

Summary of submissions and conclusions

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Executive summary

In 2008, the Ministry published a discussion paper entitled “High Capacity Short-Haul Point-to-Point Linking in the 70-90 GHz Band” for consultation in detail on the optimal spectrum management framework to provide access to the 70-90 GHz band, following previous work to identify spectrum allocation opportunities for broadband wireless access.

Responses to the consultation process are analysed within this summary of submissions paper. The analysis indicates that access to the 70-90 GHz band for fixed point-to-point linking is desired by New Zealand industry.

The analysis concludes that access to the 70-90 GHz band should be via the administrative radio licensing process, using the Register of Radio Frequencies as a centralised database of licences, with licence certification using approved radio engineers or certifiers. The Ministry of Economic Development’s (MED) standard compliance and audit procedures would also be applicable, and each licence application granted would incur a \$200 annual fee as prescribed by the current fee schedule for fixed links.

Guidance was sought on the technical specifications that should be applied to the 70-90 GHz band. The consultation process revealed that the proposed set of technical parameters that cover the broadest range of equipment available, without unduly affecting good spectrum management principles, is optimal.

This paper reviews the submissions and identifies the next steps to fully implement the results of the consultation.

1. Purpose

In July 2006, the Ministry of Economic Development (“the Ministry”) consulted on Spectrum Allocations for Broadband Wireless Access (BWA). Industry and other stakeholders identified the 70-90 GHz band as a candidate for broadband wireless access use in New Zealand as it can provide a cost-effective way to extend fibre optic networks.

In 2008, the Ministry published a discussion paper entitled “High Capacity Short-Haul Point-to-Point Linking in the 70-90 GHz Band” for consultation in detail on the optimal spectrum management framework to provide access to the 70-90 GHz band. The consultation focussed on soliciting industry opinion on the most suitable spectrum allocations, technology standards/operating parameters and licensing arrangements.

This paper summarises the submissions received, draws conclusions and recommendations and outlines the next steps in the spectrum allocation and assignment process.

2. Background

There is increasing recognition that broadband is a key enabler of economic growth and development. The Ministry released a [discussion paper](#) in July 2006 to provide interested parties with the opportunity to comment on identified spectrum allocation opportunities for broadband wireless access in New Zealand. The paper noted that the bands at 60 GHz, 70 GHz, 80 GHz and 90 GHz were candidate bands for broadband wireless access in the longer term.

The Ministry released a [follow-up discussion paper](#) in September 2008 that focussed on the 70-90 GHz band. In the New Zealand context it is expected that access to the 70-90 GHz band would provide for a range of short-haul point-to-point links that would complement development of optical fibre networks and hence assist the delivery of broadband services to New Zealanders. For example, there are a number of buildings and structures requiring connectivity to support large bandwidths that are not yet connected to existing, relatively close, optical fibre. The 70-90 GHz radio technology may provide a cost-effective approach to bring connectivity to these locations. The discussion paper sought to clarify which spectrum allocations, technical standards, operating parameters and licensing mechanism were appropriate for adoption in New Zealand.

Following the close of the submission period, the Ministry contacted the submitters to clarify their submissions, discuss the issues they raised, and establish if consensus could be achieved.

Based on the submissions and clarifications, the Ministry has considered how best to manage the immediate demand for spectrum to provide services in the 70-90 GHz range while recognising the evolving nature of technological standards. The next steps in this process are explained in the final section of this document.

3. Submissions

The Ministry received three submissions to the discussion paper on high capacity linking from two pivotal interest groups: equipment suppliers and network operators. The responses have helped the Ministry to resolve the two major issues – these being the choice of technical operating parameters, and the licensing mechanism. The Ministry held additional discussions with the submitters to clarify submissions and to establish that consensus could be achieved.

The submitters were: Vodafone NZ Ltd, Telecom NZ Ltd, and Linkit Ltd, comprising the two largest radiocommunications network operators, and an established equipment supplier in New Zealand. The submissions have been published on the Ministry’s [website](#).

4. Analysis

The Ministry’s September 2008 [discussion paper](#) on High Capacity Short-Haul Point-to-Point Linking in the 70-90 GHz Band raised three main topics for comment: appropriate spectrum allocations, technical standards, operating parameters, and the appropriate licensing mechanism.

