



15/2/17

Wireless Users New Zealand (WUNZ) welcomes the opportunity to comment on the Radio Spectrum Management DRAFT Five Year Spectrum Outlook 2017-21 on behalf of its members, a cross section of suppliers, broadcasters, tertiary institutes, live sound operators, film industry sound mixers and other radio microphone users.

WUNZ notes the objectives of the regulations of the spectrum as they directly correlate with how radio microphones are used by members, particularly:

Achieving the Government's social, cultural and economic outcomes.

Radio microphones are fundamental to communication whether for film and television production, news, public events, sports, live entertainment, in boardrooms, in education and churches.

Maximising the radio spectrum value as input to social and economic development.

Social and economic development is dependent on effective communication and radio microphones are a key part of the communication chain. However in many situations the audio transmitted needs to be pristine, with next to no lag and with minimal compression.

Meeting the growing demand for wireless services.

Radio microphones are recognised in the document and again the current bandwidth available is challenged from other potential users. Users have only recently completed the migration from the 700 MHz band at great expense and those who have moved to the 600 MHz block will be angry to learn that they may have to spend the money again in the near future.

Internationally there is no agreement on what spectrum will be available for radio microphones with tests to be completed by the next WRC in 2019 and the earliest implementation of any agreement some time later. In territories such as North America, where the push to utilise the 600 MHz band for new uses is strongest, manufacturers are scrambling to provide work arounds for their clients but no medium term solutions are evident.

What is evident is that available spectrum will be fragmented and different types of users will use different parts of the spectrum. Users of large numbers of radio microphones will have to find spectrum across a range of different blocks. Among the potential blocks for use may be guard bands.

While the sell off of the 700 MHz band is touted as a financial success there has been no account of the costs involved in achieving the digital dividend nor compensation for those affected. There is also a significant lag between when changes are announced and replacement inventory procured. On the basis of the 700 MHz sell-off it will take a minimum of 3 years from any official

announcement for wireless users to move to alternative spectrum. Thus The earliest this could happen on the basis of the draft plan is 2025

WUNZ applauds any efforts to make the Register of Radio Frequencies more accessible to radio microphone users

RSM would be wise to keep abreast of developments elsewhere. Radio microphones are generally supplied from USA, Europe and UK and we are dependent on how radio microphone manufacturers respond to spectrum issues.

WUNZ appreciates the difficulties in reconciling the different demands on spectrum and would encourage and cooperate with any research into technical requirements of radio microphones, the breadth of usage, the economic benefits and costs involved.

Page 20 – Broadcasting (specifically redeployment of 600MHz band for IMT). The RSM notes the following: *“if future changes are proposed in the use of the 600MHz band, as a result of the ongoing international review of the UHF band, there will be a requirement to consider the situation of radio microphones currently sharing this band”*.

Radio Mic Licensing in New Zealand – Current Arrangements

- Usage in New Zealand is generally covered by a General User Spectrum License (GUSL)
- There are 2 x GUSL licenses for usage in frequency bands 510-606MHz and 622-698MHz. These licenses allow maximum power level of -3dBW (500mW)
- Spectrum is primarily allocated to UHF DTT Broadcasting, so radio mic users are classed as Secondary Users of the spectrum and must not cause interference to DTT Services
- Other bands available for radio mic use are 502-510MHz and 819-824MHz. These are covered under a “Short Range Device” GUSL.

Current International Plans

- USA currently auctioning off 614MHz to 698MHz spectrum.

Should the RSM and the Government decide to redeploy the usage of the “600MHz” spectrum, how would radio mic users be affected?

If the 600MHz spectrum was redeployed in New Zealand, users would be required to acquire new equipment in legal frequency bands. Some users have already spent tens of thousands of dollars replacing their 700MHz/800MHz radio mics as a result of the Digital Dividend in 2013, and another change in such a short period would be crippling to some businesses and organisations.

Usable spectrum availability for large scale users or events where multiple users are present will be an issue. For a typical All Blacks Test match approximately 60 frequencies are currently used in the 622-698MHz band and 15 frequencies used in the 510-606MHz band.

The RSM would need to ensure there is enough spectrum to accommodate all users at such All Blacks games or other high profile sporting and entertainment events.

How does DTT impact the usage of radio mics in the 500MHz band?

