Radio Spectrum Management

Policy and Planning Group,

Ministry of Business, Innovation & Employment

Wellington

27 March 2015

RE: Fixed Services in New Zealand Discussion Document- January 2015

Thank you for the opportunity to comment on the Fixed Services Policy Discussion Document.

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?***

Response:

No, already bands such as EE, JL, KK, and LL provide digital services while the older I and J bands should be allowed to continue to provide analogue channels. However consideration should be given to the introduction of 12.5kHz channelling into at least 50% of the 25kHz channelling plan in I band.

The Fixed bands such as I and J band in channel widths 50kHz and less, were used historically for a number of purposes including analogue voice services to rural homes (PSTN extension called “country sets”), landmobile services and low speed analogue point to point and point to multi-point telemetry services.

In more recent times, many telemetry/control systems have migrated to digital modulation but many analogue landmobile services are still carried by low latency FM analogue links. In analogue landmobile voting systems, equal latency paths is vital to their operation and mixing digital and analogue fixed links in the backhaul paths will create unequal latency path and is to be avoided. In addition low latency requirements for E @ M signalling on analogue links can create issues for some applications when transitioned to digital links.

Solar power remote sites offer unique DC current draw challenges which analogue fixed link equipment meets through its use of low current standby “receive only” mode, which the majority of digital linking equipment currently available, would I believe struggle to match. Low current draw is vital to the operational requirements of these often remote solar sites many of which support important public service organisations in their roles in these less densely populated areas of New Zealand where cellular radio services have yet to venture.

However inevitably with “end of equipment lifecycle”, analogue links will continue to be replaced with digital links, driven also in many cases by the need for additional service requirements beyond just voice. That transition should be allowed to progress naturally as now, rather than be a forced intervention.

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?***

Response:

Digital services are already allowed in the existing channelling and I would not advocate any phasing out of all analogue modulation for existing or new licence applications for the reasons outlined in my answer to Question 1.

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?***

Response:

No, instead increase to "two bits per second per hertz", as a suitable minimum digital special efficiency**,** which is delivered by 4 state modulation types such as QPSK and 4QAM. I note that ACMA in their document “Proposed Amendments to RALI FX3 Protection Ratio Assumptions and Methodology” dated July 2014, state in table 2 that modulations such as 2PSK/2FSK is their minimum spectral class. So the Ministry moving to 4 state modulation minimum in New Zealand, would seen a reasonable step forward in comparison with their Transtasman neighbour spectrum agency.

When designing microwave fixed links to meet the target performance objectives of ITU-R performance specification F1668, on the longer or more difficult paths (or rain limited radio bands), the lower 4 state modulation is more likely to meet target objectives while the higher modulation will often struggle or be unable to meet the requirement. The 4 state modulation equipment from manufacturers will provide higher maximum RF powers and better receiver sensitivity than the higher modulation. My discussion here is specific to the use of " **fixed modulation links"** where the modulation is manually set to a specific modulation type, and this is currently I would suspect is the most common configuration in microwave fixed services bands.

However in fixed services bands particularly above 1 GHz, there is an increasing feature from manufacturers, to offer adaptive modulation (dynamic low to high modulation change) which provides the ability for more data throughput by dynamically changing modulation in response to dynamic link performance monitoring. In order to meet the performance objectives of critical services such as voice and real time video, these fixed links need to be able to dynamically operate at the lower 4QAM modulation for short periods of time, before returning to the higher modulation such as 512QAM, to achieve higher data throughput and spectrum efficiency.

Inevitably with “end of equipment lifecycle”, the older fixed modulation digital links will over time, be replaced with digital links with adaptive modulation. That transition I believe should be allowed to progress naturally, as currently is the case based on market requirements, rather than be through Ministry intervention.

The cellular radio industry microwave backhaul, is already having to progress to the use of adaptive modulation, in order to backhaul large amounts of increasing customer data as a part of 3G/4G cellular radio base stations services. The 56MHz channelling plan in various bands introduced recently by the Ministry, is an example of facilitating their increasing backhaul requirements for 3G/4G systems and for fixed broadband services backhaul.

That 56 MHz policy had a specific target market of newer microwave equipment targeting broadband backhaul and in that case quite correctly mandated a minimum **"**four bits per second per hertz ". However I would highlight the practical reality is that the use of adaptive modulation at much higher modulation for large percentages of time, is likely to be used in these channels and provide much higher spectral efficiency.

2.2. Spectral efficiency

The increase of data consumption in both private and public networks is creating demand for increased connectivity using fixed radio links. Digital services provide for greater spectral efficiency over analogue services. Current licencing rules require digital links to have a minimum spectral efficiency of one bit per second per Hertz. All 56 MHz channels across all bands are required to meet a minimum spectral efficiency of four bits per second per Hertz.

- **Error in Fixed Services Discussion document:**

Section 2.2 in the Fixed Services discussion document, states that all 56MHz channels across all bands, are required to adhere to the minimum spectral efficiency "4 bits per second per hertz "rule. However that is not currently the case, as the 23GHz channelling plan predates by many years the recent 56MHz policy and that band has not been referenced by the 56MHz policy stated in PIB38 in table 9 footnote 8:

(8) The use of 56 MHz channels in these bands is restricted to digital microwave radio designed in accordance with section 4.10 Performance standards and power, to achieve a minimum spectral efficiency of 4 bits per second per hertz over a 56 MHz channel (224 Mbps).

In fact the 23GHz band also has 112 MHz channelling and the 18GHz band has 55MHz and 110 MHz not covered by the "4 bits per second per hertz rule", as this 18GHz/23GHz channelling dates back many years, no doubt to when NZ Post Office Regulatory Section managed the Radio spectrum for the Crown. I suggest it is time these channels were reviewed for consistency of spectral efficiency rules for wider channel allocations.

- **PIB38 contradicts PIB58 for EE (25kHz) and LL bands :**

PIB58 states that JL and EE band (25kHz), under section 4.4 and 4.5 are required to be "restricted to high efficiency digital links using at least 16-state modulation methods such as 16-QAM". (4 bits per second per hertz)

PIB38 however contradicts this in Table 9 note 1: *(1)* JL Band and 25 kHz channels in EE band are restricted for digital services with a minimum spectral efficiency of 2 bits per second per Hertz only. PIB38 note 1 requires correction to reflect PIB58 JL and EE (25kHz rules)

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?***

Response:

New licences above the 1 GHz frequency band not already covered by PIB38/PIB58 minimum 4 bits per second per hertz rules, should have a minimum 2 bits per second per hertz spectral efficiency rule. Timeframe transition of no less than 5 years in accordance with regulation 15D for existing licences. The marketplace over time will no doubt provide higher spectral efficiency equipment to meet service requirements as I have outlined in answer to question 3.

