

ISBN: 978-0-478-38278-5 (HTML)
978-0-478-38279-2 (PDF)



**Ministry of Business,
Innovation & Employment**

UHF Radiomicrophones: Opportunities for future use

Summary of submissions and final decisions

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1. Executive summary

The Ministry of Business, Innovation and Employment (“the Ministry”) has completed consultation on the changes to radio spectrum usage that will affect radiomicrophones operating in the 518 – 806 MHz frequency range. The Ministry has made final decisions based on the submissions received. The final decisions are summarised as the following:

- confirmation that radiomicrophones will be able to use 698 – 806 MHz frequency range until 11 March 2015 on a non-interference basis but after this date use will be prohibited;
- the 502 – 582 MHz and 622 – 698 MHz frequency ranges will be available for radiomicrophone usage long term;
- 582 – 606 MHz frequency range will be available for radiomicrophone usage after 30 November 2013;
- 606 – 622 MHz frequency range will no longer be available for radiomicrophone use;
- use of the lower guard band (698 – 703 MHz) or any of the other guard bands will not be permitted beyond 11 March 2015;
- from 1 January 2014 there will be restrictions preventing the sale and supply of radiomicrophones that operate in the 698 – 806 MHz frequency range; and
- digital standards will be provided for radiomicrophones in the 502 – 606 MHz and 622 – 698 MHz frequency ranges.

These changes now need to be implemented by the Ministry. When the changes are implemented this will be announced through the Ministry’s business update. The Ministry will begin a communications campaign to ensure affected parties are made aware of the changes.



Figure 1: Shows the changes affecting radiomicrophones.

2. Process

On 20 May 2013 the Ministry published the *'UHF Radiomicrophones: Opportunities for future use'* discussion document on the final technical changes affecting radiomicrophones. This follows a long process which began in 2009 with the 'Digital Futures' discussion document.

The Ministry received nine submissions on the discussion document these were from industry representatives, suppliers, individuals, and a telecommunications operator.

The submissions have been published on the Ministry's website: <http://www.rsm.govt.nz/cms/policy-and-planning/consultation/uhf-radiomicrophones-opportunities-for-future-use/uhf-radiomicrophones-opportunities-for-future-use>

The Ministry thanks submitters for taking the time to provide input on this issue.

In this document, the Ministry is now publishing the summary and analysis of these submissions and its final decisions.

The Ministry will now move to implement the changes and commence a communications campaign to advise users of the changes.

3. Background

In 2009 the Government decided to reallocate the 700 MHz “digital dividend” radio spectrum to new uses. Recently, the Government announced that it plans to auction the digital dividend later in 2013. These decisions have an impact on UHF radiomicrophones as they will no longer be able to use the frequency range that will be auctioned. It is highly likely that this digital dividend will be purchased by mobile network operators and used to provide next generation (4G) mobile broadband services.

In May 2013 the Ministry published the ‘UHF Radiomicrophones: Opportunities for future use’ discussion document to finalise the frequency ranges available for UHF Radiomicrophones after the digital dividend has been auctioned. The document sought the views and opinions of interested parties. This document summarises and analyses the submissions received to that discussion document. The document also presents the final decisions and provides a summary of changes.

To view the ‘UHF Radiomicrophones: Opportunities for future use’ discussion document and the submissions received please refer to the Ministry’s website: <http://www.rsm.govt.nz/cms/policy-and-planning/consultation/uhf-radiomicrophones-opportunities-for-future-use/uhf-radiomicrophones-opportunities-for-future-use>

4. Summary of submissions

4.1 Cessation of radiomicrophone usage in the digital dividend

Question 1

Do you agree with allowing radio microphones to continue operation in the 703 – 806 MHz band until 11 March 2015 to allow a phase out period, noting that radiomicrophones must cease operation if they are causing interference? If not, why?

Response from submitters

Most submitters agreed with the proposal to allow radiomicrophones to continue until 11 March 2015. One submitter did not support the deadline. In principal they thought that phase out is a good idea. However, they were concerned that this would not give radiomicrophone users any certainty as they will expect their equipment to work right to the end date. The submitter was also concerned about interference from and to cellular services. Another submitter requested that the deadline be extended beyond 2015.