This section summarises the inputs received, analyses those inputs and draws conclusions about the questions raised in the discussion paper.

4.1 Spectrum allocation and channel plan

The discussion paper introduced a range of applications that can be supported using 70-90 GHz radio technology. In addition, it discussed scenarios where use of radio technology might be favoured over wireline or optical fibre. The international allocations and usage were also outlined. The following question was posed:

1. Should provisions for short-haul high-capacity fixed point-to-point links in the 70-90 GHz bands be introduced in New Zealand, and why?

All three submitters provided affirmative responses to this question.

There was consensus that most usage was likely to be metropolitan based and used to extend fibre optic networks.

One submission noted:

- the importance of fixed and mobile broadband wireless access services to the Government's Digital Strategy;
- a trend for increased uptake of higher speed mobile broadband wireless access services (cellular radio services in particular);
- the need to provide high capacity backhaul to support these services; and
- the importance that fixed links in the 70-90 GHz range have in relation to providing high capacity backhaul for other communication services.

Recommendation 1: To allocate the bands 71-76 GHz and 81-86 GHz on a primary basis to the fixed service, and allocate the 84-86 GHz band on a co-primary basis to the Radio Astronomy¹ service.

Recommendation 1a: To provide access to the frequency bands referred to above in the immediate future for high-capacity fixed point-to-point linking.

The [discussion paper](#) outlined how the international allocations had been implemented in the USA, the European Union, Great Britain and Australia and asked the question below.

2. What are the appropriate frequency allocations to be applied for this service in New Zealand – either:

1. The Australian and European allocations (incorporating guard bands) being 71.125-75.875 GHz and 81.125-85.875 GHz; or
2. The US allocations (without guard bands) being 71-76 GHz, 81-86 GHz and 92-95 GHz?

In response, two submitters supported the Australian and European allocations incorporating guard bands, and one supported the US allocation.

Considering that:

1. the Australian and European allocations accommodate almost all of the frequency division duplex US band;
 2. all three allocations are used to implement a 250 MHz channelling scheme;
 3. the use of guard bands from the outset minimises the potential for interference caused by unwanted emissions from the fixed service and from the services in the bands immediately adjacent; and
 4. operation within the 92-95 GHz band has not been exploited by equipment vendors yet;
- the Ministry is of the view that the Australian and European plan should be adopted.

Recommendation 2: To adopt the Australian and European channelling plan (with guard bands) and to consider allocating the 92-95 GHz band at a later date.

Footnote

¹ The allocation to Radio Astronomy was proposed in the initial discussion paper in order to provide for future flexibility for this service. This proposal was not supported or opposed in the submissions and is therefore recommended for the reasons outlined in the discussion paper.

4.2 Technical standards and operating parameters

The [discussion paper](#) explored international variances in equipment specifications and operating parameters including; power levels, antenna gains, and maximum equivalent isotropic radiated power (e.i.r.p.).

An explanation of the different power levels mandated in the USA, Europe, UK and Australia was provided, and the following question asked.

3. What is the appropriate transmitter power limitation to be applied in New Zealand – either:

1. a. that adopted in Australia and Europe, being a maximum power of 1 watt; or
2. b. that adopted in USA, being a power spectral density of 150 mW/100 MHz coupled with maximum power of 3 watts?

One respondent expressed a preference for the European and Australian power specification, and two respondents expressed a preference for the US power specification.

The difference between the US (3 watts) and the UK/Australian (1 watt) limits is small. Using the US transmitter power standard of 3 watts with a maximum spectral density of 150 mW/100 MHz ensures slightly better equipment performance and allows the introduction of a wider range of equipment, whilst also managing the potential for co-channel or overlapping frequency interference between services.

Recommendation 3: To adopt the US transmitter power standard of 3 watts with a maximum spectral density of 150mW/100 MHz.

Specification of antenna gain implies a limitation on antenna beamwidth and ensures that the ability for spectrum re-use is maximised. The following question was posed in the discussion paper.

4. Should a Minimum Antenna Gain of 43 dBi as used in Europe, the US and Australia be applied in New Zealand?

The respondents unanimously supported the adoption of a minimum antenna gain of 43 dBi.

Recommendation 4: To specify a minimum antenna gain of 43 dBi for licences.