I would however highlight that Fixed Service point to point spectrum licences in Private Management Rights have no requirement to meet any such Ministry rules as detailed in documents PIB38/PIB58.

In effect this creates the potential for inefficient use of that Private Management Rights radio spectrum resource, by setting no expectation of spectral efficiency. This means in the future that radio licences managed by the Crown with spectral efficiency rules, can be transitioned into spectrum licences in Private Management rights where these rules can be ignored. This raises the obvious question, why the inconsistency in expectation of the management of a valuable resource once it passes into Private Management Right.

It does tend to send mixed signals about the principles of best practice spectrum management of what still remains a Crown owned resource. This is not a criticism levelled at the Ministry and its principles of operation but rather an observation of NZ Spectrum Management evolution since 1989, where perhaps some efficient use "expectations" or high level guidelines could be created for Private Management rights licensing practice, equivalent to PIB39 for Crown management rights licensing practice.

5. ***Should further areas be added to the designated DMAs and if so which areas?***

Response:

No, I am not aware of any further “Defined Metropolitan Areas” (DMAs) that are required to be added. With respect to “DMAs”, and fixed bands above 1 GHz, PIB38 stated rules appear to indicate that high density metropolitan areas are the areas suffering issues with channel availability, rather than it being potentially wider New Zealand issue. If indeed it is only a metropolitan area issue, then why didn’t Q3 &Q4 address spectral efficiency as a “defined Metropolitan area” issue? Spectral efficiency and spectral re-use are interlinked.

In my view there needs to be a consistent approach here, as spectral re-use is achieved by a combination of factors including both antenna performance, and spectral efficiency among them.

Spectral congestion for these reasons, could equally apply on longer haul links, as much as it could in high density urban areas. The discussion document mentions Skytower and

Kordia high sites in Waikato, Christchurch, Wellington and Dunedin. These are all very popular sites in these locations and little surprise that congestion in some of the Fixed Service bands has arisen due to their strategic location for customers.

The sites have a mixture of issues but not all in the same frequency bands, noting some are using lower microwave frequency bands and in those cases antenna discrimination is more difficult to achieve without very large and expensive antennas and associated large structural infrastructure. In the higher microwave frequency bands smaller high electrical performance antennas can more easily provide directivity and good sidelobe performance.

For some of these sites, there is no doubt a limited azimuth spread for existing licences versus proposed licences, from a central city area to the high site, and that will also limit receive antenna azimuth discrimination. It is much easier to engineer a new licence where neither end terminates at an existing higher density user site, where in effect you are pointing your proposed new antenna at the interfering site.

In the case of Skytower, in a higher density population area and in bands such as 23GHz, it is no surprise that it is tough to find a free channel. However despite the PIB58 limitations in the 18GHz band, it appears having had a brief check in that 18GHz band, that there may be further assignable channels in the Skytower area. **The Ministry should remove the 2km path minimium from the 18GHz band in PIB38, as there would seem no longer any reason for this limit, and particularly if it helps alleviate problems for those suffering from 23GHz congestion in central Auckland.**

I would highlight that the 24GHz - 28GHz microwave band has a large portion in Private Management Rights, which has meant this potential Fixed Services point to point band, is not available as a possible PIB22 Fixed Services band based on ITU-R F748-4 option.

ACMA have a channel plan for the 28GHz band based on this ITU-R recommendation in RALI FX3 document, and are proposing to offer wider channels of 28 MHz/56 MHz/112 MHz. (July 2014 ACMA Fixed Services channel plan discussion document)

Noting the low number of licences in this 24 -28 GHz Private Management Rights, it would appear that the previous decisions to place this spectrum in Private Management Rights are questionable, given the loss of opportunity to other users seeking point to point short haul radio licences in areas like Auckland city.

6. *Should further DMA rules be introduced? If so, what should the rules specify? Should these be tailored to each particular DMA?*

Response:

Yes, it is time to revise them in PIB38. The Ministry's approach to spectral efficiency in Questions 3 and 4 does not have a DMA focus, but I suggest it should, as I have outlined in my Question 5 reply. DMA rules for antennas needs to be accompanied by spectral efficiency requirements in those areas and funnily enough PIB39 Table 9 is attempting to deal with both antenna and spectral efficiency aspect required for DMA's while Appendix B Table 20 is only dealing with antennas and therefore not dealing with the dual aspects.

(There is a need perhaps to consider consolidating these two tables into one, in a future release of PIB38 to reduce duplication of information.)

Antenna side lobe performance for modern antennas has been improving over the last 10 years driven largely by the need to have improved sidelobe performance in dense spectrum environments such as European cities. In addition, small diameter low profile shrouds high electrical performance antennas, are now achieving similar side lobe performance to older high performance antennas with deeper shrouds.

With respect to antenna electrical performance “front to back ratios” as per current PIB38 Table 20, the ACMA RALI FX3 Appendix 11 approach is similar to New Zealand. Antenna diameter alone is not a suitable technical parameter of comparison for antenna, as for instance a 600mm HP antenna can match the sidelobe performance of a 1.2m SP antenna. Originally the Ministry used to define antenna size for radio bands in PIB38 issue1, as the guiding principle following the lead of ACMA’s at that time, but both have moved away from that criteria for the reason outlined.

If the Ministry is looking for a better method of practical antenna definitions for PIB38, I would suggest ETSI rather than the ITU-R, as the source of that information. This is consistent with the Fixed Services discussion document approach in Question 10 where the ETSI specification is suggested for equipment.

Microwave Antenna characteristics in practical terms are defined well for the antenna manufacturers by ETSI, with practical RPE documents such as **ETSI EN 302-217** and specifically **ETSI EN 302-217-4-1, EN 302-217-4-2,** suitable for Radio Engineers to use. The microwave antennas have classes/subclasses for electrical performance, and these ETSI specifications are a well defined international benchmark, The ETSI specifications can be applied to Table 9 and Table 20 for antennas in frequency bands 1 GHz and above

In essence the simple back/front ratio approach currently in Table 9 and Appendix B Table 20 could be replaced by the appropriate ETSI class of compliance approach for frequency bands 1 GHz and above, while for crosspol discrimination figures, the ETSI category 3 would suffice for the majority.

