

15 March 2015

Fixed Service Discussion Document Submission
Radio Spectrum Management: Policy and Planning
Ministry of Business, Innovation and Employment
PO Box 2847
WELLINGTON

Email: radio.spectrum@mbie.govt.nz

Dear RSM,

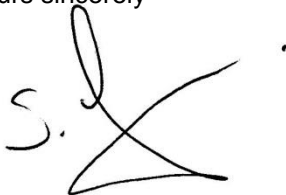
Fixed Service Discussion Document Submission

Thank you for the opportunity to participate in this Fixed Service Discussion consultation process.

4RF Limited has specialized in the design, development, and manufacture of point-to-point and point-to-multipoint digital radio link systems for more than sixteen years. Our systems are designed here in New Zealand and are used in more than 130 countries in bands that extend from VHF to 3 GHz. We not only build equipment but we also engineer, license, and install links for many customers. This activity has given us a broad perspective on the deployment of links and practical regulatory considerations.

As a supplier 4RF has a vested interest in the availability of adequate spectrum for fixed services but we sincerely believe that economic and security benefits will accrue to New Zealand from the efficient utilization of this spectrum.

Yours sincerely

A handwritten signature in black ink, appearing to be "S. J." followed by a stylized flourish.

John Yaldwyn
Chief Technology Officer
Director Regulatory Affairs

- 1. Should all or some sub 1 GHz fixed service bands be digital only? If so, are there particular bands that should be given priority to change to digital only services?**
- 2. Should any requirement for digital services apply to new licences only or should existing analogue services be required to transition to digital? If all licences are required to transition to digital services, over what time period should analogue licences be phased out?**

There is a mixture of analog and digital modulation used in the New Zealand fixed service bands. Inevitably most service will migrate to digital for the inherent benefits such systems. However, it is difficult to support the continued availability of all bands for low efficiency use given demand. At L band it is hard to justify the continued use of inefficient modulation for Customer Multi-Access Radio (CMAR) systems simply because it is traditional. CMAR customers would benefit greatly from the use of 21st century radios systems.

- 3. Should the Ministry increase the minimum spectral efficiency of digital services from one bit to four bits per second per Hertz? If so, should this apply to some (please identify which ones) or all bands?**
- 4. Should any requirement for increased spectral efficiency apply to new licences only or should existing licences be required to transition to this standard? If so, over what time period should the lower standard be phased out?**

A standard of four bits per second per Hertz in L band and perhaps KK band would encourage better use of these bands. A requirement for increased spectral efficiency applying only to new licences risks perverse outcomes such as long term retention of obsolete equipment.

A better model would be a financial incentive to migrate to more efficient modulation. For example a user investing in new equipment with 4bps/Hz efficiency might with reduced licences fees recoup the additional investment over a five to ten year period compared to a user retaining (or deploying) equipment with a 1bps/Hz efficiency (assuming the same gross data rate).

- 5. Should further areas be added to the designated DMAs and if so which areas?**
- 6. Should further DMA rules be introduced? If so, what should the rules specify? Should these be tailored to each particular DMA?**
- 7. Should any DMA specific rules be applied to new licences only or also apply to existing licences? If existing licences become subject to the new rules, how should the transition be managed?**

The DMA mechanism is certainly preferable as a technical solution to a market forces approach (simply increasing fees at congested sites). The Ministry should retain for itself the DMA mechanism to be used judiciously on an as required basis.

The Ministry may wish to consider differential minimum spectral efficiency as an additional DMA tool but it would be unfair to limit such a mechanism to only new licences.

- 8. Should the current '1 dB interference threshold degradation' method prescribed in Section 4.3 'Co-channel interference threshold' of PIB 38 be retained or replaced with a carrier to interference method? Please provide information on why the method should be changed and the increased spectral efficiency over the current 1 dB threshold degradation method expected to result from the change.**
- 9. If the method is changed to a carrier to interference method, how should this be implemented?**

As noted in the discussion document the 1 dB interference threshold degradation approach is simple, proven, and fits within the limitations of the present licence engineering system. However, there is no doubt that the C/I method is a more sophisticated approach and would probably improve frequency re-use. 4RF suggests that the C/I method should be available where spectrum availability is an issue, such as in DMAs, and where licenses are prepared (or can be encouraged) to work together to alleviate channel shortages. Because carrier to interference work requires a careful appreciation of receiver characteristics it is recommended that C/I work should be restricted to AREs.

