RADIO SPECTRUM MANAGEMENT

Options for 174 – 230 MHz: Consultation Document

Review of options for allocating spectrum in VHF Band III

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
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New Zealand Government

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Table of contents

Glossary

Abbreviation/Term	Meaning
Band III	VHF Band III, spectrum between 174-230 MHz
DAB	Digital Audio Broadcasting
GURL	General User Radio Licence
IoT	Internet of Things
LMR	Land Mobile Radio
the Ministry	Ministry of Business, Innovation and Employment
Minister	Minister for Communications
NZDF	New Zealand Defence Force
PPDR	Public Protection and Disaster Relief
RSM	Radio Spectrum Management
UHF	Ultra High Frequency. Band between 300 MHz and 3 GHz
VHF	Very High Frequency. Band between 30 and 300 MHz

Invitation for submissions

Interested parties are invited to comment on the content of this document, in particular the questions posed, and on any related issues. Comments should be submitted in writing, no later than **5pm** on **27th May 2016** to:

By email: *(preferred option)*

Radio.Spectrum@mbie.govt.nz

Subject line: "Radio Spectrum Band III Consultation"

Or

By post:

Radio Spectrum Band III Consultation
Radio Spectrum Management Policy and Planning
Ministry of Business, Innovation and Employment
PO Box 2847
WELLINGTON 6140

Any party wishing to discuss the proposals with Ministry officials should email, in the first instance Radio.Spectrum@mbie.govt.nz

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1 Introduction

Radio spectrum has many valuable uses. Spectrum is a key input into many industries, such as broadcasting and communication over cellular and other wireless networks. Technology is increasingly utilising wireless functionality, placing greater pressure on the allocation of radio spectrum. Active radio spectrum management, accompanied with good planning and sound allocation frameworks, is necessary to ensure New Zealand is world class in its use of information and communication technologies.

This consultation paper seeks views from industry and individuals on the options for assigning currently unallocated spectrum between 174–230 MHz, otherwise known as VHF Band III or Band III. This review intends to identify the best economic use of this spectrum, and the most efficient use, including the best match between current demands and the characteristics of the spectrum itself. The paper includes potential options for specific technological uses of the spectrum, as well as a more general category of potential users of the spectrum.

2 Background

The spectrum in Band III is currently unallocated due to the end of analogue television broadcasting. In New Zealand, the process of a digital switch over began in 2005 and culminated in late 2013 with the final analogue television 'switch-off'. UHF broadcasting bands have been repurposed for digital terrestrial television broadcasting. Band III was not considered for digital terrestrial television broadcasting and hence remains largely unused.

There may be demand for this spectrum from a variety of stakeholders. Good spectrum management will be required to balance these individual interests and the limited available spectrum. The options in this paper, for example, do not necessarily require all 56 MHz; and multiple uses may be accommodated. In addition, there may be other possible new uses which have not been considered yet.

Contingent on submissions to this consultation, including more than one option in the allocation of Band III is likely. From this, secondary questions around spectrum allocation and licensing will arise. There is also the possibility of allocating portions of the band now to options with clear and immediate demand, and retaining the remaining spectrum for future allocation as demand emerges in other areas. Choosing the right combination of uses to ensure spectral efficiency and maximise the economic benefit for New Zealand is at the core of this consultation.

3 Potential uses of 174–230 MHz

3.1 Radio Microphones

Radio microphones are short range devices that use radio waves to transmit sound (voice, music, etc.) from a microphone to a nearby receiver where it is used in audio reproduction. They are widely used in applications such as entertainment, broadcasting, community groups, special events, and "in ear" monitors (for example by referees in a sports game).

Radio microphones are currently authorised through the General User Radio Licence (GURL) for Short Range Devices to use frequencies in Band III. The relevant provision in the GURL is currently set to be discontinued after September 2019, although this could change. This provision allows existing wireless microphones to keep operating in the band, while providing a suitable notification timeframe to vacate Band III in anticipation of future uses. Any use of Band III before 2019, will need to be compatible with the current radio microphone allocation.

We believe that there is a limited range of new radio microphone equipment being developed for Band III frequencies. RSM has previously signalled that users should not make new investments in equipment that only uses these frequencies in case of band use changes and the possibility that radio microphones may not be able to co-exist with new uses without causing interference. There are other frequencies available for radio microphone use, for example in the UHF band. If there is ongoing demand for radio microphones in 174–230 MHz, there is an option to retain a portion of Band III for radio microphones.

Q1. Should spectrum in Band III be allocated for radio microphones? If so, how much spectrum would satisfy demand in this area?

3.2 Digital Audio Broadcasting

Digital audio broadcasting (DAB) is a digital technology created to be more spectrally efficient than analogue audio broadcasting. It is intended to deliver better sound quality and more choice of stations for consumers. If DAB is to be considered a viable broadcasting option for New Zealand, spectrum in Band III would be the preferred frequency choice for international harmonisation.