Major antenna manufacturers such as Commscope (ex Andrews & Precision), Faini (ex Comelit), RFS, Radiowaves, and Tongyu all design to these ETSI specifications as no doubt do others. These antenna manufacturers supply a large number of the microwave equipment manufacturers who will often rebrand the integrated antennas versions with their own brand name, but all reference the ETSI specifications.

Super high performance antennas (SHP) are now evolving, as outlined in the ETSI specifications higher classes **(ETSI EN 302-217-4 class 4)** and from antenna manufacturers, for the likes of the short haul link bands 13GHz and higher. Type 2 PIB38 antennas I suspect would probably largely align with **ETSI EN 302-217-4 class 3** though that requires validation.

The Ministry could undertake a engineering exercise to determine whether the Super Highr Performance antenna (SHP), would allow additional licences to be engineered in the 18GHz and 23GHz bands in Auckland city in particular . That study could then form the basis of validating any antenna revised requirements in the DMA area covering Skytower and further

exercises could be undertaken for the other DMA areas in identified congested bands elsewhere.

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?***

Response:

PIB38 revised rules once consolidated, should be applied to new licences from an agreed date, with 12 months from issue date as a suggestion. This could apply to Super High Performance antennas in specified high demand areas, if they were determined to be required. However, first a technical evaluation exercise should be undertaken as per my Question 6 last paragraph reply. Spectral efficiency rules in the DMA areas can be applied to new licences in a consistent manner to the antenna rules approach

I would also suggest PIB38 current type 2 antenna standards (referenced to the correct ETSI equivalent standard) are adopted as a minimum antenna national standard for bands above 3 GHz and type 1 are removed from PIB38 Tables 9 and 20**.** Timeframe transition of no less than 5 years, in accordance with regulation 15D for existing licences should apply. Spectral efficiency rules for equipment were revised to tighter standards in DMA areas, should be applied in the same timeframe for consistency.

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.***

Response:

The current Interference evaluation method outlined in PIB38 section 4.3.2 for bands above the KK band, is well understood and allows a margin suitable to take into account future cumulative interferers both co-channel and adjacent channel. This 1dB degradation of the receiver noise methodology is consistent with the important reference ITU-R recommendation F758, for the Fixed Services sharing with other services.

This F758 recommendation in addition to F1094, has been used in the past by the RSM engineering team when the incumbent M and N band (1.7 GHz -2.3GHz) Fixed Services licences were technically defined for the 2GHz (3G) spectrum auction into "maximum permitted interference signals" (MPIS) values, for creation of spectrum licences back in 1999. (2GHz Spectrum Conversion Report - Engineering Criteria, April 1999).

So the current PIB38 section 4.3.2 methodology has a sound background relevant to both Fixed Radio licences and Fixed Spectrum licences and I would recommend against following the ACMA C/I methodology for these reasons alone, quite apart from the lack of relevant data in SMART to actually apply the ACMA C/I methodology.

9. *If the method is changed to a carrier to interference method, how should this be implemented?*

Response:

I do not support a change from the current method

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?*

Response:

The values appear to be compromise values “one size fits all” and is incorrect for some modulations. Certainly the 30dB FDR value is not conservative enough for the Ist adjacent channel value for QPSK/4QAM modulation. I note of course this table has been in PIB38 for some time and this aspect should really have been raised by ARC’s in previous PIB38 revision discussions.

I would support the Ministry's adoption of the ETSI specification EN 302 217-2-2 (specific reference to pages 48 - 98), which is a specification used worldwide by microwave equipment manufacturers.

This provides an International specification covering 1.4GHz to 86GHz providing for multiple modulation types and appropriate co-channel and adjacent channel benchmarks which are a practical engineering specification, as it relates to manufacturers equipment.

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

Response:

I would support the Ministry's adoption of the ETSI specification EN 302 217-2-2 which is a specification used worldwide by Fixed Services equipment manufacturers for 1.4GHz - 86GHz and is a practical specification, as it relates to manufacturers equipment.

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

Response:

ITU-R recommendation F1191 is a useful recommendation and adding it to a list of relevant recommendations in PIB38 is worthwhile.

Licences have by convention nominally had the necessary bandwidth as the emission designator, and the bandwidth stated on the licences has been normally less than or equal to the channel bandwidth but in reality this has never captured the occupied bandwidth of the emission.

The Ministry's old analogue landmobile specifications RFS26, specified that the transmitter emission will rolloff into the centre of the adjacent channel at better than 60dB below the carrier relative to the main channel carrier. The licence emission however will certainly not state a bandwidth wider than 12.5kHz, so the licence does not reflected the occupied bandwidth for this analogue services. So this is not just a digital emission issue, it is the nature of the modulation process whether it is digital or analogue modulation, there are always "out of band emissions" (as opposed to spurious emissions) that are wider than the channel width.

RSM RFS26 extract:

5.4 Unwanted Power in Adjacent Channels

5.4.1 Definition

The unwanted power in adjacent channels shall be that part of the total power output of a transmitter, under defined conditions of modulation, which falls within a specified passband centred on the nominal frequency of either of the adjacent channels.

5.4.3 Limit

The unwanted power in adjacent channels shall not exceed a value of 60 dB below the transmitter carrier power, but need not be lower than 0.2 microwatts.

Page 2 of ITU-R SM328 has these extracts from the International Radio Regulations which explain the concept of out of band emissions and they will fall of course into the adjacent channel

that the Radio Regulations (Article 1, Section VI) contain the following definitions of terms related to characteristics of emissions:

"**1.144** *out-of-band emission*: Emission* on a frequency or frequencies immediately outside the *necessary bandwidth* which results from the modulation process, but excluding *spurious emissions*.

1.145 *spurious emission*: Emission* on a frequency or frequencies which are outside the *necessary bandwidth* and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic *emissions*, parasitic *emissions*, intermodulation products and frequency conversion products, but exclude *out-of-band emissions*.

1.146 *unwanted emissions*:* Consist of *spurious emissions* and *out-of-band emissions*.

1.146A *out-of-band domain* (of an emission)*:* The frequency range, immediately outside the necessary bandwidth but excluding the *spurious domain*, in which *out-of-band emissions* generally predominate. *Out-of-band emissions*, defined based on their source, occur in the out-of-band domain and, to a lesser extent, in the *spurious domain*. *Spurious emissions* likewise may occur in the out-of-band domain as well as in the *spurious domain*. (WRC-03).