10. Are the Frequency Dependent Rejection values in PIB 38 appropriate? If not, what should these values be? Should there be different values for different bands?

We believe the values have broad acceptance (in the absence of more specific information) and that the alternative should be a formalized carrier to interference method invoked under congestion conditions.

11. Should the Ministry implement equipment standards for fixed services above 1 GHz? If so, what standard should be specified?

The advantages of equipment standards include:

- Simplified planning with defined worst case boundaries
- Providing targets and definitions for product designers
- User confidence by outlawing of poor equipment

The disadvantages include:

- The restriction of truly innovative solutions that were not envisioned at the time of the standard's implementation
- The expense of their development and revision to keep pace with evolving technologies

AS/NZS 4768.1 is identified within the discussion document as an example of standards based approach in the sub 1 GHz band, yet this standard is now inappropriately restrictive for modern QAM based technologies that have become available over the last two years. It has simply not kept up with technology in the way that say EN300 113-1 V1.6.2 has been updated to V1.7.1.

A suggested approach is to provide a set of minimum transmitter requirements to ensure efficient spectrum utilization through suppression of unintended emissions. Transmitter requirements utilizing the available standards such as EN 302 217 2 and EN 302 561 would remove the requirement to develop and maintain a unique set of standards for New Zealand. From a design and manufacturing standpoint consolidation of the number of standards to be considered and evaluated considerably reduces time to market and associated costs.

An ongoing input to Standards development may be achieved through associate membership of ETSI allowing representation on the technical committees but excluding final voting and approval rights on European Standards (ENs).

Transmitter requirements could be expected to include:

- Suppression of unwanted emissions (spurious and out-of-band)
- Frequency stability
- Transmitter PEP power accuracy
- Transient emissions (where applicable)
- Intermodulation attenuation (where applicable)

While receiver performance has a direct impact on spectrum efficiency, market forces will naturally remove the lowest performers, although it is acknowledged that this is a slow process.

The method of authorization is also linked to this discussion. In the USA, point-to-point suppliers have demonstrated an excellent record of compliance with the rules, consequently verification (practically equivalent to Level-of-conformity-A2) is used to grant authorization.

Reference: ET Docket No. 97–94; FCC 98–58 clause 16

12. Should the Ministry adjust the general licencing conditions for digital services to ensure licences better reflect occupied bandwidth in the microwave bands?

4RF believe this is an issue only above 2 GHz. In the bands below 2 GHz tight adjacent channel requirements are set out in the relevant ETSI standards.

13. Is inaccurate information on licences a significant issue for AREs and ARCs and licensees? If so, how should the Ministry respond to the issue?

Not generally. A mechanism to allow formal discovery of installed equipment where invoked under congestion conditions by an ARE might be a use policy initiative.

14. Should the Crown consider creating management rights for bands where there is predominantly a single licensee? If so, are there other criteria that should be met before a management right is created for fixed service bands?

15. If spectrum is transferred into the management rights regime, should it be managed by the Crown or allocated to a private manager? If allocated to a private manager, should the allocation be by contestable means or to the predominant user?

The radio licencing regime is appropriate for the fixed service. Severe economic distortions would result from oligopoly control and the Ministry (or Treasury) would then need to deal with disadvantaged agencies of the Crown. 4RF supports the position of RFUANZ in their response to questions 14 and 15.

16. Should the Ministry apply consistent channel sizes across specified frequency ranges in fixed service bands? If so, what should be the basis for these channel sizes? Should channel sizes be based on the preferred channel width shown in Table 3 [of the consultation document]?

4RF believes the present arrangements are generally appropriate.

17. Should the Ministry rename bands that are currently prefixed with letters, by numbers representing their approximate frequency of operation?

4RF believes the customary naming arrangements are appropriate.