Submitters expressed a need for better information and an educational campaign so that radiomicrophone users are made aware of the changes. Some submitters requested that the Ministry inform radiomicrophone users about when possible interference from new use of the management right may occur and when they will need to turn off their equipment.

One submitter, (a telecommunications and mobile network operator) expressed comfort with allowing radiomicrophones in the 703 – 806 MHz band to continue until 11 March 2015. However, the submitter requested that the Ministry ensure radiomicrophone use of 703 – 806 MHz ceases use by the 11 March 2015 deadline. The submitter also expressed concern that it could be difficult to find radiomicrophone interferers and requested that the Ministry provide additional compliance assistance. Normally, the management right holder needs to find the interferer and provide a level of proof under the Radiocommunications Act 1989 before the Ministry will take action.

Ministry analysis

The Ministry considers that the 11 March 2015 deadline is as late as practicable, to allow new uses of the 700 MHz band. Radiomicrophone use is incompatible with the potential new uses of the band. It is expected that by 11 March 2015 deployment of new services in the digital dividend will be well underway. The Ministry considers that the 11 March 2015 deadline should be implemented and an incumbent licence will be placed into the management rights to be sold in the 700 MHz auction to give effect to this transition. It was originally intended that radiomicrophone use was to cease when the spectrum was auctioned to private management right holders. This would have been 1 January 2014.

Whilst the radiomicrophone licence never offered use of the 700 MHz spectrum post 2015, the Ministry intends to initiate public communications to educate radiomicrophone users on the deadline and the changes. Parties participating in the 700 MHz auction need to be aware that interference resolution for these new management rights will remain the responsibility of the management right holder under the Radiocommunications Act.

4.2 Could Radiomicrophones use the APT guard bands?

Question 2

Do you agree with permitting the operation of radio microphones at low power in the 698 – 703 MHz band (–20dBW / 10mW EIRP) on a non-interference basis?

Question 3

Noting the possibility of degradation from cellular mobiles, is providing for radio microphone use in the 698 – 703 MHz band useful to radiomicrophone users?

Response from submitters

Most submitters considered that the guard band has limited use for radiomicrophones if use is only allowed at a maximum Equivalent Isotropically Radiated Power (EIRP) of -20dBW (10mW). Some submitters considered that the power should be set at the current General User Spectrum Licence (GUSL) limit (0.5 W) and noted that professional equipment operates between 30mW – 100mW. Submitters considered that 10mW would only be useful to users operating low cost systems and that existing professional radiomicrophones will not be able to be switched to 10 mW, submitters also considered that different power limits would create confusion. One submitter considered that the lower guard band at 10mW could be useful for some users such as TV studios and remote locations. Another submitter suggested allowing the centre and upper guard band to continue beyond 11 March 2015. Another submitter suggested that the Ministry consult with the Australian Communications and Media Authority (ACMA) and claimed that the ACMA is considering the lower, centre and upper guard bands of the Asia Pacific Telecommunity (APT) band plan for radiomicrophone usage.

Some submitters suggested that the Ministry should conduct practical testing to determine the power level that could be operate in the guard band.

One submitter, (a telecommunications and mobile network operator) strongly opposed the use of the lower guard band and did not agree that interference to cellular base stations would be minimal. This submitter considered that cellular operators are increasing cell site density to deliver faster speeds and that radiomicrophones are therefore more likely to be in the proximity of base stations which will increase the interference potential. The submitter further noted that Australia is amending its low interference potential devices class licence which will prohibit use of 694-820MHz for radiomicrophones from 1 Jan 2015. In the opinion of this submitter, this shows that the ACMA is of the view that radiomicrophones will cause interference to cellular base stations if they operate in the band 698-703MHz.