1.152 *necessary bandwidth:* For a given *class of emission*, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

1.153 *occupied bandwidth:* The width of a frequency band such that, below the lower and above the upper frequency limits, the *mean powers* emitted are each equal to a specified percentage $\beta/2$ of the total *mean power* of a given *emission*.

Unless otherwise specified in an ITU-R Recommendation for the appropriate *class of emission*, the value of $\beta/2$ should be taken as 0.5%",

Digital fixed services have been licenced for many years, so ARC's should be aware from reading equipment specifications, that transmitters' occupied emissions are not all contained within the channel width.

I would support the Ministry's adoption of the ETSI specification EN 302 217-2-2 for 1.4GHz - 86GHz and is a practical specification. Radio Engineers would become familiar with this ETSI specification (particularly if referenced in PIB38) and its reference to ITU-R channel bandplans (which NZ adopts via PIB22). They would become aware that the microwave equipment manufacturers conform to this specification which includes emission masks

In reality the licence emission designator is a nominal piece of information and engineers should be relying on equipment specifications and references to the likes of ETSI specification EN 302 217-2-2 to make compatibility calls which is where PIB38 has always attempted to provide guidance .

So in summary I see no need for any changes to general licence conditions but rather the use in PIB38 of reference to ETSI EN 302 217-2-2 specification. PIB38 Appendix C should also reference ITU-R specifications such as F758, F1191, SM329, SM328 and any other relevant ITU-R recommendations and ETS1 specifications, which underpin engineering concepts outlined in PIB38.

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?

Response:

With respect to the Fixed Service licences or more specifically SMART information, I'm sure there are inaccuracies for a variety of reasons, many simply due to the licences being created by RSM engineers in-house in the old "National Frequency Register" (NFR) database with its limitations prior to SMART and prior to external ARC -ARE regime. If PIB38 was to reference ETSI specifications, then ARC's could be asked to provide in SMART the additional information for antennas and relevant equipment in terms of ETSI reference standard /class. ARC's should be aware of what their client is proposing to use, both in equipment and antenna type otherwise how can they accurately certify a licence.

I'm also aware that a certain amount of historical equipment and antenna detail may be unavailable to ARC's, as it's not in SMART and may be difficult to obtain. Antenna polarisations such as "other"" which has been in the licence database well before SMART, should be discouraged. In Fixed Services, if both polarisations are being used over one radio path by a licensee on one channel, it should in fact be two radio licences not one.

It is normally two transmitters using that radio channel spectrum in horizontal and vertical polarisation simultaneously, relying on XPIC interference cancellers to assist with the XPOL operation. PIB58 section 4.1 highlights the situation where it states each transmitter requires a licence, yet it contradicts that statement by allowing two transmitters, one on each polarisation, to have one licence.

> One licence is required for each transmitter. For example, a bi-directional link requires two licences, one for each transmit end. Similarly, each frequency requires a separate licence. The use of both polarisations on a channel is covered by a single licence.

The polarisation recorded as the word "other" in Fixed Services point to point licences, should state " H and V " as that indicates two polarisations are being used (and two

transmitters & receivers) . Prior to SMART, the limited polarisation options were hard coded into the NFR and “other” came from that era. With the introduction of SMART the chance was there to correct this type of historical situation but that was missed. It is time this was addressed, as engineering a licence with a polarisation called “other” must be frustrating for a number of ARC's and is not “best” Spectrum Management practice internationally.

However the emergence of multi-core technology in microwave transceivers, now means one physical microwave radio transmitter can transmit simultaneously with different modulated carriers into for instance 28MHz channels on vertical and on horizontal into a dual polarised antenna. Alternately they can transmit two independent modulated carriers into a 56MHz channel and this technology is emerging for providing dual carriers for XPIC, wideband channels (dual carriers) and for 4 x 4 MIMO technology for higher data backhaul.

So it does make definition of a ”transmitter” very interesting, as it can be argued these multicore microwave radios are just one transmitter physically noting they are in one physical “outdoor unit”.

Radio transmitter definition from the Radiocommuncations Act:

radio transmitter means apparatus designed to produce radio waves for the purpose of radiocommunications

radio apparatus means any apparatus intended for the purpose of radiocommunications, being a radio transmitter or a radio receiver, or any combination of them

There are other areas no doubt that could be improved on in terms of data recorded in SMART, but I have targeted a few here that I feel are achievable and necessary. Of course ARC's and ARE's have no control of changes made at radio sites after the licence is granted to the licensee, and if they do not work for the licensee’s company they have no visible of changes.

The pragmatic view is for the Ministry to ask annually as part of licence renewal, for the licensee to have any licence updated where parameters may have changed, such as for instance antennas, noting in many cases they may have no impact on the licence validity, if they are a direct technical replacement.

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?

Response:

No, I do not agree that because a single licensee is using a particular piece of radio spectrum that this should determine it is suitable for transition to Management Rights.

In the 5GHz band case, it was created when BCL (now Kordia) were forced by the Crown out of N band (1.9GHz - 2.3GHz) because of the 2GHz (3G auction). The 5GHz band was

allocated and used for longhaul high capacity microwave (indoor radio transceiver equipment). The RSM POLDOC rules around the use of this band created at the time, restricted its use to N + 1 uses which is still how it is specified in PIB38 Table 9.

I note that PIB58 states that this band is available for N+1 frequency diversity and STM-1 rates per bearer (155Mbits).

4.6 5 GHz Band

The 5 GHz Band (4.4 - 5.0 GHz) is designed to be used for high capacity medium to long haul radio relay systems.

This band is only available for *n+1* frequency diversity protected systems carrying high capacity data at, or equivalent to, Synchronous Transport Module Level 1 (STM1) rates per bearer.

Since this band was created, the all indoor radio transceiver microwave equipment, has been largely supplanted in the Industry by “poletop microwave”, however poletop equipment was not manufactured for the 5GHz band until recent times.

In addition, the N + 1 rules in PIB58 Table 9 may be reducing entry for potential licensees who wish to establish 1 + 0 single channel links of poletop microwave as they would in bands like R and W band, rather than N + 1 frequency diverse configurations. **I would support the removal of the N + 1 from the 5GHz band as I would for T band.**

Another very important point to consider is 5G (and beyond) international spectrum discussions at WARC 2015/2019 conferences, where high bandwidth mobile spectrum is of interest.

The 3.4 - 3.6GHz area (currently in management rights) I understand may be of interest, and perhaps the 5GHz Fixed band may fall into a “prime candidate” 5G cellular option and/or wideband backhaul band. At that point a market based auction would be considered no doubt if the cellular option was confirmed by WARC, so decisions made now for the 5G band could negate those future options.