Specification of a maximum radiated power, in conjunction with antenna gain also ensures that spectrum re-use objectives can be maintained. Hence the following question was asked in the discussion paper.

5. What is the most appropriate maximum radiated power for emissions to be applied in New Zealand – either:

- a. +55 dBw e.i.r.p. as used in the US and UK; or
- b. +45 dBw e.i.r.p. as used in Europe and Australia?

Two respondents provided comment to the question and both supported the use of the +55 dBw e.i.r.p. figure. It is noted that adopting a higher maximum radiated power allows the introduction of a wider range of equipment. Whilst the higher power may reduce the ability for frequency re-use, this is mitigated through the specification for the antenna gain (and hence 3 dB beamwidth) and power spectral density.

Recommendation 5: To specify a maximum radiated power of +55 dBw e.i.r.p. for licences.²

The overall effect of Recommendations 1-5 is to enable the widest range of equipment to be used in New Zealand, without curtailing future spectrum planning options in adjacent spectrum and ensuring maximum utility within the 70-90 GHz band.

To ensure that Recommendations 1-5 are appropriately implemented the equipment standards corresponding to the parameter specifications above should be mandated in a revised Radiocommunications (Radio Standards) Notice 2007. The relevant standards are:

- ETSI TS 102 524 “Fixed Radio Systems; Point-to-Point equipment; Radio equipment and antennas for use in Point-to-Point Millimetre wave applications in the Fixed Services (mmwFS) frequency bands 71 GHz to 76 GHz and 81 GHz to 86 GHz” for Europe; and
- CFR Title 47 Part 101 subpart Q “Service and Technical Rules for the 70/80/90 GHz Bands” for USA.

At the time of writing no equipment specifications had been mandated for equipment in use in the 70-90 GHz band by the Australian Communications and Media Authority.

Recommendation 6: Revise the Radiocommunications (Radio Standards) Notice 2007 to include appropriate reference to ETSI TS102 524, and CFR Title 47 Part 101 subpart Q.

Footnote

²To achieve the maximum allowable e.i.r.p. of 55 dBw, together with the 3 watts transmitter power, implies that an antenna gain greater than the minimum of 43dBi will be necessary.

4.3 Appropriate licensing mechanism

The [discussion paper](#) detailed three options for licensing fixed point-to-point links in the 70-90 GHz band. In brief those options were:

4.3.1 Option 1: Individual administrative licensing

This option provides for robust interference mitigation and full certification by approved radio engineers/certifiers using the SMART system and the Register of Radio Frequencies to provide a centralised database of licenses. This form of licensing provides well defined audit and compliance procedures. An annual administrative fee of \$200 per fixed link transmitter is levied as prescribed by the current fee schedule for fixed links.

4.3.2 Option 2: Non-exclusive administrative licensing

This option offers a low barrier to entry (\$200 per licensee), and less robust interference mitigation mechanisms, but is balanced by using light-handed regulation enabled via the de-centralisation of licence databases to licensees. Licensee-maintained database entries would require confirmation of records by approved radio engineers/certifiers and must be provided annually to the Ministry of Economic Development.

4.3.3 Option 3: General user licence

This option offers the lowest barrier to entry as no licence fee is levied, however, access to the spectrum is on a public park basis, and users of the licence must accept interference from other licensed users.

Respondents were asked the following four inter-related questions.

6. Is Option 2, Non-exclusive licensing, the most appropriate licensing mechanism to be introduced in New Zealand, if not what is your favoured licensing mechanism and why is this so?

7. If your answer to question 6 supports licensing Option 2, should this licensing mechanism be introduced on a national basis as in the UK or USA, or on a regional basis?

8. If your answer to question 6 supports licensing Option 2, what mechanisms to streamline the sharing of technical information and self-coordination process would you suggest?

9. If your answer to question 6 supports licensing Option 2, should Approved Radio Engineers and Certifiers be required to date and sign-off each technical record to ensure that record is accurate?

One respondent to question 6 preferred Option 2.

Another respondent stated their preferred mechanism was Option 1, although this respondent stated that Option 2 was their second preference and noted that implementation of the Option 2 approach had been problematic in Australia, and hence implementation in New Zealand would need more discussion and the prescription of “definitive guidelines” before implementation.

