RADIO SPECTRUM MANAGEMENT

NOT GOVERNMENT POLICY

Re-planning options for frequency bands within 1710-2300 MHz

Discussion document

March 2020

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
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Invitation for submissions

Interested parties are invited to comment on the content of this document, in particular on the questions posed, and on any related issues. Comments should be submitted in writing, no later than **5pm** on **Friday, 29th May 2020**[1] to:

By email: *(preferred option)*

> Radio.Spectrum@mbie.govt.nz with the Subject line: "1710-2300 MHz Discussion document"

or,
By post:

> 1710-2300 MHz Discussion document
> 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 Radio.Spectrum@mbie.govt.nz in the first instance.

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[1] Note. This is an extension from the original deadline of 17 April 2020 and is made due to the 2020 pandemic lockdown in New Zealand.

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1. Introduction

Radio Spectrum Management (RSM) is considering the best value use of a number of spectrum bands from 1710 to 2300 MHz.

This paper proposes new uses for the 1800 MHz duplex gap, the lower and upper portions of the paired 2200 MHz band, and proposes options for the paired 2100 MHz band expansion. The paper also proposes postponing a decision on the unpaired 2000 MHz band until there is clarity on the type of international harmonised usage for this band. RSM is seeking comment on these proposals, or on any alternative proposals for these spectrum bands.

2. Background

The spectrum bands in scope of this consultation have existing management rights with a common expiry date of 31 March 2021. The decisions made as a result of this consultation will be implemented after the expiry date of these management rights.

In May 2018, RSM decided not to renew a number of existing management rights in these bands as it was determined that they were being under-utilised. The expiry of existing rights is an opportunity to reallocate the blocks in a way that maximises their use in the future. All management right holders have been notified of this decision.

The spectrum blocks in scope are:

- 1785-1805 MHz (1800 MHz Duplex gap)
- 1980-2010 MHz and 2170-2200 MHz (Paired 2100 MHz band expansion)
- 2010-2025 MHz (Unpaired 2000 MHz band)
- 2025-2110 MHz and 2200-2300 MHz (Paired 2200 MHz band)

Not included in the scope of this consultation are the management rights allocated to mobile broadband in the frequency ranges 1710-1785 MHz and 1805-1880 MHz (known as the 1800 MHz Band), and the frequency ranges 1920-1980 MHz and 2110-2170 MHz (known as the 2100 MHz Band). RSM consulted on options for the renewal of these management rights in April 2018[2]. Also not within scope is the frequency range 1880-1920 MHz (the GURL for cordless phones).

[2] Please refer to https://www.rsm.govt.nz/projects-and-auctions/consultations/renewal-of-management-rights-in-1800-mhz-and-2100-mhz-bands-consultation/

The sub-bands in the 1710-2300 MHz frequency range which are inside the scope of this document can be summarised as follows:

Sub-bands	Known as	Bandwidth	Current Use	RSM proposal
1785-1805 MHz	1800 MHz duplex gap	20 MHz	Private MR	Wireless Mics
1980-2010 MHz	Paired 2100 MHz band expansion	30 MHz	Not in use	Trials
2010-2025 MHz	Unpaired 2000 MHz band	15 MHz	Private MRs	On hold
2025-2081.5 MHz	Paired 2200 MHz band (lower)	56.5 MHz	Private MRs	Fixed Links
2081.5-2110 MHz	Paired 2200 MHz band (upper)	28.5 MHz		Space Operation
2170-2200 MHz	Paired 2100 MHz band expansion	30 MHz	Not in use	Trials
2200-2256.5 MHz	Paired 2200 MHz band (lower)	56.5 MHz	Private MRs	Fixed Links
2256.5-2290 MHz	Paired 2200 MHz band (upper)	33.5 MHz		Space Operation
2290-2300 MHz	Guard band	10 MHz	Private MR	Guard band

Table 1 Sub-bands between 1710-2300 MHz that are inside the scope of this discussion document with sub-band pairs colour coded

The chart in Annex 2 illustrates the sub-bands that are both inside and outside the scope of this discussion document.

3. Proposal for new usages

When coming to the proposals in this document, RSM considered the current use of the spectrum bands in scope, and alternative uses for them that could enhance utility.

RSM is seeking comment on the following proposals:

3.1 Repurpose the 1800 MHz Duplex Gap for use by wireless microphone operations.

3.2 Postpone a decision on the use of the Unpaired 2000 MHz band until there is clarity on international harmonisation of the band.

3.3 Repurpose the lower portion of the Paired 2200 MHz band for fixed links under an administrative radio licensing regime based on the channel raster arrangements in Recommendation ITU-R F.1098-1.

3.4 Reserve the upper portion of the Paired 2200 MHz band exclusively for space operation use.

3.5 Seeks views on potential uses for two indicative channel paired blocks for the Paired 2100 MHz band expansion for short-term licences.