I would offer by example, decisions made around the 24GHz -28GHz band offered as Private Management Rights in the past. Did this lead to a good outcome, noting the prices paid for lots and the relatively low number of spectrum licences in that spectrum?

Would some of this spectrum if available now as a 28GHz fixed band (as in Australia) not assist with providing further fixed band spectrum in Auckland around Skytower for example?

I would highlight that the 25GHz, 26GHz and 28GHz bands are all covered by ITU-R recommendation F 748 which offers channel sizes consistent with Question 16 approach. Microwave Equipment manufacturers I understand are able to supply equipment in these channel plans, so it is a pity this spectrum was placed into a Private Management Right ahead of the market requirement having fully developed.

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?

Response:

This spectrum should not be transferred to Crown Management Rights as outlined in my reply to question 15. If a future decision was made to offer this spectrum as Private Management Rights, it should be by market based auction. However first the Ministry needs to undertake research of International uses for this spectrum via forums including WARC2015 /2019 and then publish a discussion paper as always.

Once in Private Management Rights, the 5GHz band for instance, is no longer restricted to only the current Fixed Service point to point use, which obviously raises its market value, especially in a 10 year or longer tenure Management Right.

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?***

Response:

Yes, but only to new spectrum areas, not to existing heavily used channel plans unless consistent with existing channelling steps for that band. All but one of the current NZ bandplans from 3GHz to 38GHz conform to existing ITU-R plans and I note ACMA have no plans to take this "one size fits all" approach to existing channel plans, in their document " ACMA RALI FX3 July 2014 Fixed band discussion document".

With respect to comments about the W band (29.65MHz channels) and being based on a United States plan, while that is correct, that channel plan is of course now embedded in the ITU-R recommendation F386 and covered in ETSI EN 302 217-2-2. The same applies to the R band (29.65MHz channels) where F383 applies, then we have P band (F635), 5GHz (F1099), T band (F384), Z band (F387) all old 40MHz channelling and finally 18GHz band (F595) with 27.5MHz channelling all are cover in ETSI EN 302 217-2-2.

If we were starting today's with "clean" spectrum, they would no doubt follow a generic channel approach 56MHz/28MHz/14MHz/7 MHz/3.5MHz. However to apply that channelling now in the heavily used band plans outlined in the last paragraph, cannot be considered without considering in depth the huge costs for existing licensees to conform, versus the benefits for the Industry. I note the Ministry is pragmatic in its approach to the 40MHz band plans and suggesting a 10MHz minimum step which I would support across P, 5GHz, T band, and Z band though I suggest in PIB22 apply this initially only to one block of each band.

In addition the new plans would need to ensure they are consistent currently with what microwave manufacturers can supply into New Zealand based on what they are manufacturing. Microwave equipment manufacturers follow approved ITU-R band plans as evidenced by ETSI specification EN 302 217-2-2 but which duplexer options beyond current offerings into New Zealand market would need clarifying.

Preferred channel widths is an acceptable approach for all new band plans for new spectrum and in principle I support Table 3 in the Fixed Services discussion document, though I note above 2.7GHz the issues for existing band plans. However allocation of the narrower

channels underneath wider channels, should be in a managed demand based approach, so it does not compromise the ability to allocate wider channel as well. This has always been an approach in the Ministry in the past, to try and manage narrow and wider channels requirement, in an effort to maximise the radio channel re-use as evidenced by a number of the existing fixed channel plans.

I band is an example where a 12.5kHz plan should be provided, as I raised in my response to Question 1, and noting Table 3 advocating 25kHz channel width minimum for LL band then KK band should follow that approach, as per my response to question 28.

L band should ideally be changed to offer similar narrow channel widths rather than status quo of 2MHz minimum as per my response to Question 29.

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

Response:

I would support a rationalisation of the bands as suggested based on using numbers aligned to frequency band as proposed.

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?***

Response:

I would say yes to be consistent with the approach taken in other fixed bands

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?***

Response:

I note in PIB38 for bands below 3GHz, only KK has any minimum distance, so I wonder why a minimum distance is now being considered as an option for STL's when they have been operating for many years in the likes of I and K bands without this rule.

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

Response:

I have no comment

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?

Response:

I have no comment

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?

Response:

I have no comment

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?

Response:

I have no comment

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

Response:

Reviewing PIB38 and PIB58 guidelines these appear sound criteria, so the current plan would appear satisfactory

<u>PIB58:</u>

4.4 EE Band

Plans for 12.5 kHz and 25 kHz channels in the Fixed Service portion of EE band are specified in PIB 22. The EE band plan includes two blocks of paired channels within the range of 162.2 to 170.31 MHz. There are only a small number of channels available for Fixed Services in this frequency range, so this band is reserved for applications involving high data rate digital services over relatively obstructed paths. High gain antennas should be used to help maximize re-use of the channels.

Licences may only be assigned with 25 kHz channels for high efficiency digital services using at least a 16-state modulation scheme, such as 16-QAM or equivalent. Single-channel voice or single-low-rate digital transmissions must be assigned 12.5 kHz EE band channels.

PIB38:

4.11 Fixed services in VHF EE band (162.2 - 170.3 MHz)

EE-band is limited to obstructed paths, and where it has been shown the UHF linking is unsuitable. Approved Persons must write an explanatory letter, justifying the need for VHF and upload it against the licence or application in the Register. 25 kHz channels (EEW) are only available for high data rate systems using digital modulation.

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?

Response:

I band should have a 12.5KHz plan offered in a portion of its 25kHz allocation consistent with the approach in J band 12.5kHz channelling versus J band 25 kHz allocation. Over time new I band 12.5kHz channelling will allow a transition to a 12.5kHz plan to better utilize spectrum.

With respect to 100kHz channelling, I am wondering what services/equipment are going to use this channel spacing, as I can only think of STLs but they are not bi-directional. If some 100kHz channels were to be offered, a small allocation should be created for efficiency reasons to ensure the 50kHz channel plan is not compromised.

However the equipment that would use this wider bandwidth channel needs to be identified and if it is STLs, then 100kHz unidirectional channels are required, not bi-directional channels which means identifying specific channels as per the I band and JL band simplex channels approach.

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?

Response:

With respect to 100kHz channelling I am wondering what services/equipment are going to use this channel spacing? If some 100kHz channels were to be offered, only a small allocation should be created initially.

However the equipment that would use this wider bandwidth channel needs to be identified and if it is STLs, then 100kHz unidirectional channels are required and not bi-directional noting JD are bi-directional.

