

RBA

Radio Broadcasters
Association

UHF Radiomicrophones

RBA Response to Discussion Paper

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Radio Broadcasters Association

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1 Executive Summary

MBIE has engaged industry previously on wireless microphone use. However, considerable time has passed and resolution of both available and usable spectrum is still outstanding.

The RBA reiterates that UHF radiomicrophones are an essential component of program assembly.

In the discussion paper MBIE suggests there is a significant amount of *available* spectrum but does not account for denial by TV licences or intermodulation effects that are crucial in determining *useable* spectrum.

The RBA is interested to understand if UHF spectrum outside the UHF TV and LTE bands has been searched for additional clear spectrum that might support UHF radiomicrophone use.

RBA members have been delaying UHF radiomicrophone purchases for some time. A timely provision of clarity around the situation over the next five years would be very helpful.

Use of the 703 – 806 MHz band for as long as possible would also be helpful.

Further information is required on whether use of the APT guard band is technically compatible and at what power limits. Studies or tests are encouraged.

Study and development efforts are being made towards UHF radiomicrophones that employ more efficient technology, but none of these have come to market in a cost effective form. We note that New Zealand licencing currently prohibits their use anyway and pose some questions on how a transition from analogue to digital UHF radiomicrophone use could be undertaken.

The RBA suggest that in line with other countries, reservation of one or more UHF TV channels for at least five years is highly desirable to assist UHF radiomicrophone use in the period where spectrum becomes constrained yet more efficient UHF radiomicrophone technology is not yet available.

Another question is posed to MBIE on how to deal with cases where there is insufficient spectrum at large events; could event licences be created that allow UHF radiomicrophone use at higher powers?

The RBA look forward to continued consultation with MBIE to find suitable solutions to these issues.

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3 Purpose

Radiomicrophones are an important part of assembling radio programs at live (or delayed) events.

As users of UHF radiomicrophones RBA members thank the MBIE for the opportunity to provide comment on this issue.

4 What are Radiomicrophones

In the description of radiomicrophones MBIE correctly highlights that fixed frequency devices with no flexibility are vulnerable to becoming unusable when their frequency of operation is coincident with use of a Spectrum Licence right.

What Frequencies can Radiomicrophones currently use?

The majority of radio microphones in use for professional broadcast are agile over a wide range of frequencies. But this range cannot be made too wide or operational reliability becomes difficult to achieve.

An example of a common tuning ranges (or blocks) for a single microphone are 36 and 60 MHz.

This means that for an organisation that only needs 1 UHF radio microphone for potential nationwide use they would actually need to purchase several units.

Limits due to intermodulation

A consequence of the wide tuning range (broad RF filtering) means that two types of intermodulation are likely:

- Microphones in close proximity produce intermodulation products that are radiated, and/or;
- The receivers are prone to intermodulation upon reception of one or more strong signals.

So although at an event with multiple operators there may appear to be a contiguous block of clear spectrum, in reality many of the frequencies will be denied.

This effect multiplies as more frequencies are used, that is to say, more frequencies are denied than additional usable frequencies.

MBIE have not taken into account reduction in usable spectrum at large events due to intermodulation. This means that stated estimates of usable spectrum are exaggerated.

Figure 1 is copied from a Sennheiser application note on use of their UHF radiomicrophones, which are in common use in New Zealand.¹