3.1. Radio microphones in the 1800 MHz Duplex Gap

RSM proposes to re-purpose the 1800 MHz duplex gap (1785-1805 MHz) to accommodate radio microphones, complying with ETSI standard EN 300 422-1.

Accommodating radio microphones in the 1800 MHz duplex gap would ensure that sufficient spectrum is available for this use in lieu of the previous clearance of the 700 MHz band in 2013, and any future clearance of portions of the 600 MHz band.

If a decision is made to make this spectrum available for radio microphones, RSM will need to quantify the appropriate size of guard bands at both ends, of this frequency range.

Question 1:	*Do you agree with the RSM proposal to use the 1800 MHz duplex gap (1785-1805 MHz) for radio microphones? If not, what is a better use of this block of spectrum?*
Question 2:	*What size guard band would be appropriate for achieving compatibility between radio microphone use and mobile networks operating below 1785 MHz and above 1805 MHz?*

3.2. Postponing a decision on the Unpaired 2000 MHz band

RSM proposes to postpone any decision on the Unpaired 2000 MHz band (2010 -2025 MHz) until there is clarity on an international harmonised usage for this band.

The frequency range 2010-2025 MHz is identified as a candidate band to support narrowband Mobile-Satellite Service in Region 1[3] under Agenda item 1.18 for the World Radiocommunication Conference in 2023. Although the studies are for Region 1, there is potential that any new satellite usage could be adopted by other Regions, including Region 3 which contains New Zealand.

Question 3:	*Do you agree with RSM's proposal to postpone a decision on the Unpaired 2000 MHz band (2100-2025 MHz) until there is clarity on international harmonised use for the band? If not, what is the best value use for this band?*

3.3. Fixed links in lower portion of Paired 2200 MHz Band

RSM proposes to make the lower portion of the paired 2200 MHz band (2025-2081.5 MHz and 2200-2256.5 MHz) available for fixed links to enable the clearing of the 'L' and 'LL' (1427-1518 MHz) band.

The frequency ranges 2025-2110 MHz and 2200-2290 MHz are globally harmonised for fixed and mobile services, earth-exploration satellite, deep space research and space operation services. The spectrum in this band was originally planned for fixed wireless access because New Zealand did not have a need to use this spectrum for space-related services at that time. However there seems to be limited use of this band for fixed wireless access or high-density mobile systems due to the restriction in the ITU Radio Regulations[4] to not introduce high-density mobile systems in 2200-2290 MHz, and by a lack of suitable equipment.

3.3.1. Clearing the 'L' and 'LL' bands to accommodate mobile broadband

The 2025-2081.5 MHz and 2200-2256.5 MHz spectrum would be sufficient to accommodate the migration of fixed links from the fixed 'L' and 'LL' bands in the frequency range 1427-1524 MHz, spectrum that is likely to be necessary to accommodate growth in mobile broadband[5].

Clearance of these fixed link bands would require either a transition programme to migrate existing fixed links to new frequencies at a timeframe shorter than 5-years, or discontinuing all fixed links with a 5-year notification period. If a transition programme is necessary, we believe that we could repurpose 2025-2081.5 MHz and 2200-2256.5 MHz as a substitute for the 'L' and 'LL fixed link bands after March 2021.

3.3.2. Proposed channel plan for 2025-2081.5 MHz and 2200-2256.5 MHz

We propose the following channel plan, illustrated in figure 1, based on ITU Recommendation ITU-R F.1098-1, "Radio-frequency channel arrangements for fixed wireless systems in the 1900-2300 MHz band".

[3] As defined by Article 5, International Radio Regulations (IRR)

[4] Footnote no. 5.391

[5] The frequency range 1427-1518 MHz was identified for use by International Mobile Telecommunications (IMT) systems at the World Radiocommunication Conference 2015 [to accommodate growth in mobile telephony]

