. The logic of this opposition remains unclear to Spark. We believe that as a small market relying on scale benefits we missed a great opportunity. We urge the government to find a way to have this spectrum identified for IMT 2020 at the WRC 19.

11. We think it is appropriate for the current RSM approach to technology flexible spectrum management to continue, but nonetheless it is also vitally important to ensure that New Zealand does not fall behind international developments.

12. Spark strongly believes that the 5G evolution in mobile technology and the mobile and wireless developments which accompany it offer exciting social and economic opportunities for New Zealanders through increased use of mobile broadband and M2M communications.

13. In order to enable New Zealand operators to carry out this next phase of mobile network development, the RSM is likely to need to provide its support for the international harmonisation of spectrum arrangements referred to above, in order both to ensure that international equipment vendors and others are able to achieve appropriate economies of scale and that the benefits of these new technologies can flow through to the New Zealand economy. International work on the development of 5G technologies is continuing apace however. In the US, the FCC identified a number of possible bands for future IMT services, and the EC has established a 5 year action plan in relation to 5G. Work is also under way as part of the WRC agenda. We expect that RSM will continue to engage with stakeholders at appropriate times in relation to the domestic band replanning processes, and continue to participate in the harmonisation processes at an international level and in international fora.

14. We think it would be appropriate in the RSM 5 Year Spectrum Outlook to address these issues more directly notwithstanding that currently RSM is monitoring developments. Spark is aware that consideration of 5G requirements is currently on the RSM's work programme, and strongly urges that RSM's Spectrum Outlook and its work programme be updated to deal more fully with anticipated and actual planned developments around spectrum arrangements. Furthermore we suggest that when opposing international trends that are of clear benefit to NZ, MBIE should act with caution before taking such a stand due to its long term implications.

Spectrum Trends Driving Change: Emerging authorisation regimes

15. Spark agrees that RSM should continue to monitor international developments on authorisation models for spectrum sharing as described in section 4.2 of the Draft Five Year Spectrum Outlook. A range of new institutional approaches such as Licensed-shared access, and authorised shared access, and new technologies such as dynamic spectrum management offer opportunities for new approaches to spectrum sharing which do not rely on the traditional more static approaches based on defined geographic and spectral boundaries.

16. We agree that at present it is unlikely to be appropriate or necessary to deploy any of these techniques in New Zealand in the medium term, even though some of them have been proposed or in some cases deployed by overseas spectrum regulators. We agree, though, with RSM that new forms of spectrum sharing are valuable to consider, and cannot be ignored. New Zealand is a small market, and in many respects, we must follow the trends in the major markets, regardless of the domestic spectrum demand and supply.

17. We agree that RSM should continue to monitor the international developments and deployments, and depending on those developments, report to and consult with stakeholders on their views as to the domestic benefits of any of these approaches or other approaches to spectrum sharing.

Sector Developments – Public Safety Communications

18. Spark notes that the Draft Five Year Spectrum Outlook suggests the government is considering the reservation of portions of the 800MHz band for a dedicated 'Whole of Government Radio Network for PPDR'. Spark strongly believes that a separate network for PPDR does not make economic sense. The existing mobile networks in the sub 1GHz bands are well suited to provide the needs for PPDR. Spark New Zealand is willing to engage with the government to extend the coverage of its mobile network in parts where PPDR coverage is deemed required.

19. Spark notes that the UK has adopted a different strategy, namely to rely on hardened commercial networks and spectrum, with prioritised access to bandwidth for PPDR purposes. We understand that access is based on commercial spectrum currently held by Everything Everywhere, and PPDR users access services via the same LTE carriers and base stations as commercial users have available to access their LTE services. This means that PPDR users in the UK can use existing commercial devices if necessary although also special "ruggedized" device would normally be used by PPDR service personnel required. A key advantage of this approach is that the first ruggedized devices exclusively for PPDR use can be developed based on chipsets that support existing commercial LTE bands. UK Home Office has selected the winners and public safety LTE services should be available in 2017. We would be pleased to provide further information on this if required.

20. WRC15 concluded that it encouraged administrations to consider parts of the frequency range 694-894 MHz for PPDR applications but these PPDR spectrum harmonization recommendations do not limit national regulators. In November 2016, European Conference of Postal and Telecommunications Administrations (CEPT) ECC Report 218 addressed spectrum options for the implementation of broadband PPDR services in CEPT countries in the 400 and 700 MHz frequency ranges. The report proposed the concept of "flexible harmonization" to enable an efficient implementation of PPDR LTE within CEPT and did not designate a single frequency band for PPDR LTE in Europe.

21. If the approach were simply to set aside 2 x 10 MHz FDD spectrum for PPDR even with 2x2 MIMO it might only be possible to achieve a limited peak rate performance and only in excellent radio conditions due to the limited spectrum. In this regard it's important to note that public safety users often work in extreme locations, which are also challenging for mobile network coverage, and no doubt also would require that communication would be possible outside existing terrestrial mobile network coverage.