Ministry analysis

The Ministry notes a lack of support for the allowing the guard band at a low power of -20 dBW (10mW) EIRP and has considered the suggestions from submitters to raise the power to (-3 dBW (500mW) EIRP. The Ministry also notes some opposition to allowing use of the guard band at all. From the information received, the Ministry considers that there are going to be difficulties allowing low power use in the lower guard band both with usability for radiomicrophones and interference risk to cellular networks. It is noted that different power levels in different bands could be confusing to users and possibly create compliance issues. Increasing the power in the 698 – 703 MHz band for better usability by radiomicrophone systems will increase the risk of interference to potential cellular systems. The Ministry also observes the potential interference radiomicrophones could experience from cellular mobiles transmitting in close proximity. The Ministry considers that use of the centre and upper guard bands will be problematic as it will likely cause interference to cellular mobile handsets which are likely to be used in very close proximity to radiomicrophones.

The Ministry has been following the developments in Australia and observes that the ACMA has prohibited radiomicrophone use in 694 – 820MHz from 31 December 2014. The ACMA has put measures in place to prevent the sale of radiomicrophones that use this frequency range. This prohibition includes the lower, centre, and upper guard bands of the APT band plan.

At this stage there is no realistic way of conducting practical tests between radiomicrophones and potential cellular systems as there are no commercially deployed networks using the 700 MHz band and there is very limited equipment available in the market. Practical testing is something that could be done at a future date if appropriate. If radiomicrophone vendors, users, and interested parties wish to approach the new management right holders to investigate what satisfactory tests could be conducted to prove compatibility, the Ministry will facilitate this but the Ministry does not plan to conduct these tests at this stage.

The Ministry will therefore not allow use of the 698 – 703 MHz frequency range (lower guard band) to continue after 11 March 2015. The Ministry will continue to watch international developments and studies to determine if use of any of the APT band plan guard bands is appropriate for radiomicrophones in the future.

4.3 Digital Radiomicrophones

Question 4

Do you agree with allowing digital radio microphones? What types of emissions / modulation and emission bandwidths would be appropriate?

Response from submitters

Submitters generally supported allowing for digital radiomicrophones but note that there is not much cost effective equipment available on the market.

One submitter asked how the Ministry would approach an introduction of, or transition to, digital radiomicrophone use.

Ministry analysis

In principal the Ministry will provide for digital and update the General User Spectrum Licences accordingly. The Ministry is still seeking information on appropriate emissions and bandwidths so implementation of this may take some months.

The Ministry will provide for digital and existing analogue emissions on the same General User Spectrum Licence(s). It will be the users' decision on what technology they choose. Radiomicrophones operate on a non-interference basis so users will need manage any incompatibly issues between digital and analogue. Digital radiomicrophones are in the early stages of use and deployment by industry. The Ministry notes a lack of industry demand for a transition from analogue to digital and does not intend to plan a phase out of analogue at this stage.

4.4 Standards applicable to Radiomicrophones

Question 5

Are there any other performance standards that should be listed in the 'Radiocommunications (Radio Standards) Notice 2010'?

Response from submitters

Most submitters did not have a view on what other performance standards should be included. One submitter noted that much UHF microphone equipment is sourced from the United States, and suggested that the Ministry examine any equivalent US standards, including ETSI TR 102 799 V1.1.1, CEPT Report 32, and EN 300 422.

Ministry analysis

The Ministry will further consider if other standards can be added to the Radiocommunications (Radio Standards) Notice 2010. The Ministry notes that in general, reports are not appropriate to list in the notice as they are not standards.

4.5 Other issues raised

4.5.1 Extension of the band down to 502 MHz

Response from submitters

One submitter suggested that the lower frequency range for radiomicrophones be extended down from 510 MHz to 502 MHz. The submitter noted that this is currently allocated for television broadcasting.

Ministry analysis

The Ministry accepts this suggestion and will extend the band down to 502 MHz providing an additional 8 MHz for Radiomicrophone usage. The 502 – 510 MHz (TV25) frequency range is not part of the standard television band or television management rights but is allocated for television use. Radiomicrophones are compatible on a geographic basis, with television use. While TV25 may be used for some broadcasting services at some stage it is unlikely it will be used for normal television services any time in the near future.