3.2.1 Current DAB situation in New Zealand

Kordia has been testing DAB in Auckland and Wellington for some time, retransmitting selected radio programming. In Wellington, Kordia has been using a trial channel within Band III. In Auckland, Kordia has been using another trial channel at frequencies just above 230 MHz with the agreement of the New Zealand Defence Force (NZDF). To date, there is no government policy for a digital radio migration plan using DAB technology.

3.2.2 International DAB situation

Australia has had DAB+[1] services since 2009, using spectrum blocks between 202–216 MHz to broadcast across the state capital cities. In 2014 Commercial Radio Australia[2] said that DAB+ is "outperforming all other non-subsidised technologies" in the country.

European countries have implemented DAB and DAB+ in Band III, with countries such as Norway and Switzerland aiming to complete an FM radio switch off in the future. Denmark plans to move to digital radio when more than half of radio listening becomes digital, while countries such as the Netherlands, Germany, France and Italy have governments supportive of DAB or DAB+ rollout. For example, the Minister responsible for digital radio in the UK has signalled the possibility of a full migration from analogue to digital radio in the future.

[1] DAB+ is a major upgrade to the Digital Audio Broadcasting (DAB) standard for digital radio

[2] Commercial Radio Australia Ltd is the national industry body representing Australia's commercial radio broadcasters.

In the late 1990s, Canada began implementing DAB services in the major metropolitan cities using L-Band spectrum (1452–1492 MHz). This was counter to the international usage of DAB in Band III. The lack of harmonisation resulted in high prices for receivers and a limited uptake by consumers. The use of L-Band also resulted in issues with sound quality and poor propagation characteristics.

3.2.3 Discussion

DAB implementation in New Zealand would generate access to the broadcasting market for new entrants, creating an alternative broadcasting market to the traditional AM and FM markets and alleviating some congestion in the FM band[3]. One 7 MHz analogue TV channel could accommodate four DAB multiplexes (each in a frequency block of 1.536 MHz). Depending on the preferred broadcast audio quality, each multiplex could typically carry between 12 and 20 simultaneous programme streams. This is different from traditional audio broadcasting where one licence can carry only one programme.

There are three main concerns regarding the allocation of Band III spectrum to DAB:

- It is not clear if additional DAB channels will increase the variety of digital broadcast providers or generate new listeners. This could counteract some of the expected social and economic benefits from allocating limited spectrum to DAB.
- The use of DAB requires a DAB compatible receiver, currently retailing at approximately $70-$700 (average approximately $360) in New Zealand. The limited range of low-cost DAB receivers may become a barrier to entry for consumers and there may be multiple radios to replace within a home. However, some new cars coming in to New Zealand are equipped with DAB radios.
- A DAB allocation may result in allocating spectrum to an 'orphaned technology', suggested by the limited success of DAB in other countries. As internet streaming of audio content continue to gain popularity, DAB may become irrelevant as similar services can be delivered via internet. Their ability to remain mobile in the face of high data costs, however, may discourage further uptake.

If some or all of Band III is used for DAB, then we would need to consider the number of channels to be created and how licences should be allocated. As each multiplex / licence can carry more than one programme, not every broadcaster will acquire their own multiplex.

Traditionally, broadcasting in New Zealand is licensed under a management rights framework. The Crown may allocate these rights or allocate spectrum licences. Rights may be offered subject to meeting conditions set to achieve specific policy goals in broadcasting.

Q2. Should spectrum in Band III be allocated for DAB? If yes, why? If not, why not?

Q3. Would an allocation of 14 MHz in the form of eight 1.536 MHz frequency blocks be an appropriate spectrum allocation for DAB in New Zealand? If not, how many multiplexes would be more appropriate for current demand?

[3] The management right for FM sound broadcasting is at 88-108 MHz and expires in 2031.

3.3 Land Mobile

Land mobile radio (LMR) refers to the operation of land based radio transmitting equipment for communication between mobiles and/or portable sets either direct or through a radio repeater station. Currently, LMR uses VHF spectrum between 136–174 MHz and UHF spectrum. Stakeholders have signalled their interest in accessing more spectrum in the lower portion of Band III for LMR use.

If Band III spectrum is allocated for LMR, there are two major considerations to ensure best use of spectrum. These are whether to:

- restrict the use of these frequencies to specific technologies (for example, digital technology only); and
- transfer the spectrum to the management rights regime to reflect the congestion in other LMR bands, particularly VHF bands, to ensure this spectrum goes to those who value it most highly.

VHF LMR users have recently completed the transition from 25 kHz to 12.5 kHz channels. Now the new channel arrangements are in place it is appropriate to consider how many free channels are available in current bands and whether there is a case for a further allocation to LMR. The outcome of this evaluation may impact future allocation.

Considering that a 2 x 5 MHz block of spectrum could accommodate 400 duplex-paired channels based on a 12.5 kHz raster, we wish to understand the level of demand for land mobile radio and whether an allocation is justifiable within Band III.

Q4. Should spectrum in Band III be allocated to LMR? If yes, how much spectrum would satisfy demand in this area?