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

Response:

I have no comment other than I suspect mono STL links may be in need of some more uni-directional channels which may be one reason I'm guessing for 100kHz channels discussion raised by questions 25 and 26?

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

Response:

The current band plan I understand was developed in the early 1990s to meet a specific requirement for low capacity digital linking and had a single channel width size of 500kHz based around the limited range of digital linking equipment at that time. KK band actually came out of a portion of the TS 800MHz trunked despatch band which was 25kHz channelled at that time.

Since that time, the digital linking equipment available for this band has evolved to provide a variety of modulation and channel bandwidth options. It would be timely to review the range of channel widths available and subdivide some channels, noting the more recent LL band offers smaller channel sizes, which raises the question why is KK band not following the LL band example?

KK band should remain for bi-directional digital links only and the relevant ETSI specification that should be adopted for equipment is potentially EN 302 217-2-2.

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

Response:

L Band for many years has contained a large number of point to multi-point licences mostly for rural telephone customers which make it difficult to engineer new licences in a number of locations as the elevated central station antenna is either omni-directional or sectoral. However it is a very useful band in terms of being low frequency therefore able to operate over longer radio paths and offer a reasonable channel width.

In the future if those licences were no longer in the band, it would make ideal for additional point to point low capacity links. It could have some of its channels subdivided to offer lower bandwidths consistent with those LL band, and the relevant ETSI specification could be EN 302 217-2-2.

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

Response:

This band needs to have its N +1 designation removed as is proposed for T band. The Ministry should consider the subdivision of the 40MHz channels as per Table 3 based on 10MHz channel width to allow medium capacity links, subject to demand for such an option. (refer to my response to Question 16)

In addition channel aggregation should be allowed, which would provide 80MHz channels for wideband backhaul.

Please refer to my reply to Question 14 for my detailed comments on this 5GHz band.

(I would highlight that PIB22 Appendix 1 needs to show its ITU-R recommendation F1099 reference)

31. *Do you have comments on the current coordination process or possible future demands for services in the P band?*

Response:

Current co-ordination process appears satisfactory and I have no comment at this time about future uses for P band other than the Ministry as always keeps an eye of WARC2015/2019 discussions. The Ministry should consider the subdivision of the 40 MHz channels as per Table 3 based on 10MHz channel width to allow medium capacity links subject to demand for such an option.(refer to my response to Question 16)

32. *Should the Ministry adopt 28 MHz channelling for the R band?*

Response:

If this spectrum was unused then a 28MHz plan would definitely be the preference rather than 40MHz, however it is not empty spectrum. Firstly, as with the T Band proposal in question 35, the Ministry should remove the RA channels from the R band plan in PIB22.

The current PIB22 plan has **a 252.05MHz** duplexer spacing based on ITU-R recommendation F383.

Rechannelling this band for 28MHz channelling with **266MHz** duplexer spacing (Annex 2 of F383-9) would mean the new channels would co-channel with 2 x existing 29.65MHz channels, make a difficult technical exercise for some years for all ARC's, with the incumbent links underneath.

Rechannelling this band for 40MHz channelling with **260MHz** duplexer spacing (Annex 1 of F383-9) or **270MHz** duplexer spacing (Annex 3 of F383-9) would mean the new channels would co-channel with 2 x existing 29.65MHz channels, make a difficult technical exercise for some years for all ARC's, with the incumbent links underneath.

I believe the huge cost of rechannelling for existing licensees and large ARC re-engineering and co-ordination with C band earth stations, make this exercise very difficult. The incumbents links' duplexers are not field retunable, so it will in effect mean new transceivers, site visits, link outages and a large ARC exercise to attempt to find new channels (which overlap 2 existing channels) while the old channels are in place in the band. This may mean some existing licensees may have to move to other radio bands to find channels, which means antenna swapouts, which is expensive noting the large antennas used in this band.

The other question is what plans are coming through WARC 2015 /2019 that may impact on the usage of this band, and would make these proposed changes redundant.

I note no such moves for rechannelling this band in the ACMA RALI FX3 July 2014 Fixed band discussion document.

However I would advocate that the Ministry should permit channel aggregation of adjacent 29.65MHz channels (59.3MHz channels) which is consistent with the recently adopted "channel aggregation plan" for adjacent 28MHz channels. Channel aggregation relies only on adjacent channels of the same size which is why this ITU-R plan permits it with 29.65MHz plans. This meets one part of Option 3 objective, of the Ministry's section 3.10 of the discussion document.

Below is an ITU_R F383-9 extract outlining this aggregation of 29.65MHz channels approach, as well as use of co-channel arrangements (as per use of XPIC):

4 that when the equipment and network characteristics permit, co-channel frequency reuse of the arrangement in Fig. 1C can be employed, with the agreement of the administrations concerned, for improving spectral efficiency;

5 that when very high capacity links (e.g. twice STM-1) are required and network coordination permits, with the agreement of the administrations concerned, the use of any two adjacent 29.65 MHz channels specified in *recommends* 1 is possible, for wider bandwidth systems, with centre frequency lying in the central point of the distance between the two 29.65 MHz adjacent channels;

I would highlight that ACMA have promoted this channel aggregation approach in this band in their July 2014 Fixed Services proposal.

Final point is that this band is in ETSI specification EN 302 217-2-2 which covers the existing 29.65MHz channelling as part of the channel options.

33. If the Ministry is to adopt 28 MHz channelling, should this be applied to new licences only or should all existing licences be required to transition to the new channelling? How long a timeframe should be allowed for the transition?

Response:

A minimum timeframe of 5 years and the starting day for the new plan should be 12 months from the policy being adopted, as existing licensees will no doubt have existing equipment on hand and plans to deploy it. As I outlined in my response to question 32, the policy will create for a number of years, major issues and for the incumbents under the new channel plan. The benefits to the spectrum plan will take some a years to deliver and at some cost to the incumbents.

34. Is the N+1 designation still required for efficient use of T band?

Response:

No, N + 1 designation as with the 5GHz band, should be removed.

Since the T band was created, the all indoor microwave radio transceiver equipment has been largely supplanted in the Industry by “poletop microwave". In addition, the N + 1 rules in PIB58 Table 9 may be reducing entry for potential licensees who wish to establish 1 + 0 single channel links of poletop microwave, as they would in bands like R and W band rather than having to deploy N + 1 frequency diverse configurations.