4.5.2 Specific frequencies available for radiomicrophones

Response from submitters

Submitters requested more information on what frequencies within the remaining television band will be good to use for radiomicrophones without interference. Some submitters expressed concern that Sky Network Television Limited may convert all of its unused analogue licences to digital licences leaving little free spectrum in Auckland. One submitter asked for at least one clear television channel to be set aside nationwide.

Ministry analysis

Radiomicrophone use in the television bands is on a secondary basis where radiomicrophones have to work around the primary television use and not cause interference to television broadcasting. Users of radiomicrophones pay no fees and have no protection from interference. Radiomicrophone users must make their own decisions on what frequencies will work best for them in their circumstances or area of operation. The Ministry cannot recommend specific frequencies. The frequencies used for television broadcasting will vary from region to region and can change over time due to commercial demands.

Sky Network Television Limited has the option to convert some its existing analogue licences to digital. This option is available to Sky until 1 December 2013. If Sky does not take up any or all of their options, the frequencies will be returned to the Crown and Cabinet will need to decide what will happen with these frequencies. The Ministry is therefore unable to predict the extent and/or timing of the operation of television services in these currently unused portions of the band. It is likely, however, that it may take some years to utilise all of the spectrum and that digital television licences will follow the same geographic frequency pattern as currently established. This may assist decisions by radiomicrophone users.

The Ministry will not be holding any frequencies or television channels for exclusive radiomicrophone use. However, the Ministry notes that at this stage there are frequency ranges with little television use in them. These include 502 – 518 MHz and 686 – 698 MHz.

4.5.3 Other frequency ranges

Response from submitters

One submitter asked what work has been done looking for potential clear channels suitable for microphone use in the 450 – 960 range.

Ministry analysis

The purpose of this consultation was to provide certainty on the changes to the current general user spectrum licences and not to identify new spectrum sharing scenarios in other bands. The Ministry notes that there are various frequency ranges available under the General User Radio Licence for Short Range Devices (GURL-SRD) which may be suitable for radiomicrophone use but is shared with other short range devices.

4.5.4 Event licences

Response from submitters

One submitter asked if event licences can be created where there is insufficient spectrum for large events. They also asked if special licences at higher powers, co-channel with television licences, could be created for events.

Ministry analysis

Radiomicrophones do not operate under an individual licence, they are under a general user spectrum licence. There are no frequencies specifically set aside specifically for events. It is also noted that a large event typically requires a number of radiomicrophones with reasonably separated frequencies, rather than a narrower band with small frequency separations between radiomicrophones. However, the Ministry does consider the licensing of any frequency or any channel on a short term basis for special events, provided that no interference will be caused to existing users. This is common practice for big events such as the Rugby World Cup, V8 races, World Rally Championship, and other international events. This does not suit many radiomicrophone users as it is strictly short term for an event. Fees do apply, an individual licence is required, and an Approved Radio Engineer or Certifier (ARE / ARC) must certify any licence. Refer to [‘The Radio Licence Policy Rules’](#) (PIB 58) and in particular 2.1.2 ‘Non-conventional Fixed Term Licences’ for details.

Television Broadcasting is a licenced service protected from harmful interference. Transmitters such as radiomicrophones must not cause harmful interference to television reception. It is highly unlikely that a high power radiomicrophone special event licence co-channel and within television coverage could be certified by an ARE.

4.5.5 Change to condition on General User Spectrum Licences

Response from submitters

One submitter suggested re-examination or relaxation of the condition (f) in the current General User Spectrum Licences. They considered that when radiomicrophone users are indoors they should be able to operate up to -3 dBW (0.5W) EIRP without first determining the absence of existing licensed services in the proposed area of operation. This is on the basis that indoor operation is attenuated and is unlikely to cause a problem to television broadcast reception.

