



MEDIA & COMMUNICATIONS PORTFOLIO

Communications Officials' Fortnightly Report

Fortnight ending:	07/12/2025	Priority:	Medium
Security classification:	In Confidence	Tracking number:	0024678

Recipients**Action sought**

Hon Paul Goldsmith
MINISTER FOR MEDIA AND COMMUNICATIONS

Note the contents of this report

Jenny Marcroft MP
**PARLIAMENTARY UNDER-SECRETARY TO THE
MINISTER FOR MEDIA AND COMMUNICATIONS**

Released under the Official Information Act 1982

MBIE has reached out to WISPs ahead of 3.34-3.46 GHz replanning (spectrum for WISPs and private networks)

Daniel O'Grady

9(2)a

Last week MBIE contacted a small number of wireless internet service providers (WISPs) to request information about the current challenges and costs they face as well as technical details about their equipment use in the 3.3 GHz spectrum band. This information will help us form policy and technical proposals for the future use of the 3.34-3.46 GHz frequency band (spectrum for WISPs and private networks).

WISPs have responded positively to this outreach via social media and seem pleased this project is underway. We will update you on the development of proposals for the use of 3.34-3.46 GHz, including seeking your approval for public consultation, in due course.

Out of Scope

Released under the
Official Information Act 1982

Out of Scope

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Official Information Act 1982



MEDIA & COMMUNICATIONS PORTFOLIO

Communications Officials' Weekly Report

Week ending:	03/03/2024	Priority:	Medium
Security classification:	In Confidence	Tracking number:	2324-1452

Recipient	Action sought
Hon Melissa Lee MINISTER FOR MEDIA AND COMMUNICATIONS	Note the contents of this report

Minister's comments:

Updates

Out of Scope

Starlink offers half price monthly subscription fees for slower speed broadband service in New Zealand

Deb Salter

9(2)a

Starlink is now offering New Zealand customers half price monthly subscription fees for a Deprioritized Standard satellite broadband service. The Standard service is \$159 per month while the Deprioritized service is \$79 per month. The Deprioritized service is advertised as being 50-100 Mbps download speeds (as compared to 150-250 Mbps for the Standard service plan). The Deprioritized Service will be slower at peak times as customers on the Standard service will be given priority.

Wireless Internet Service Providers (WISPs) have raised concerns with MBIE officials regarding this latest offering from Starlink. WISPs have suggested it will be difficult for them to remain commercially viable when competing with Starlink at this price point. WISPs will likely be considering how they can continue to operate in a more competitive market and increasingly moving into the provision of fibre.

Out of Scope

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Official Information Act 1982

Out of Scope

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Official Information Act 1982

Archived: Wednesday, 11 March 2026 2:50:41 pm

From: [Brewer, Jonathan](#)

Mail received time: Thu, 3 Jul 2025 09:28:28

Sent: Thursday, 3 July 2025 9:28:30 pm

To: [Claire Smollett](#)

Subject: 6 GHz FWA trial licences request

Importance: Normal

Sensitivity: None

Attachments:

[20250703 letter Jonathan Brewer to Claire Smollett.pdf](#); [PolicyTracker-Jan-13-JB-Extract.pdf](#); [Radio Spectrum Outlook Consultation Response from Telco2 Ltd.pdf](#);

Kia ora Claire,

It was great to catch up with you two weeks ago. One of the matters we discussed was the possibility of a trial of 6 GHz spectrum for Fixed Wireless Access (FWA).

The letter attached presents what I believe is a reasonable and low-risk trial that would allow my customer Inspire Net to explore use of the 6 GHz band for FWA, and would allow my company to develop an Automated Frequency Coordination (AFC) system to enable more effective use of the radio spectrum.

I also mentioned in our chat I've been advocating for dynamic spectrum use of the kind enabled by AFC for some time now. I've also attached my response to RSM's 2012-2016 Five Year Outlook, and coverage of that response by the industry journal Policy Tracker for some fun background reading. :-)

Ngā mihi,

Jon

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<https://telco2.co.nz/>

9(2)a

Archived: Wednesday, 11 March 2026 2:49:32 pm

From: [Brewer, Jonathan](#)

Mail received time: Sat, 4 Oct 2025 04:34:58

Sent: Sat, 4 Oct 2025 17:31:35

To: [Claire Smollett](#)

Subject: Fwd: 6 GHz FWA trial licences request [IN-CONFIDENCE - RELEASE EXTERNAL] [UNCLASSIFIED]

Importance: Normal

Sensitivity: None

Attachments:

[image001.gif](#); [pib-38-radio-licence-certification-rules-pib-38-issue-13-july-2025.pdf](#);

Tēnā koe Claire,

My reading of PIB 38 section 1.5 is that applications for tests and demonstrations are made to the RSM National Manager. I've previously successfully applied for test licences in the 60 GHz band (ids 105055/105312) and 80 GHz band (110293/110252), and in neither case was it necessary for the policy and planning team to get involved. I'm unclear as to why they need to be involved in this case. Can you please explain?