35. Should the redundant TA channels be removed from the channel plan for the T band?

Response:

Yes the TA channels should definitely be removed from PIB22 channel plan. I would highlight that ACMA have promoted this approach in this band in their July 2014 Fixed Services band plan changes proposal.

36. Should the Ministry consider rechanneling the T band to 14 MHz channel widths? If not, why not?

Response:

No, I do not support a heavily used 40MHz channel plan, being rechannelled to 14MHz channel widths. The Ministry should consider the subdivision of the 40 MHz channels as per Table 3 based on 10MHz channel width to allow medium capacity links subject to demand for such an option.(refer to my response to Question 16)

ITU-R recommendation F 384-11 figure 1a -1b covers the current plan used in New Zealand for 40MHz channelling and co-channel operation for spectral efficiency (XPIC operation). I see no driver for causing costly disruption to existing licensees networks to meet a new 14MHz plan when the 40MHz plan can be subdivided into 20MHz and 10MHz band as required.

However I would advocate that the Ministry should permit channel aggregation of adjacent 40MHz channels (80MHz channel) which is consistent with the recently adopted “channel aggregation plan” for adjacent 28MHz channels. Below is an F384-11 extract outlining this aggregation:

1.5 that when very high-capacity links (e.g. twice STM-1) are required and network coordination permits, with the agreement of the administrations concerned, the use of any two adjacent 40 MHz channels specified in *recommends* 1 is possible, for wider bandwidth systems, with the centre frequency lying in the central point of the distance between the two 40 MHz adjacent channels;

I would highlight that ACMA have promoted this approach in this band in their July 2014 Fixed Services band plan changes proposal.

37. Should new 56 MHz channels V23A (7110.5 MHz) and V23A# (7341.5 MHz) be created? If so, could the new 56 MHz channels coexist with the TVOB channels currently in place? What would be an acceptable coordination policy if this were to occur? Should the new 56 MHz channels be available only on a non-interference basis?

Response:

My first point to highlight is the centre frequencies outlined here for the proposed channels do not have the V band 161MHz duplex split. I assume this is an error?

In any case, I would definitely not support this proposed itinerant use of V band channelling allocation as it overlaps V9C # to V12C # 7MHz channels, and puts them at risk of interference from a service with "no fixed location". Furthermore it makes it extremely difficult for ARC's to engineer new V band fixed links in the future and co-ordinate against an itinerant services.

Currently in V band these itinerant services appear to have no antenna types recorded, have no polarisation for the antenna and are licenced for ” All New Zealand use”. How is it possible for an ARC to co-ordinate a new fixed service licence against an "All New Zealand" itinerant service?

The current long standing 70MHz of outside broadcast channelling in V1/V2/V1A/V2A , has a very low licence current use, compared to much more heavily used V9C - V20C, 7MHz channel allocations. So noting that low usage in the V1/V2/V1A/V2A channels, why is there a requirement for more OB channels and in particular why the need for 56MHz channels noting the current licenced emissions are 21MHz in 28MHz channels?

Why cannot the other itinerant “Outside Broadcast” channels in OX and Y band meet the requirement of this service in V band existing channels are unable?

Those bands have been set aside for this type of purpose (noting the “All New Zealand licences”) and I see they also have a low licence count. Again the “All New Zealand licences” have neither antenna type nor polarisation recorded.

“Like services” are best with “like services” and co-ordinated by the members of those itinerant services, noting V and Y band “ All New Zealand licences” have use the same Continental Microwave VML-80D equipment type (analogue equipment I believe). I note OX Band “All New Zealand” licences has “unknown” in SMART for equipment and antenna types.

38. Can existing demand for the TVOB channels in V band be accommodated on other TVOB channels?

Response:

Based on Question 37, it is clearly time for the Ministry to undertake a review of OX, V and Y band itinerant channel usage, to capture true occupancy and channel re-use rates for what appear to be lightly licenced bands. This review would also allow a review of equipment and antenna type and specifications which can also then be entered into SMART as an overdue

data entry. If these itinerant services need additional spectrum then it is far better that this is in a specific "itinerant " band, as it was in O band for years and now OX band, where users co-ordinate with each other. V band has a specific co-ordinated portion but encouraging that to grow is not a sensible spectrum planning approach, as per my response to question 37.

39. Do you have comments on the current coordination process or possible future demands for services in the U band?

Response:

I concur with the Ministry's view on U band and propose no changes as indeed it is a heavily used band and I do not see demand reducing. I have no comments to make on the current co-ordination process.

40. Should W band be rechanneled to enable either 28 MHz, 40 MHz, or 56 MHz channelling to enable new services? Which channel size is preferred? Why?

Response:

If this spectrum was unused, a 28MHz plan would definitely be the preference (noting 56MHz is aggregating 28MHz channels) rather than a 40MHz plan, however it is not empty spectrum. The W band is a heavily used channel plan in New Zealand and I note **no such moves for rechannelling in the ACMA RALI FX3 July 2014, fixed band discussion document.**

The current PIB22 plan for W band has **a 311.325MHz** duplexer spacing based on ITU-R recommendation F386 Annex 6 figures 9 & 10.

A new 28MHz channelling plan has a **283.5MHz** duplexer spacing based on Annex 2 figure 2, and each new 28MHz channel would co-channel with 2 x existing 29.65MHz channels, make a difficult technical exercise for some years for all ARC's, with the incumbent links underneath.

A new 40MHz channelling plan has a **310MHz** duplexer spacing based on ITU-R recommendation F386 Annex 6 and each new 40MHz channel would co-channel with 2 x existing 29.65MHz channels, make a difficult technical exercise for some years for all ARC's, with the incumbent links underneath.

I believe the huge cost of rechannelling for existing licensees and large ARC re-engineering exercise, make this exercise very difficult. The incumbents links' duplexers are not field retunable, so it will in effect mean new transceivers, site visits, link outages and a large ARC exercise to attempt to find new channels (which overlap 2 existing channels) while the old channels are in place in the band. This may mean some existing licensees may have to move to other radio bands to find channels, which means antenna swapouts, which is expensive noting the large antennas used in this band.

The other question is what plans are coming through WARC 2015 /2019 that may impact on the use of this band, and would make these proposed changes redundant.

However I would advocate that the Ministry should permit channel aggregation of adjacent 29.65MHz channels (59.3MHz channels) which is consistent with the recently adopted "channel aggregation plan" for adjacent 28MHz channels approach. Channel aggregation relies only on adjacent channels of the same size, which is why this ITU-R plan permits it with 29.65MHz channels. I would highlight that ACMA have promoted this approach in this band in their July 2014 Fixed Services band plan changes proposal.