Ministry analysis

The Ministry notes that the limit under condition (f) is in place to reduce the likelihood of interference to broadcast television viewers and could not be generally relaxed. However, the Ministry recognises that there are variety of scenarios out of its control and recognises that more flexibility may be desirable. The Ministry will consider a revision of the condition, a draft is below. The exact wording of the condition will still need to be finalised:

“(f) Use of a power level above -20 dBW is only permitted when the user has first determined that the intended frequency of use will not affect the reception of television broadcast in or adjacent to the proposed area of operation”

4.5.6 Television White Space

Response from submitters

Some submitters expressed concern that the discussion document does not mention television white space devices.

Ministry analysis

The Ministry is investigating television white space and notes that it is in its early stages of development. Before any long term regime is developed the Ministry will consult with industry. The Ministry invites radiomicrophone users to participate in future consultations about white space use.

4.5.7 Data provided by the Ministry

Response from submitters

Some submitters criticised the way the Ministry provides licence data and noted that SMART needs to be more user friendly.

Ministry analysis

The Ministry provides licence data in a variety of formats. These are through the Spectrum Search Lite tool and SMART. Spectrum Search Lite is a graphical interface giving users a spectrum analyser-type display. Also associated with Spectrum Search Lite is an access database (prisims.mdb). This database could be used by users in a variety of ways or used in applications developed by users or vendors. SMART is a web based system and allows live searching of the licence database. SMART is real time whereas Spectrum Search Lite is updated weekly. The Ministry is also planning future enhancements to SMART to make it more user friendly and provide data in better ways. The Ministry is currently working towards some downloadable web service tools which may assist some users. These new tools will be more capable and it is planned that they will eventually replace Spectrum Search lite and the prisims access database (prisims.mdb). There is no deadline on this yet.

SMART:

<http://www.rsm.govt.nz/smart-web/smart/page/-/smart/WelcomePage.wdk>

Spectrum Search Lite:

<http://www.rsm.govt.nz/cms/tools-and-services/spectrum-search-lite>

Database in access file: prisim.mdb

<http://www.rsm.govt.nz/cms/pdf-library/resource-library/spectrum-search-lite/spectrum-search-lite-database>

4.5.8 Māori Television Service (Te Aratuku Whakaata Irirangi Māori) Amendment Bill 2012

Response from submitters

Some submitters requested that the Ministry facilitate discussions with the manager of the right to be provided under the Māori Television Service (Te Aratuku Whakaata Irirangi Māori) Amendment Bill 2012 (assuming that it passes into an Act of Parliament – at the time of writing, the Bill is before Select Committee) to ascertain if radiomicrophones could operate in the right. Submitters also asked if any consultation has taken place on this matter.

Ministry analysis

Under the Bill, the Management right is to be provided for the purpose of the Māori Television rather than for other purposes. The Crown is unable to permit radiomicrophones in a management right allocated to another party such as Te Pūtahi Paoho.

4.5.9 Banning equipment in the 698 – 806 MHz band

Response from submitters

Some submitters considered that the Ministry should ban equipment operating in the digital dividend as soon as possible to prevent unwary buyers from purchasing equipment rendered unusable after 11 March 2015.

Ministry analysis

The Ministry will move to restrict the sale and supply of radiomicrophones in the 698 – 806 MHz band after the publication of this document. The Ministry will advise dealers and suppliers when this is to be implemented and will allow some transition time before it takes effect. As noted in section 4.1, the Ministry will also begin a public information campaign.

5. Summary of changes and decisions

After analysis of the submissions received the Ministry is now in a position to make final decisions on the future spectrum available for radiomicrophones. The summary of changes and decisions are listed and are shown in Figure 5 below:

- 1) Radiomicrophone use in the 698 – 806 MHz frequency range will be allowed until 11 March 2015 on a non-interference basis. Use will be permitted through an incumbent General User Spectrum Licence within the digital dividend spectrum to be sold. Radiomicrophone use will be on a secondary basis and users must not cause interference to other licenced systems.
- 2) After expiry of the General Licence on 11 March 2015 all radiomicrophone usage in the 698 – 806 MHz must cease.
- 3) Long term use of frequency range 502 – 606 MHz will be allowed. Use is on a secondary basis where radiomicrophones must not cause interference to other licenced services. The frequency range 582 – 606 MHz will not be available until after digital switch over (30 November 2013). The Ministry is now working to allow use of 502 – 510 MHz and will advise stakeholders when this happens. These changes provide an additional 32 MHz of spectrum for radiomicrophone use that was not previously available.
- 4) Use of the 606 – 622 MHz frequency range will not be authorised. This is to allow for the outcomes proposed in the Māori Television Service (Te Aratuku Whakaata Iirangi Māori) Amendment Bill 2012.