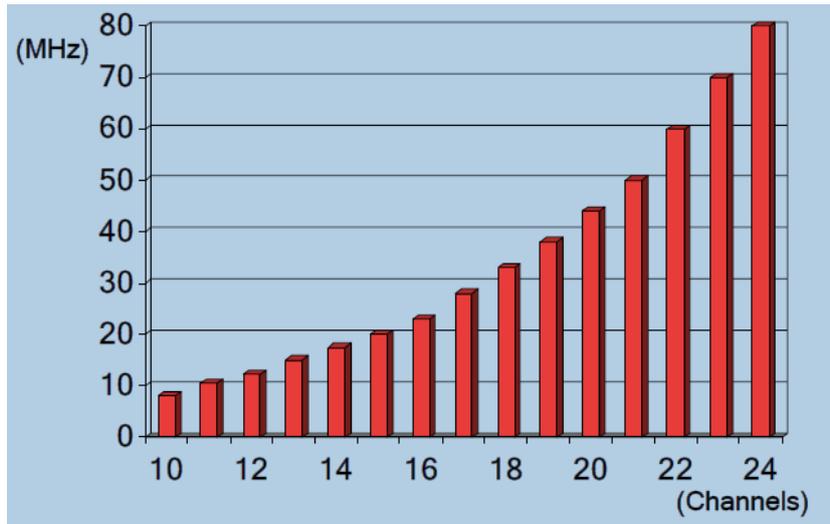


Figure 1 A graph of indicative usable channels per available bandwidth.

Other bands

Shure UHF microphones are available in 60 MHz blocks from 470 - 592 MHz.

Sennheiser UHF microphones are available in 36 MHz blocks from 450 - 960 MHz.

If upon importation a tuning block extends outside the New Zealand GUSL then it appears to be straightforward for the agent to adjust the unit to deny these channels, presumably by a firmware update.

The RBA would like to ask MBIE whether they have done any work in looking for potential clear channels in the entire range from 450 – 960 MHz that might be suitable for microphone use, noting that incumbent users must remain protected.

¹ SIFM Instructions for use (PDF) <http://en-de.sennheiser.com/service-support/services/sifm-software>

5 Need for change

The RBA understand the need for changes in the UHF band.

We also understand that these changes have been a long time in development and that ASO/DSO was planned and announced some time ago.

With growing certainty around the upcoming digital dividend, the RBA have represented in previous submissions the need to consider the requirements of access to useable spectrum for UHF wireless microphone use.

Despite these urgings this discussion paper has been delayed until a short time before the 700 MHz auctions.

Q1: *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?*

Members of the RBA have been delaying UHF wireless microphone purchases for a considerable time.

These delays are causing considerable difficulty in supporting live events.

Clarity on the available or useable spectrum is still not publically available. Information that is unclear includes:

- What will happen to the channels that Sky TV own?
- Will MBIE withhold one or more TV channels for UHF radiomicrophone use, or auction the channel with the chance of preventing UHF radiomicrophone use in congested areas?
- Will digital TV restacking occur in Auckland and if so, when?

It is important that the investment in microphones in the 703 – 806 MHz be preserved for as long as possible.

We are now in a situation that consideration should be given to extending the GUL in the 703 – 806 MHz band beyond 2015 until new bands are identified which are suitable for wireless microphone use.

Although there are incentives for successful bidders for the 700 MHz lots to implement the rights in a timely manner, there is a chance that portions of the LTE band will remain unused for some time in some areas.

6 Could Radiomicrophones use the APT guard bands?

Q2: *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?*

Radio microphones should be allowed to use all the available space in the UHF band.

The RBA agree with this proposal but would like to see the rational and/or calculations that MBIE have used to arrive at this power level, noting that higher power levels may be technically compatible with other uses in the band.

A 30 mW level would be a more useful limit.

In the current proposal there is foreseeably little or no usable UHF spectrum left for radiomicrophone use in some locations in the near future.

It seems irresponsible to deny the use of unused spectrum when it is on a secondary non-interference basis.

The RBA suggest strong consideration be given to continuation of UHF radiomicrophone use in the 698 – 703 MHz band for as long as possible.

Q3: *Noting the possibility of degradation from cellular mobiles, is providing for radio microphone use in the 698 — 703 MHz band useful to radiomicrophone users?*

In the foreseeable future there will be cases where there are no usable frequencies for radio microphones in the 510 – 694 MHz band in some areas.

Although it would only be a small benefit in limited situations, use of the guard band should be permitted as an attempt to mitigate the impact of denial of much of the available spectrum.

Practical tests or calculations would assist in determining suitable power limits.