22. If a dedicated band was to be chosen, then we assume that the requirement would also be for suitably ruggedized special (and no doubt market specific and low volume) equipment that is capable of direct group operation where no network infrastructure is available, and second that an appropriate network is constructed. Our understanding is that in broad terms, dedicated PPDR sites typically need higher security, certainty of power and backhaul provision. With dedicated spectrum, we think it likely that the cost of network construction site/coverage requirements, and availability of suitable PPDR optimised user devices may be higher than if the UK approach were to be adopted.

23. In short, the PPDR allocation and performance possibilities under the indications set out in the Draft Five Year Spectrum Outlook differ materially from current commercial products, available in many jurisdictions which support 3 carrier components up to total 60 MHz bandwidth and 450 Mbps peak rate. There is a risk that this approach to dedicated PPDR spectrum only will not allow public safety applications to benefit from the latest mobile broadband technology performance. It may be more appropriate for New Zealand needs to consider implementing a variant of the UK approach with suitably ruggedized equipment.

Spectrum Management Activities – Comments on the RSM work programme 2017-2018.

RSM will work on the replanning of the additional IMT allocations in the C-band (3.4 – 3.6 GHz).

24. Further to our comments in relation to 5G spectrum above, we support the replanning of the C-band from 3.4 to 3.6 GHz. We suggest this should be combined with extending the band to 3.7GHz so that replanning over the range 3.4 -3.7 GHz can be carried out in a holistic manner rather than a piecemeal approach of 3.4 to 3.6 separate to 3.6 to 3.7 GHz. Further, we wonder why the Government is limiting the upper limit of the C band spectrum range available for IMT to only 3.7 GHz, when the upper limit is viewed as 3.8 GHz in Europe and 4.2 GHz in the US. We should at least align the upper limit with Europe as the CEPT has decided 3.4- 3.8 GHz is core 5G spectrum.

25. We also urge the Ministry to have the replanning completed urgently, and as much before the expiry of the present Rights as possible, i.e. 2022. Delaying this important activity will, in our view, prejudice the timely availability of 5G spectrum in New Zealand and also create a lag relative to many countries in the rest of the world.

26. This band is likely to be one of, if not the, first 5G bands and in commercial use before 2020. In that context, the current expiry of management rights in 2022 is problematic for New Zealand. The Ministry should consider options for bringing forward its availability given the significant change in its expected use, and value, since it was allocated. These options should include options that enable existing rights holders to be compensated for having a shortened license period and that enable them to share in the value of this spectrum to providers of 5G services. For example, a reverse auction, or an auction proceeds sharing accord between MBIE and existing holders should be considered. Come what may, the Ministry should find a way to have this spectrum available early than the 2022 MR expiry date.

RSM will engage in the international regulatory developments in the L-band (1427-1518 MHz) and the UHF 600 MHz bands in order to assess future options for the New Zealand market.

L-band (1427-1518 MHz)

27. The Ministry should consider the band plan options for this band, either as a supplementary downlink or convention duplex arrangement. The supplementary downlink while a well supported option from Region 1 is not supported in New Zealand as the band arrangements to be paired are not compatible between Region 1 and 3. We note that 3GPP has a work item approved to develop an FDD band plan for this range. This would be our preference. We recommend that the Ministry support that in international forums. More fundamentally though, we request that MBIE adopt a position on the matter, rather than the nil view it has adopted on this very important band to date.

UHF 600 MHz band

28. We strongly support the need to identify more spectrum for IMT use in parts of the band below 698 MHz. New Zealand championed for this at WRC15, however we were not successful due to the unconventional methodology of getting neighbour approval at WRC15. Nonetheless there are a number of countries in region 3 who supported New Zealand. In the first instance those countries should be lobbied again to start work on a band plan for UHF 600 MHz. This band plan work will already happen in the 3GPP after the conclusion of the reverse band auctions in the United States. New Zealand should take note of the US developments and lead work on this band in the AWG and APG forums.

RSM will monitor the international developments on authorisation models for spectrum sharing. RSM does not consider necessary the implementation of sharing mechanisms in the medium term, taking into account New Zealand's levels of spectrum supply relative to national spectrum demand.

29. Further to our comments above, we note that New Zealand is a small market, and must follow the trends in the major markets, regardless of the domestic spectrum demand and supply. New forms of spectrum sharing are valuable to consider, and cannot be ignored.

RSM will review the feasibility of additional spectrum for IMT carriers subject to international harmonisation outcomes, in the L, S and C bands.

30. We suggest that in seeking comments from the industry on spectrum management that rather than referring solely to L, S and C bands that RSM also specify their upper and lower limits.
    - For the L band if it is in the range 1427 -1518 MHz.
    - For the C band if it is in the range 3.4 to 3.6 or 3.4 to 3.7 GHz
    - For the S band as there are no upper and lower limits specified, we are unable to comment meaningfully.