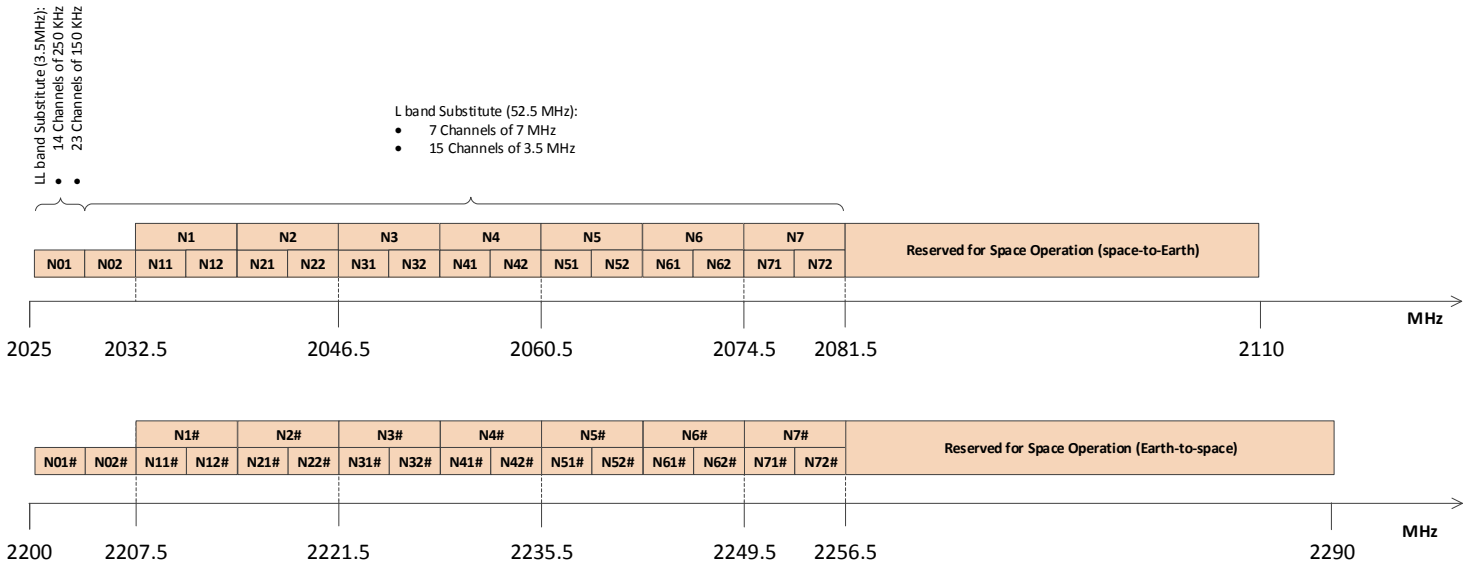

Figure 1: Proposed channel plan for fixed links in the lower portions of the Paired 2200 MHz band

There are technical restrictions for the protection of space operation, space research or earth exploration-satellite services when introducing new fixed links in this band. For example, Recommendation ITU-R F.1247-4 describes the technical characteristics of fixed links that we could consider as part of our licensing rules, including power spectral density pointing in the direction of specified geostationary satellites (GSO), maximum transmission power, automatic transmit-power control or antenna patterns.

3.3.3. Short-term licences for TV or space operation

RSM also proposes to consider short-term licences that may or may not align with the channel raster, on a case-by-case basis for TV outside broadcasts of major events and for space operation. However, such short-term licences would be subject to coordination with fixed links.

Question 4:	*Do you agree with RSM's proposal to use the lower portions of the Paired 2200 MHz band (2025-2081.5 MHz and 2200-2256.5 MHz) available for fixed links to enable clearing of the 'L' and 'LL' bands (1427-1524 MHz)?*
Question 5:	*Do you agree that the proposed channel plan for fixed links in Figure 1 would be adequate to transition those affected licences in 'L' and 'LL' fixed link bands? If not, why not?*
Question 6:	*Do you agree that the proposed channel plan for fixed links could also accommodate short-term licences that may or may not align with the channel raster on a case-by-case basis and are subject to coordination with fixed links for TV outside broadcasts of major events and for space operation?*
Question 7:	*Are there better uses for the lower portions of spectrum in the Paired 2200 MHz band? If so, what?*

3.4. Space operation in the upper portion of the Paired 2200 MHz Band

There is increasing demand for frequency bands dedicated to space operation due to the proliferation of small satellites, of large satellite constellations and to the increased regularity of launch vehicles in putting satellites in orbit.

The Paired 2200 MHz band (2025-2110 MHz and 2200-2290 MHz), being the globally harmonised space operation band in UHF range, has been the most popular choice for telemetry, telecommand and network tracking for satellite network operators and space launchers.

In light of the growing interests in space activities, we propose to reserve the upper portion of the Paired 2200 MHz band (2081.5-2110 MHz and 2265.5-2290 MHz) for space operation in the space-to-Earth and Earth-to-space directions, respectively, in New Zealand.

The carve-out of the Unpaired 2000 MHz band (2010-2025 MHz) from the 2025-2110 MHz band means that there would be asymmetry in bandwidth between the two sub-bands being reserved for space operation, namely, between the frequency ranges of 2081.5-2110 MHz (space-to-Earth) and of 2256.5-2290 MHz (Earth-to-space).

To allow flexibility in adopting the appropriate bandwidth for the corresponding uplink and downlink of space operation, we do not propose any specific channel arrangements for licensing purposes. We also intend to keep a guard band of 10 MHz in the frequency range 2290-2300 MHz as a technical measure to achieve compatibility with the adjacent management right above 2300 MHz.