Q5. If spectrum is allocated to LMR, should there be technological requirements around the use of this spectrum? If yes, why? If not, why not?

Q6. If spectrum is allocated to LMR, is it appropriate to charge a fee for this use or transfer the spectrum to the management rights regime? If yes, why? If not, why not?

3.4 The Internet of Things

The phrase 'Internet of Things' (IoT) references the trend of extremely high connectivity between machines. 'Things' refers to devices or objects which utilise internet protocol to connect, with or without human assistance. The phrase does not denote any specific technologies, but could include devices such as animal tracking, remote control of home technologies, smart parking, wearable technology, and processes such as cloud computing and data telemetry. These technologies are becoming increasingly important in society and have the potential to improve productivity in a wide range of industries (including utilities companies, which will be further outlined in section 4.1).

IoT technologies may require more, or exclusive, spectrum as they develop and become more common. However, international demand in this area is for narrowband slices of spectrum. The small amount of spectrum that these new technologies require and the potential economic benefits that they provide make IoT an important option in the allocation of Band III.

Providing spectrum for IoT may create an environment for innovative technologies to be developed and utilised in New Zealand while not doing so could become a barrier to furthering

development. Encouraging innovation generates secondary needs including support for those wishing to use this spectrum for new technologies, and a process of device standardisation able to use this potential new sub-band.

IoT technology typically operates under the GURL and as such does not require individual licences. There is currently no spectrum dedicated to IoT exclusively, in particular, for use by long range and low power technologies. There may be a demand for a low frequency IoT band which could accommodate these technologies.

3.4.1 Licensing

GURLs encapsulate multiple applications in the same frequency range which may not be practical under an individual licensing regime, making them an appropriate fit for IoT. While the nature of a GURL may facilitate the varying uses of IoT, it may be difficult to reverse the decision to only use GURLs for IoT if licences were required in the future, for example due to increased interference caused by IoT technology to other radiocommunication services.

There are possible benefits of licensing IoT, including availability of data regarding specific technologies and the ability to minimise interference issues, particularly for long range use. Issuing licences (including for telecommand and telemetry applications) to IoT, however, may be problematic for stakeholders given that it contradicts the ethos of IoT technologies to have low or no barriers to entry.

Q7. Is there a demand for exclusive spectrum in Band III, either now or in the future, for IoT technologies? If yes, which IoT technologies are demanding this spectrum?

Q8. If spectrum is allocated to IoT, how much spectrum would satisfy demand in this area?

Q9. Which type of licensing framework is most appropriate for spectrum allocated to IoT?

4 Potential users of 174-230 MHz

4.1 Utilities

Utilities companies, in particular electricity networks, have shown an interest in access to spectrum within Band III. In previous submissions on RSM consultations, utilities companies have signalled that they wish to use additional spectrum to expand technologies such as smart networks and grid control in an effort to improve the efficiency of their businesses. A decision to allocate spectrum exclusively for these types of users requires a firm position and description of use from the industry as a whole, in order to maximise the wider economic benefits of allocating the limited spectrum.

Q10. Is there demand for exclusive Band III spectrum for utility companies? If yes, what types of uses are driving this demand and how much spectrum do these uses require?

4.2 New Zealand Defence Force

The New Zealand Defence Force (NZDF) has had previous interest in the sub-band between 225–230 MHz, at the top of Band III. The NZDF used this sub-band up until the late 1980s, when they carried out a swap of spectrum at 400–405 MHz to allow the launch of a third analogue television network.

Q11. Is there demand for NZDF use of spectrum between 225–230 MHz?

Q12. Should spectrum in Band III be allocated to NZDF? If yes, why? If not, why not?

4.3 Public Protection and Disaster Relief

Public protection and disaster relief (PPDR) has been signalled as a possible use of spectrum in submissions to other RSM consultations. New Zealand has already reserved spectrum in the VHF and UHF bands (e.g. ESA, ESB and ESC bands) for PPDR narrowband (voice) use. This ensures access to a range of LMR technologies for PPDR agencies, as well as interoperability with other countries during international disasters. The necessity for spectrum in Band III for PPDR in New Zealand is unclear at this stage, as is the extent of PPDR specific technologies which require this spectrum.

Japan, as an example, has in recent years started deploying PPDR broadband services in the band 174–205 MHz. Broadband usage allows for different services than narrowband, including sending video. Internationally, other countries are considering frequency ranges in the UHF band (e.g. 700/800 MHz band) for broadband PPDR services. Aligning ourselves with one country, such as Japan, rather than many countries, in order to allocate spectrum in Band III to PPDR may not be an efficient or economically wise use of limited spectrum.

Q13. Should New Zealand consider PPDR uses in Band III? If yes, why? If not, why not?

Q14. If there is demand for PPDR in Band III, how much spectrum would satisfy this demand?

5 General Questions

This consultation has endeavoured to include a range of options for Band III. We may not have identified all potential options. If you consider there are other worthwhile uses of this unallocated spectrum, we would like to hear your views.

Q15. Are there any other uses of Band III that should be considered? If yes, please describe.

6 Summary of questions