The third respondent stated a preference to utilise the Management Right regime to allocate the spectrum although this option was not proposed in the discussion paper.

The third response also stated that they could support Option 2 with modification. This respondent’s motivation for modifying Option 2 was based on the need to ensure sufficient inter-system coordination to prevent interference. The response used technical similarities of point-to-point linking using the 38 GHz band with those in the 70-90 GHz band to credibly justify the suggested modifications. The response also concluded that a self-coordination process, similar to that currently used in the OX band, would suffer difficulties when implemented in

the 70-90 GHz range because: there will be a greater number of licensees with whom to communicate, a higher density of links to coordinate with, and less tolerance to interference inherent in the links. The respondent also suggested that licensees might employ a self-coordination system to frustrate their competitors' attempts to roll out services, or to extract additional revenue from those competitors.

The third respondent suggested the following modifications:

- [70-90 GHz] fixed link licences need to be certified [by an approved radio engineer or certifier];
- licence details must be recorded on a central database and utilise the SMART system; and
- levying of an annual fee of \$5-\$10.

The Ministry notes that Option 2 modified in accordance with the third respondent's suggestions requires every link to be coordinated, certified and recorded on the Register of Radio Frequencies and hence is very similar to Option 1. The modified Option 2 retains the national non-exclusive licence concept with an associated low nominal annual fee. However, the non-exclusive licence concept is only valid when used in conjunction with self-coordination, and a low nominal annual fee can only be offered with a corresponding reduction in the administrative, compliance and auditing services offered by the Ministry. As no reduction in services is suggested, no fee reduction can be justified, and the modified Option 2 is equivalent to Option 1.

On balance the respondents prefer the implementation of Option 1 over the other options. This preference suggests that interference protection is favoured over ease of access to the band, a point of view that was confirmed in subsequent conversations with all three respondents.

Use of Option 1 implies that all licence records will be signed-off by an approved radio engineer or certifier, and this aligns with the views of all respondents relative to question 9.

Recommendation 7: To implement the standard administrative licensing regime for the provision of fixed point-to-point links in the 70-90 GHz band and to make necessary changes to relevant publications.

4.4 Other issues

One respondent also raised the issue that importers of equipment should be required to provide proof of equipment conformance. The Ministry notes that all radio equipment placed on the market for sale in New Zealand must conform to the standards prescribed in the Radiocommunications (Radio Standards) Notice 2007, the equipment supplier must be registered and maintain adequate proof of conformity. Periodic audits of products at point of sale, and of registered suppliers are carried out by the Ministry. A full explanation of the applicable equipment compliance regime is available on the [Ministry's website](#).

Part of the proposed frequency range is allocated to the Amateur service on a secondary basis and is included in the current Amateur General Licence issued by the Ministry. The extent of actual usage is unknown. The use of the band for fixed links as proposed may limit such secondary use, but the short range of the fixed links will minimise any such limitation. The use of the SMART licence database will clearly identify the fixed link locations to assist Amateurs in identifying potential issues.

5. Next steps

The results of the consultation process point clearly towards providing access to the 70-90 GHz band via the administrative radio licensing process, and ensuring that licences granted under that process will be engineered to the technical specifications recommended in this paper.

The Ministry will need to implement any necessary changes to the SMART registration system to facilitate creation of licences by AREs and ARCs.

An allocation of the 92-95 GHz band for fixed links employing time division duplex may be required in the future.

Implementation of the recommendations contained herein involves updating the Ministry's publications as follows:

- to amend [PIB 21 "Table of Radio Spectrum Usage in New Zealand"](#) to show the correct New Zealand Allocation, summary of usage and references to appropriate policies to implement Recommendations 1 and 1a of this paper;
- to amend [PIB 22 "Fixed service bands in New Zealand"](#) to include a new section for the 70-90 GHz band that indicates the desired use, achievable path length, antenna and power restrictions, and channel plan to partially implement Recommendations 2, 3, 4 and 5;
- to amend section 2 of [PIB 38 "Radio licence engineering rules and information for approved radio engineers and approved certifiers"](#) to reflect the desired use, achievable path length, antenna and power restrictions, and allocation to complete the implementation of

Recommendations 2, 3, 4 and 5; and

- to re-issue the Radiocommunications (Radio Standards) Notice to implement Recommendation 6.