7 Digital Radiomicrophones

Q4: Do you agree with allowing digital radio microphones? What types of emissions / modulation and emission bandwidths would be appropriate?

At this time RBA members have not been able to identify any digital radio microphones that are cost effective. Cost of UHF radio microphones are expensive and most introduce latency issues that make them problematic for live broadcast contribution.

In principle the RBA support evolution to digital technology on the basis that it provides a lower cost and improved effectiveness.

However, as the type of digital modulation is not yet clear, it is not possible to assess the potential type of incompatibilities between analogue and digital microphones.

RBA members have not acquired or trialled any suitable digital UHF radio microphones so we cannot comment on appropriate emission designations.

Q5: Are there any other performance standards that should be listed in the Radiocommunications (Radio Standards) Notice 2010'?

The standard mentioned, EN 300 422, is a European standard. As much of the UHF microphone equipment is sourced from the US the RBA suggest MBIE should also examine any equivalent US standards.

Several other documents should be considered as well.

The report ETSI TR 102 799 V1.1.1 (2010-06) "*Technical Report Electromagnetic compatibility and Radio spectrum Matters (ERM); Operation methods and principles for spectrum access systems for PMSE technologies and the guarantee of a high sound production quality on selected frequencies utilising cognitive interference mitigation techniques*" builds on other work within Europe.

For example, CEPT Report 32 "*Report from CEPT to the European Commission in response to the Mandate on Technical considerations regarding harmonisation options for the digital dividend in the European Union - Recommendation on the best approach to ensure the continuation of existing Program Making and Special Events (PMSE) services operating in the UHF (470-862 MHz) including the assessment of the advantage of an EU-level approach*" is a key input to EN 300 422.

One of the major findings is that spare channels must be withheld by Administrations to ensure that UHF microphone (PMSE) use can be maintained.

It is understood that this has happened in the UK and should also happen in New Zealand.

The RBA strongly urge MBIE to withhold at least one TV licence, especially in areas like Hamilton and Auckland where events international significance are most likely to be held.

The other key finding was that UHF microphone (PMSE) technology must be improved to make it more efficient.

The RBA acknowledge it is conceivable that at some point in the future, perhaps 5-15 years away, a full conversion of UHF microphones to digital technology can be mandated and undertaken. At least five years notice of such a change should be given in line with other licence tenure provisions of the Radiocommunications Regulations.

8 Other Matters

Power Limits

The RBA understand that most professional use of UHF radiomicrophones is within the range 30 mW to 250 mW.

The current licence limit of -3 dBW eirp (500 mW) is appropriate.

Permitted Modulation

The emission designator 300KF3EJN is appropriate for continued use of existing technology.

The RBA note that GUSL licences with this designator effectively deny use of digital radio microphones.

How would MBIE approach an introduction of, or transition to, digital radiomicrophone use?

What are the licencing implications?

Event Licences

The RBA foresee the situation in areas with congested UHF spectrum, such as Hamilton or Auckland, could require an event licence that allows 100 mW to 250 mW devices to be used co-channel with TV Spectrum licences. In these locations it is likely that as little as 16 MHz of spectrum will be clear which would be insufficient for a large event.

A complex and problematic approach would likely required, asking one or more TV Spectrum Licence holders and possibly the venue to agree to the interference to TV reception for a limited time at that venue location.

This is likely to be a sub-standard approach as even 100 mW radiomicrophones are likely to suffer interference from TV signals.

What would MBIEs response be to a request for such a licence?

Consultation

Public meetings have been held by WUNZ on these issues and some of these were attended by an MBIE representative.

The RBA suggest that consideration be given to the timetable for further consultation on this dynamic issue until a position of stability is reached. Some of the options that were discussed during the preparation of this paper were:

- Easier access to information on timing and available spectrum.
- A confirmed timeline of events related to UHF radiomicrophone use.
- Public workshops to discuss and resolve difficult issues.

The RBA look forward to continued consultation with MBIE to find suitable solutions to these issues.