31. Regardless of these comments on band limits, we note that spectrum from UHF to around 6GHz is now progressively being used for mobile. Therefore we support the Ministry's desire for additional spectrum for IMT carriers.

RSM will participate in the ITU studies (Working Party 5D) related to IMT-2020 (5G) leading to the spectrum allocation decisions expected at WRC-19.

32. We strongly support the participation of the Ministry in the meetings of ITU WP5D. The work plan of WP5D concerning the revision of ITU-R M.1036 is of vital importance to Spark. We note that MBIE presented a paper to the recent WP 5D meeting to have a single band from 3.4-3.7Ghz but missed the recording/pursuing of this in the development of a band plan in October. This is a pity. We believe that by attending meetings we are in a better position to influence the meeting outcome to our advantage. We also believe that the Ministry should continue to attend all APG meetings, as they are the responsible body for formulating the APT views for WRC. Additionally we believe the Ministry should attend the AWG meetings as they could develop studies leading to band plans and these could be liaised with external organisations i.e. 3GPP. We note the Ministry is not attending any AWG meetings.

RSM will monitor the developments on the ongoing international review of the UHF band, especially in relation to emerging proposals for IMT use. Should these proposals materialise, RSM will need to review the impact on the use of wireless microphones sharing the UHF band with DTT

33. As far as the review of the international review of the UHF band is concerned, please see our earlier comments. In relation to sharing with wireless microphones, we note that there should be no wireless microphone usage in parts allocated to mobile including the centre band gap.

RSM will assess, inform and implement the outcomes of the consultation on the future use of the VHF band III (174-230 MHz) in relation to the market demands for digital audio broadcasting.

34. We note that DAB is not allocated in the L Band (1427-1518 MHz).

RSM will implement any Cabinet decisions on a Whole of Government Radio Network for PPDR

35. As noted above, we believe that a separate network for PPDR does not make economic sense. The existing mobile networks in the sub 1GHz bands are well suited to provide the needs for PPDR. Spark New Zealand is willing to engage with the government to extend the coverage of its mobile network in parts where PPDR coverage is deemed required.

RSM will engage in the international studies on narrowband and broadband machine communications for IoT under the agenda issue set for WRC-19. RSM has temporarily reserved the band 5.875 – 5.925 GHz, subject to the international studies and WRC-19 decisions.

36. We note that many use cases of IMT2020, fall under the eMTC and URLLC. Both these categories will also be considered until spectrum for IMT2020 at WRC 19.

RSM will implement modifications to the General User Radio Licences for the satellite, maritime and aeronautical services to accommodate the implementation of ESIM. RSM notes that it will monitor the international studies for the expansion of ESIM to the bands 17.7 – 19.7 GHz and 27.5 – 29.5 GHz.

37. We note that in connection with the implementation of a regulatory framework to support the development of a national space industry RSM is working on implementation of global spectrum allocations for use by space radiocommunications.

38. However we do note that the frequency range 27.5 -29.5 GHz was a candidate for IMT2020. It was not successful in WRC 15 due to political considerations rather than technical reasons.

39. Regardless some countries that have a profound impact on standards and Eco systems are going ahead with IMT 2020 deployment in this range. Therefore we are concerned that if a general user licence modification were to be made in future, the existence of the modified GURL would make the band very difficult to clear at a later time.

RSM will assess and report the outcomes of the industry consultation on future uses for the band 174- 230 MHz (VHF band III) in relation to the potential use of land mobile in this band

40. No comment

RSM will review the outcomes of international decisions in the L band (1427 -1518 MHz) for IMT, with a view to develop options for incumbent fixed links services should this allocation change

41. See previous comments. We support spectrum clearance activities.

RSM will implement modifications to the aeronautical General User Radio Licence to accommodate the WRC-15 outcomes on WAIC systems as well as the GURL for maritime services, to implement the decisions on allocations for AIS in the maritime service bands.

42. No comment

RSM Activities – Policy and Planning – Recent Projects

International Engagement:

43. We support the RSM's plans to attend the following meetings:,
    - All APG meetings
    - Selected AWG meetings
    - ITU-R WP5D meetings
    - Bilateral meetings with other administrations

RSM program of work

44. We generally support the program of work indicated in chapter 8 of the Draft Five Year Spectrum Outlook. We suggest that there should be consideration given to the fuller implementation of WRC15 outcomes. For example we strongly suggest that RSM should take active participation in international forums concerning:
    - the L band (1427-1518 MHz);
    - The various millimetre wave bands identified and not identified at WRC; MBIE should identify key bands that are preferred candidates for IMT 2020 and make efforts for the 28 GHz band to be considered at the WRC.
    - The band 3.6 to 3.7 GHz needs urgent clearance and currently this is not reflected in the work plan shown. Furthermore the upper limit of the C band for IMT should be raised to at least 3.8 GHz
    - The renewal of Rights in 3.5 GHz cannot be deferred until 2022, for the reasons discussed above.
    - The additional spectrum in the UHF band does not appear in the work program.

END