Ngā mihi,

Jon

----- Forwarded message -----

From: **Daniel O'Grady** <daniel.ogrady@mbie.govt.nz>

Date: Fri, 3 Oct 2025 at 15:27

Subject: RE: 6 GHz FWA trial licences request [IN-CONFIDENCE - RELEASE EXTERNAL]

To: [REDACTED] 9(2)a >

Kia ora Jon,

Thank you for this information. As this is a Policy and Planning issue Claire has passed it through to me as the responsible manager in MBIE and I have tasked a team member with going through the info. This has taken a little while to get to due to a combination of sickness and leave over the past few weeks. We will be in touch once we have carefully considered what you have provided us.

On another note, I also wanted to let you know that the Minister has now asked us to commence work on the spectrum in 3.34 - 3.46 GHz and to consider the needs of both WISPs, private networks and other uses. We will be looking at what is feasible to enable given the differences between these services. As a Ministerial priority this will take preference over work on AFC in lower 6 GHz but we will still take a look at what you have provided us.

Ngā mihi,

Daniel O'Grady

MANAGER

Radio Spectrum Policy and Planning

Communications, Infrastructure and Trade Branch

Ministry of Business, Innovation & Employment

9(2)a

From: Claire Smollett

Sent: Friday, 12 September 2025 4:25 pm

To: Brewer, Jonathan <9(2)a >

Cc: 9(2)a >

Subject: RE: 6 GHz FWA trial licences request [UNCLASSIFIED]

Kia ora Jon

Thank you for your patience. Annette Lynch our team administrator has successfully downloaded all 32 attachments from the Dropbox cloud and has successfully saved these in our internal drives.

Noting below the commercial in-confidence marking and release conditions, I am working through allocating the file and attachments to an appropriate RSM colleague for their assessment.

I trust you will have a restful weekend,

Ngā mihi nui

Claire Smollett

NATIONAL MANAGER RADIO SPECTRUM MANAGEMENT

Te Whakatairanga Service Delivery

Hikina Whakatutuki - Ministry of Business, Innovation and Employment

claire.smollett@mbie.govt.nz | 9(2)a

15 Stout Street, 6011 | Wellington | New Zealand

NZBN 9429000106078

RSM-e-signature

From: Brewer, Jonathan <9(2)a >
Sent: Monday, 1 September 2025 4:59 pm
To: Claire Smollett <Claire.Smollett@mbie.govt.nz>
Cc: 9(2)a >
Subject: Re: 6 GHz FWA trial licences request [UNCLASSIFIED]

Tēnā koe Claire,

Please find attached a response to your request for additional detailed technical information named "AFC Full Proposal Telco2 Inspire Cambium Qualcomm.pdf".

Also please download the file [tc2_afc_trial_attachments.zip](#) from my Dropbox for 32 separate supporting documents referenced in the response. I'd appreciate it if you could confirm when you're in receipt of the attachments file and have successfully opened it.

The following documents are commercial in confidence and may not be released without redaction approved by Telco2, Inspire, Cambium, and Qualcomm.

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- 450v trial Link Budget and CN objectives.xls
- afc_trial_records_example_20250729.txt

The following Wi-Fi Alliance materials are non-public and may only be released while complying with the terms of copyright printed in the documents.

- AFC System to AFC Device Interface Specification v1.5.pdf
- AFC_System_Reference_Model_v1.0.pdf

Please let me know if you have any further questions or requests for information.

Ngā mihi,

Jon

On Wed, 6 Aug 2025 at 10:51, Claire Smollett <Claire.Smollett@mbie.govt.nz> wrote:

Kia ora Jon,

Thank you for your email, I have taken the time to review this and discuss your query with my colleagues before responding.

I want to begin by saying that it is encouraging to hear of your interest in Automated Frequency Coordination (AFC) to enable 'standard power' RLAN use in the 5925 – 6425 MHz frequency range in New Zealand. As noted in our 2021–2022 6 GHz consultation and the New Zealand Spectrum Outlook, under monitoring, AFC in the 5925 -6425 MHz frequency range is on our work programme. While the industry had expressed some interest in AFC during consultation, RSM has not yet received any detailed proposals.

We view AFC as an industry-led and funded initiative. RSM is open to facilitating AFC implementation, provided it functions correctly, is accessible to the wider industry, allows for broader participation, and operates within an appropriate regulatory framework.

Rolling out AFC in New Zealand will require a significant investment of time and resources from both RSM and the wider industry. For example, AFC approvals in the United States took around three years (2021–2024) to complete, and implementation across the Asia-Pacific region also remains limited. Therefore, any advancement locally will largely depend on the availability of

resources and the level of industry engagement.

RSM will not consider applications for ad-hoc licences and RSM will not consider bespoke licensing models for this band. Such models are not deemed appropriate and do not align with the intended use of RLAN within this frequency range. This spectrum is not designated for medium or high-power Fixed Wireless Access (FWA) beyond standard power RLAN. Any proposals for such use would necessitate a full spectrum replanning process and would diverge from established international practices. It is essential that any use of standard power RLAN devices in this band remains dynamic and adaptable through an AFC.