18. Should digital services be permitted in STL bands? If so, should digital and analogue services be permitted or should all existing analogue services be required to transition to digital?

4RF believes that digital service should be permitted.

19. Should a minimum link distance be specified for STLs in some bands for current and / or future links? If so, which bands should have the minimum link distance specified?

20. Should no new dual mono STL services be allowed? If not, should the Ministry transition users from dual mono services to digital links?

21. If the Ministry allows digital licences in the STL bands, should any broadcaster that transmits more than 3 programmes between a studio and broadcasting site be required to use a 500 kHz channel digital STL and those broadcasting a single programme be required to use a 250 kHz channel digital STL?

22. Should a limit of three STL licences (via a combination of analogue and digital transmissions) at any single location be introduced for any single licensee? If so, should this be limited to congested sites only? If so, which ones? Should these limits apply retrospectively to current licences or should they only apply for new licences. Should the limits apply once any licence holder applies to make a change to any one licence at a site?

23. How should the Ministry manage the timing and introduction of any changes to STL services? How should each of the five proposals above be managed?

4RF has no specific position on the above questions. In general we are not in favour of fixed service spectrum being reserved for a specific class of industry nor do we believe efficiency rules should be relaxed for a specific class of fixed service users.

24. Are there any issues with the current band plan, use of, or future demands for the EE band?

4RF believes that this band will be useful for telemetry and SCADA services.

25. Should the Ministry offer 100 kHz channels in the I band (Group G) which interleave with the current 50 kHz channel plan? If not, how should the channel plan be amended, if at all?

4RF believes that increased data throughput is best achieved with appropriate choice of equipment and that given the congestion in this band 100 kHz channels seem unworkable. Data rates of up to 216 kbit/s are available from our equipment in 50 kHz channels using 64 QAM modulation.

26. Should the Ministry offer 100 kHz channels in the J band (Group D) which interleave with the current 50 kHz channel plan? If not, how should the channel plan be amended, if at all?

Again 4RF believes that increased data throughput is possible by the correct choice of equipment and that given the congestion in this band 100 kHz channels seems unworkable.

27. Are there any issues with the current band plan, use of, or future demands for the JL band?

4RF would like to see the 75, 150, and 300 kHz channels be generally available with the present reservation for STL use removed.

28. Are there any issues with the current band plan, use of, or future demands for the KK band?

4RF believes the present arrangements are appropriate.

29. What services should L band be used for in the future? Why?

The unused DAB spectrum has been wasted for more than a decade and a half since ill-conceived Maastricht 2002 Special Arrangement. 4RF believes that the most likely future use of this spectrum will now be as unpaired spectrum for supplemental downlink (SDL) by cellular interests in delivering more download services for consumers. A major issue with the deployment of these SDL services will be the out-of-band emissions typical of HSPA+ and LTE transmitters and the impact on fixed link users. There seems little point in allocating temporary fixed services in this spectrum now.

30. Are there any issues with the current band plan, use of, or future demands for the 5 GHz band?

We note the unfortunate overlap between channel 5G7# at 4950 - 4990 MHz with the 4940 - 4990 MHz band widely used for public safety services in other parts of the world.

- In the USA 2002, the FCC allocated 4940 - 4990 MHz band for fixed and mobile services (except aeronautical mobile service) and designated this band for use in support of public safety.
- ITU WRC 2003 identified the 4940 - 4990 MHz band to support public safety services in Regions 2 and 3 for use by government agencies responsible for the provision of defence, national security, law enforcement, and emergency services.
- In European work on Broadband Disaster Relief (BBDR) systems, CEPT considered frequency ranges including 4940 – 4990 MHz (ECC Report 110, Budapest, September 2007).
- The ACMA Radiocommunications (Public Safety and Emergency Response) Class Licence 2013 provides 4940 - 4990 MHz for public safety agencies.

A management rights regime that extended to 4990 MHz would be incompatible with the preservation of the spectrum for the eventual introduction of a public safety broadband service in this widely used spectrum.

Question 31 to 54

4RF has no particular view on these questions with respect to the higher bands.

END