Final point is that this band is ETSI specification EN 302 217-2-2 covers the existing 29.65MHz channelling as part of the channel options.

41. ***Should the Yx channels be disestablished from the Y band channel plan, enabling the current dominant channel plan (YxA) to become the single channel plan for Y band?***

Response:

That would seem a sensible idea looking at that band and the current usage however the itinerant use of that band on Y1/Y1#/Y2/Y2#/ Y3/Y3# would need some consultation.

I would not advocate changes without the Ministry addressing question 37 and 38 and without compromising the V band current Fixed Services, as a trade off arrangement to address this question 41 proposal.

The Ministry could consider the subdivision of the 28 MHz channels as per Table 3 based on 7MHz channel width to allow medium capacity links subject to demand for such an option. (refer to my response to Question 16)

42. ***Should the Y band have an additional 56 MHz allocation added to the current YxA 28 MHz channel plan?***

Response:

It is a very small channel plan and this may compromise its efficient use, so unless there is industry support for this proposal I would say no.

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43. ***Should the band boundaries be realigned to match ITU-R F.386, by adjusting the U / W boundary at 7.730 GHz down to 7.725 GHz, and by adjusting the W / Y boundary from 8.290 GHz to 8.275 GHz?***

Response:

This question is tied in with the question 40 and 41 to which I have answered no and yes respectively. I would not support this change without more analysis being undertaken as I can see the W band being impacted for benefits that may take many years to be realised.

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44. Should the Ministry offer a 14 MHz channel plan for H band and migrate users away from 21 MHz channelling?

Response:

H band is a lightly used band and offering a 14MHz channelling is a sensible idea.

There may be other options for this band such as offer in ITU-R recommendation F1568-1 but I have not sufficient time to explore those implications at this time, so cannot comment further.

45. Should the band be reallocated to a different service or use? If so, what other services or uses should be allocated to the H band?

Response:

Refer to question 44 response regarding recommendation F1568-1.

46. Should the Z band channel plan be changed to 28 MHz channels? If not, why not?

Response:

No, I do not support changing this heavily used 40MHz channel plan, to be rechannelled to 28MHz channel widths. The Ministry should consider the subdivision of the 40MHz channels as per Table 3 based on 10MHz channel width to allow medium capacity links subject to demand for such an option. (refer to my response to Question 16)

ITU-R recommendation F 387-12 supports the current use in New Zealand of 40MHz channelling and co-channel operation for spectral efficiency (XPIC operation). I see no driver for causing major costly disruption to licensees' networks to meet a new 28MHz plan when 40MHz channels can already be subdivided. In addition, introducing a 28MHz plan not supported yet in the ITU-R recommendation is not a sound strategy noting that equipment manufacturers using ETSI specification EN 302 217-2-2 will follow the existing plan.

However I would advocate that the Ministry should permit channel aggregation of adjacent 40MHz channels which is consistent with the recently adopted "channel aggregation plan" for adjacent 28MHz channels. That aggregation of two 40MHz channels is supported in this F 387-12 recommendation and allows the larger channels the Ministry suggests to be allocated at 80MHz channel width

I would highlight that ACMA have promoted this aggregation to 80MHz in this band, in their July 2014 Fixed Services band plan changes proposal.

47. If a 28 MHz channel is adopted, should the Ministry also adopt a 56 MHz channel plan?

Response:

Refer answer to question 46

48. If the band is rechanneled, should incumbent licensees be required to transition to the new band plan?

Response:

Refer answer to question 46

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

Response:

Not that I am aware of other than in some specific high demand sites as raised in Questions 5, 6 , 7.

50. Should the Ministry introduce an additional 56 MHz channel to the X band, or should it remain unavailable for assignment?

Response:

I suggest the Ministry introduce the additional 56MHz channel to X band.

51. Should the Ministry facilitate in any specific way the development of satellite services in the Ka band? For example, should the Ministry consider early clearances of some fixed services in either the 18 or 23 GHz bands?

Response:

Referring to my extensive answers to question 5 and 6 with respect to DMA areas, particularly in central Auckland, I would not support any further compromise of these bands at this time. However if the Fixed Service were in the future able to regain control of some of the 24GHz - 28GHz microwave bands when that spectrum returns to the Crown from Private Management Rights, that subject could be revisit.

Fixed Services band plans based on ITU-R 748-4 option for 25, 26, 28MHz bands is supported by manufacturers of point to point microwave equipment.

ACMA have a channel plan for the 28GHz band based on this ITU-R recommendation in RALI FX3 document, and are proposing to offer wider channels of 56 MHz

52. Should the Ministry remove the underutilised 3.5 and 7 MHz channels from the 23 GHz channel plan?

Response:

I do not agree with removing the 7MHz channels from 18 GHz or 23GHz plans as they are still a useful channel width, for example able to support 35Mbit packet data at 128QAM modulation. I would also highlight Table 3, Question 16 in the discussion document has a 3.5MHz or 10MHz base minimum channel width for 2.7GHz bands and above (excluding 80GHz band), so a 7MHz channel width is consistent with Table 3 approach

Just because 7MHz channels are currently underused, it does not mean that will continue to be the case, looking at some of the congestion issues arising in Auckland Central area. Everyone is "not one size "in the Radio Industry and therefore it is good to have a variety of channel widths available (as per Question 16), as not all are looking for large broadband backhaul in all channelling bands.

However with respect to 3.5MHz channelling in the 23GHz band, I note the ACMA are taking a similar approach, so I would agree with removing them in 23GHz, if that is the general consensus as the 18GHz band does not have them.

Other bands V band, G band and 38GHz have this 3.5MHz channel size but I see no reason to remove those at this time noting Table 3 (question 16) advocates 3.5MHz minimum channel widths.

53. Are there any issues with the current band plan, use of, or future demands for the 38 GHz band?

Response:

The introduction a few years ago of the 28MHz channels to 38GHz band, was a good idea as not having those present in the past had limited its use when compared to 23GHz and 18GHz bands offering that channel size. While 38GHz is rain limited, it is a useful band particularly where 23GHz is congested in Auckland, so I don't expect demand to reduce in the major city centres.

54. Should the Ministry move the licencing regime for the 70 – 80 GHz band from administrative licencing to a New Zealand general user radio licence?

Response:

I would strongly advise against that until trends are established overseas and WARC 2015/2019 may well provide important guidance on this band and its future.

Michael Houlihan (ARE026)