- 5) Long term use of frequency range 622 – 698 MHz will be allowed. Use is on a secondary basis where radiomicrophones must not cause interference to other licenced services.
- 6) Use of 698 – 703 MHz frequency range or any of the APT guard bands beyond 11 March 2015 will not be authorised.
- 7) Digital radio microphones will be provided for in any new or amended General User Spectrum Licences. Note that digital radiomicrophones will not be permitted in the 698 – 806 MHz frequency range at any time.
- 8) The sale and supply of radiomicrophones in the 698 – 806 MHz frequency range will be restricted. The Ministry is considering a 1 January 2014 deadline for this.

Since 2009, MBIE has identified 128 MHz of available spectrum to replace the 108 MHz that will be lost to radiomicrophone users because of the changes. While the available frequency range will change, the overall spectrum available for radiomicrophones will increase by 20 MHz. As it has always been the amount of usable spectrum in an area will be subject to television usage and other radiomicrophones in use.

The Ministry will now start a communications campaign to inform users of the changes to their obligations. The Ministry will pro-actively inform radiomicrophone users (and other key stakeholders) of the changes to make sure that radiomicrophone users take necessary action and in particular vacate the 698 – 806 MHz frequency range by 11 March 2015.

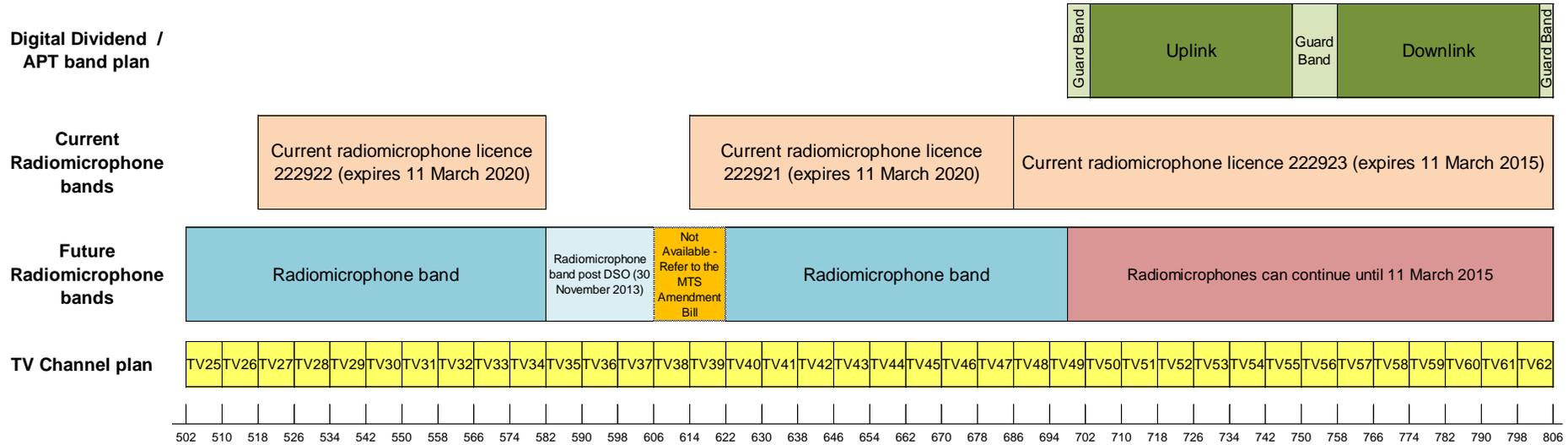


Figure 2: Overview of the 502 – 806 MHz band showing the changes for radio microphone