Question 8:	*Do you agree with RSM's proposal to reserve 2081.5-2110 MHz and 2256.5-2290 MHz exclusively for space operation in New Zealand? If not, why not?*
Question 9:	*Do you agree that the reserved spectrum would be adequate to support the growing demand in space activities?*
Question 10:	*Is there a better use for the spectrum between 2081.5-2110 MHz and 2256.5-2290 MHz? If so, what?*
Question 11:	*Do you agree with the proposal to use 10 MHz guard bands in the frequency range 2290-2300 MHz?*

3.5. Options for the Paired 2100 MHz Band Expansion

The Paired 2100 MHz band expansion (the 2x30 MHz pair of 1980-2010 MHz and 2170-2200 MHz) is not currently part of a management right[6]. RSM is monitoring international developments for the future use of this unoccupied spectrum and is now seeking views on the best value use for this spectrum. The emerging uses for these blocks are outlined.

3.5.1. Mobile broadband applications

This option is the 2x30 MHz spectrum pairing, adjacent to the Paired 2100 MHz band, could be combined to form a pair of contiguous blocks (i.e. 1920-2010 MHz and 2110-2200 MHz) for

[6] The terminology "band expansion" refers to the extension of the 5G n1 band pairing of 1920-1980/2110-2170 MHz to 1920-2010/2110-2200 MHz of the 5G n65 band.

mobile broadband, if these bands were considered suitable for future migration to 5G[7]. This spectrum could be allocated through a competitive auction process if there is sufficient industry demand.

3.5.2. Ground-to-aircraft and aircraft-to-ground communications for on-board internet services

An alternative proposal for the 2x30 MHz spectrum pairing is for ground-to-aircraft and aircraft-to-ground communication using mobile technologies, such as 4G/LTE, to provide on-board internet for domestic commercial flights.

3.5.3. Mobile-satellite service

Lastly, RSM could enable a 2x30 MHz spectrum pairing for the deployment of a mobile-satellite service. In Europe, these frequency ranges have been assigned to support the European Aviation Network using a mobile-satellite network, which in conjunction with a terrestrial 4G/LTE mobile network operating as the complementary ground component, is used to support an integrated satellite and air-to-ground communication for on-board connectivity. However, this deployment scenario is not available for New Zealand due to the lack of satellite coverage footprints in these frequency ranges.

Considering the interest that RSM received for trial opportunities, we would continue to make the Paired 2100 MHz band expansion available for short-term trials before any final decision is made. As the frequencies immediately below the band edges, at 1980 MHz and 2170 MHz respectively, are occupied by 2-degrees for its 3G/UMTS network, any allocation would require an engineering assessment to ensure technical compatibility with the incumbent licences.

Question 12: *What is the best value use for the Paired 2100 MHz band expansion?*

[7] 1920-2010 MHz and 2100-2200MHz are defined by 3GPP Standards as an operating band for 5G FDD.

Annex 1: Complete list of questions asked in this discussion document

1. Do you agree with the RSM proposal to use the 1800 MHz duplex gap (1785-1805 MHz) for radio microphones? If not, what is a better use of this block of spectrum?

2. What size guard band would be appropriate for achieving compatibility between radio microphone use and mobile networks operating below 1785 MHz and above 1805 MHz?

3. Do you agree with RSM's proposal to postpone a decision on the Unpaired 2000 MHz band (2100-2025 MHz) until there is clarity on international harmonised use for the band? If not, what is the best value use for this band?

4. Do you agree with RSM's proposal to use the lower portions of the Paired 2200 MHz band (2025-2081.5 MHz and 2200-2256.5 MHz) available for fixed links to enable clearing of the 'L' and 'LL' bands (1427-1524 MHz)?

5. Do you agree that the proposed channel plan for fixed links in Figure 1 would be adequate to transition those affected licences in 'L' and 'LL' fixed link bands? If not, why not?

6. Do you agree that the proposed channel plan for fixed links could also accommodate short-term licences that may or may not align with the channel raster on a case-by-case basis and are subject to coordination with fixed links for TV outside broadcasts of major events and for space operation?

7. Are there better uses for the lower portions of spectrum in the Paired 2200 MHz band? If so, what?

8. Do you agree with RSM's proposal to reserve 2081.5-2110 MHz and 2256.5-2290 MHz exclusively for space operation in New Zealand? If not, why not?

9. Do you agree that the reserved spectrum would be adequate to support the growing demand in space activities?

10. Is there a better use for the spectrum between 2081.5-2110 MHz and 2256.5-2290 MHz? If so, what?

11. Do you agree with the proposal to use 10 MHz guard bands in the frequency range 2290-2300 MHz?

12. What is the best value use for the Paired 2100 MHz band expansion?

Annex 2: Chart showing the sub-bands inside the scope of this discussion document