If no other frequency bands were to be made available for radio mic users, then at best a maximum of 56MHz of clear spectrum would be available for radio mic use in the 500MHz band.

For the bulk of the radio mic users, i.e. Schools, Gyms, Churches and Theatres, the available white space in the 500MHz band may be sufficient in most areas in the country however post the 700 MHz sell-off significant numbers of professional users have already migrated there.

There would also be some problem areas due to the coverage patterns of DTT from Main and Infill sites. This would affect users at some major sports venues where anything between 0 and 16 MHz of clear spectrum would be available for radio mic use.

No clear spectrum would be available in the 500MHz band at Mt Smart Stadium in Auckland and at Trafalgar Park in Nelson.

Only 8MHz of clear spectrum would be available in the 500MHz band at QBE Stadium in Albany, and at Eden Park in Auckland.

Only 16MHz of clear spectrum would be available in the 500MHz band at FMG Stadium and Seddon Park in Hamilton and at Bay Park in Tauranga.

This would severely affect the entertainment, broadcast coverage and match officials officiating at premiere sporting events such as; All Blacks Tests, Super Rugby, International Cricket, NRL Premiership and NRL 9's.

The increasing use of radio mics in reduced spectrum

The usage of UHF radio mics is increasing and as indicated above, for major events the current 622-698MHz spectrum is currently being used at capacity. Intermodulation (IMD) software indicates that in this 76MHz bandwidth, up to 32 frequencies can operate without any IMD issues.

Digital radio mics do offer efficiency of spectrum usage. Some systems proudly announce that up to 47 channels can operate within a 6MHz band, but the specs also show that maximum range is only 30m. At some sports venues up to 300m operating range is required. Latency is also another factor that needs to be considered especially for musical performances and TV Broadcasts.

Digital radio mic technology is evolving, but manufacturers need more time to research and develop systems that are able to match the performance of current analogue or digital hybrid systems, especially for high end professional users. The costs of such systems though would be 3 or 4 times as much as current radio mic systems.

Serious consideration also needs to be given to some form of active licensing or professional managed frequency co-ordination of radio mic frequencies either by the RSM or another approved appointed body. At an All Blacks Test match there can be up to 10 different users groups all wanting to use radio mics. Self-coordination by users in a market with decreased spectrum will ultimately lead to conflicts between users.

Appendix #1 Examples of radio microphone usage and congestion at public events in the available 502 – 698MHz spectrum (minus 606 – 622) for short range RF devices such as wireless microphones and IEM:

Auckland:

Since Auckland's television landscape occupies the 510-606MHz range it is almost impossible to run anything in that part of the spectrum in venues like Eden Park, Victoria Park, Western Springs,

Viaduct Event Centre etc. The TV channels are just too strong to make much radio microphone usage possible. "There are some tricks, but we can not beat physics."

Christmas in the Park: around 40 radio frequencies including wireless intercom systems, IEMs, TV field crews, performer handheld mics, wireless guitars and other instruments.

X Factor: around 46 frequencies for IEM, wireless instruments, performer handhelds, headsets, TV field crew IFBs and interview microphones.

Cricket World Cup Opening Ceremony required a total of 65 frequencies for performance and main broadcast, that does not include reporters.

Laneways Festival 2016: 66 RF frequencies across the whole festival including what bands brought with them.

Vodafone New Zealand Music Awards 2016: 52 frequencies 2014, 47 frequencies, including all performance mics and IEM as well as all Sky TV microphones and IFBs.

My Kitchen Rules 2015: 25 microphones and IFBs

New Plymouth:

WOMAD Festival (2015) about 54 RF frequencies across the whole festival including what bands bring with them.

The annual SPARK conference 2015 used about 42 frequencies across the whole building.

From the field

"I remember an All Blacks test match, with me in one of the corporate boxes and the radio handheld microphone just would not work anywhere further than 3m from its antennas (because it sat on top of a strong TV station).

Couldn't wait for the handhelds on the field of play to stop being used so I could use their frequencies... and that was when CH27 was still free, now that is gone as well. On that particular event we struggled to get 4 working radio microphones. We learned our lesson however and stopped using equipment in the 500MHz range at Eden Park moving to equipment in the 600-700MHz..."

Contact: Stephen Buckland, Chairman, Wireless Users New Zealand – stephenb@soundtq.co.nz; ph 09 366 1750; P O Box 68 594, Newton, Auckland.