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Radio Spectrum Management Policy and Planning  
Ministry of Business, Innovation and Employment  
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### 3.3 GHz Regional and Non-national Use - Discussion Document

We would like to thank the Ministry for the opportunity to make a late submission on the 3.3 GHz discussion document.

1. *Do you agree that the 10 MHz between 3.40 – 3.41 GHz should be included with the 3.4 - 3.8 GHz band (the 3.5 GHz band) that will be made available for national use?*

While the inclusion of 10 MHz into the proposed national spectrum provides tidy “round number” spectrum allocations, there is already a large amount of spectrum available for national operators whereas there is unlikely to be sufficient spectrum for Regional and Local use. This 10 MHz should be considered as part of the 3.3 to 3.41 GHz spectrum while plans are being developed.

2. *What is your view on using the 3.3 - 3.4 GHz band for regional broadband and/or private networks? Are there other use cases of this band that should be considered?*

We agree that this is a good use of this band, subject to sufficient spectrum being available for both use cases. Private networks will help realise aspirations for smart cities, smart industry and intelligent working.

3. *Do you agree with our assessment of current spectrum use and potential impacts?*

We agree with the assessment. Our only comment is that co-ordination with adjacent national 5G networks above 3.4 GHz will be difficult. National 5G networks are expected to be widespread and as such is likely to preclude geographic separation as a co-ordination option. Synchronisation may not be feasible given the technology and frame structure likely to be needed, and a guard band will significantly reduce the amount of spectrum available to Regional and Local users.

4. *Do you agree with the assessment that regional and local use will not be able to co-exist in the same geographic area on the same frequency. If not, why?*

We agree that Regional and Local use cannot co-exist in the same geographic area on the same frequency.

5. *Do you agree that both regional and indoor use as well as local and indoor use could be manageable in the same geographic area on the same frequency? If not, why?*

We do not agree with an Indoor use category in this band. While Regional and Local operators will specifically design and plan the installation of professional equipment, the Indoor use category may end up with a WiFi-like approach where equipment may be installed with little planning, and potentially beyond their indoor locations.

Users wanting high-speed connectivity for Indoor use should be implementing Wi-Fi 6. Any large formal deployment of indoor high-speed connectivity should be classed as a private network and implemented under the Local use category.

6. *Do you agree that the most effective way to manage spectrum in this band is to have contiguous services with a common frame structure and timing (synchronisation)? If not, why not?*

While synchronisation of contiguous services is the most efficient way of utilising spectrum, it may not be appropriate if Regional and Local operators are not planning on implementing 5G NR compliant equipment or identical frame structures.

National 5G operators are likely to use a 3:1 downlink:uplink ratio in the TDD frame structure, but this is unlikely to be efficient for private networks since they don't necessarily have download-focused applications. Instead, private networks are often used for more symmetric business applications and for applications that involve sending data from remote sensors / remote users back to an intelligent network (e.g. cameras, port container-handling vehicles, remote users). DL:UL ratios of 1:1 or even 1:2+ are appropriate for such applications. If 3:1 synchronisation was implemented, a proportionally larger amount of spectrum would need to be allocated to Local use to provide the uplink bandwidth required.

7. *What are your preferred options for a band plan for the 3.3 - 3.4 GHz band, are there other options we should consider, if so please explain what these are?*

Given the issues with synchronisation described above (inappropriate frame structure, 5G equipment not likely to be suitable for Regional users), we propose that the entire 3.3 to 3.41 GHz band is allocated to Local use only. There is not currently any spectrum dedicated to private campus-based networks in New Zealand, meaning that industry and organisations have no easy way to implement high performance private wireless connectivity. Regional users, on the other hand, already have spectrum in the 2575 to 2620 MHz band available as a Managed Spectrum Park (MSP). This MSP isn't suitable for private networks since it is based on large geographic Territorial Local Authority areas.

Indoor use, as described in question 5 above, should not be implemented in this band.

8. *How much spectrum is required for regional and uses and how much is needed for local Use?*

As described above, this band should be for Local use only.

Subject to technical confirmation of the suitability of a 40 MHz guard band, we propose that 3.30 to 3.37 GHz is allocated for Local use, with a 40 MHz guard band from 3.37 to 3.41 GHz.

9. *What equipment options and standards should we consider for the 3.3 GHz band?*

It is proposed that LTE and 5G NR radio equipment and standards should be considered for this band. The very localised nature of campus networks suggests that synchronisation and common frame structure may not be necessary, but where two networks are in proximity to each other a 1:1 frame structure compatible with LTE should be mandated. In time, this could



be changed to requiring the use of a 5G NR-only frame structure.

10. *If we adopt multiple standards how should we manage interference issues while minimising inefficient use of spectrum?*

As described above, the localised nature of campus-based private networks should minimise the interference issues but could be managed by mandating that adjacent operators implement synchronisation and a common frame structure.

In urban areas, it may be appropriate to consider limiting a Local operator to only part of the 70 MHz spectrum available.

11. *Do you agree that we should seek to permit all three use cases, indoor, local and regional uses in the 3.3 GHz band? Do you agree with our mix of use? If not which cases should we permit?*

As described in Question 7, only Local use should be permitted in this band.

12. *What authorisation mechanisms should we use for indoor, local and regional use cases non-national access in the 3.3 – 3.4 GHz band? Are there any other mechanisms that should be considered?*

We propose that Local use is licenced by defined areas since private networks will be localised and specific for a campus. This defined area should be typically constrained to a single contiguous block of land ownership / interest (e.g. a dairy factory, a port), perhaps with a buffer zone around it (e.g. 2 km).

Private networks may well cover many campus locations throughout New Zealand (e.g. a dairy company) so licensing rules should not constrain this. Nor should licensing rules constrain an organisation from providing private networks as a managed service to multiple different customers (e.g. a multi-campus dairy factory, a port, an industrial site).

It is possible that private networks in urban areas may neighbour other private networks but they shouldn't be overlapping since private networks are typically deployed on private property. 1 km x 1 km blocks are not recommended for licence allocation since these are unnecessarily arbitrary, as will be the allocation rules for the maximum number of blocks etc.

13. *What rules should be applied to the authorisation mechanisms to ensure compatibility and fair access?*

For Local use, the proposed rules are described in question 12 above and question 14 will ensure fair access to organisations implementing legitimate Local networks.

In addition, operators that have National 3.x GHz spectrum or MSP spectrum shall not be allowed to licence Local spectrum.

14. *How should we prevent spectrum denial / hoarding/ speculating of licenses? Should we adopt one of the existing models that RSM already employs or what new model should we use in the 3.3 GHz band?*

Organisations shall not be able to use Local use spectrum for private wide area networks (e.g. smart meter connectivity, traffic signage) since this would require licensing over many disparate property titles. Organisation shall also not be able to form a contiguous area with multiple individual blocks.

Licensing rules should have a use-or-lose clause to ensure that systems are implemented.

All base stations and CPE must only be located inside the licence boundary, and must connect



to devices inside the licence boundary, to avoid a base station in one licenced block providing service to users over a wide area.

Local use base station sites shall be low sites only rather than high hilltop sites (with an exemption available on request). The intent of Local use licensing is for targeted campuses rather than wide area coverage.

This will ensure that there is no hoarding of spectrum and that spectrum is available in the very specific or local areas that it is required.

Contact details for our submission are below:

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We would be happy to meet with the Ministry to discuss our submission further.