As you will also know the 6425 - 7125 MHz is subject to later considerations and likely consultation for RLAN /Wi-Fi, Mobile (IMT) and shared models (see our Spectrum Outlook). The 7125 -8400 MHz frequency band is now also under consideration for Mobile (IMT) which New Zealand may need to take account of in the future. Consequently, this may mean in the future that some of the Fixed point to point links in these bands may need make more use of the 5925 -6425 MHz band and it is important 'Standard Power' RLAN devices adapt around any new Fixed link licences in a timely manner. Ad-hoc / bespoke licensing will make this challenging and protracted and require intervention.

RSM may be open to considering a test licence for your AFC proposal, provided its purpose is to gather technical data to support AFC development in New Zealand for standard power RLAN and is not for the purpose of delivering FWA to consumers through ad-hoc / bespoke licensing. Any test licence would fall under section 1.5.2.2 '*Test and Demonstrations*' and would not permit ongoing use beyond expiry. Equipment must be switched off or migrated to an existing permitted band once the licence ends.

We propose a two-step assessment process:

Step 1: Submit full details of your proposed AFC. We'll assess its functionality and request a test environment (e.g. without live transmitters) to demonstrate that it operates correctly.

Step 2: If Step 1 is satisfactory, we may consider issuing a test licence to validate AFC performance in a live environment provided that the Register of Radio Frequencies (RRF) in its current format can support the test licence.

A more detailed outline of the process for progressing with an AFC proposal is as follows:

- 1. Submit AFC Details**

Provide full technical documentation of your proposed AFC system. (See **Appendix A** for required information on both Equipment and AFC).

- 2. Initial Assessment & Test Environment**

RSM will review the submitted information. If satisfactory, you'll be asked to set up a controlled test environment (without live transmitters) to demonstrate AFC functionality. Note that this will be progressed as resource permits, given the Minister's current priorities for RSM.

3. Live Test Licence (If Required)

If the initial demonstration is successful, RSM may consider issuing a test licence under section 1.5.2.2 ('*Test and Demonstrations*') to validate AFC performance in a live setting. This licence will be time-bound, with no ongoing use permitted after expiry.

4. Technical Report Submission

After the test period, you'll need to submit a detailed technical report summarising findings, performance, and any issues encountered.

5. RSM Review & Consideration

RSM will evaluate the report to determine whether there is sufficient basis to further consider enabling AFC in New Zealand. This process will be led by policy and planning and will be subject to Ministerial priorities and available resources.

Once we receive the complete technical information outlined in this appendix (set out below as **Appendix A**), RSM will undertake a detailed assessment to determine the extent to which the proposal may support the development and implementation of AFC in New Zealand. This assessment may involve follow-up questions or requests for clarification to ensure we have a full understanding of the proposed system and its implications.

While a successful test may demonstrate technical feasibility, any progression toward enabling AFC in New Zealand will require further policy and planning work by RSM. This work is subject to resource availability and Ministerial priorities, and will be considered within the broader context of spectrum management and regulatory alignment.

And finally, please also note that all submitted information may be used to inform our thinking and/or in potential future consultation regarding the use of AFC in New Zealand. This would be to ensure transparency and to provide the wider industry with an opportunity to have input into the process.

Appendix A: Technical Information Requirements for AFC Testing

To support assessment and potential licensing for AFC testing, RSM requires the following detailed technical information:

1. Equipment Details

Please provide comprehensive information on the equipment intended for use in the test, including:

- Make and model of all equipment (both Base stations and Customer Premise Equipment)
- Equipment specification sheets
- Equipment test reports
- Supplier's Declaration of Conformity and applicable standards
- Details on contention-based protocols (e.g. CSMA, MACA)
- Technical specifications for feeders (if applicable)
- Antenna make and model
- Actual antenna radiation patterns (not masks)
- Site setup information, including engineering drawings
- Link budget and carrier-to-noise (C/N) objectives

2. Automated Frequency Coordination (AFC) System Proposal

Please provide a detailed proposal covering the following aspects:

- AFC provider details (e.g. one of the seven currently recognised providers)
- Technical architecture diagram of the AFC system
- Description of AFC operation, including update cycles and response times
- Evidence of the provider's technical capability to operate AFC and standard power equipment
- Secure communication methods between AFC and standard power devices
- Interface details between AFC and the equipment
- Interface details between AFC and the RRF and if this is real time or periodically updated
- AFC analysis methodology, including:
 - RLAN system characteristics and assumptions
 - Fixed link characteristics and assumptions
 - Propagation models and implementation details
 - Modelling software and methods used
 - AFC analysis results and decision logic
- Testing plans to demonstrate protection of fixed links
- Implementation plans for AFC in New Zealand, including whether it will be proprietary or open-source and accessible to the wider industry
- AFC operator policies on record keeping, including:
 - Registration data retention
 - Historical frequency availability data retention for RSM

3. Test Plan

Please include:

- Definition of success and failure criteria for the test
- A detailed project plan with timeframes, milestones, and objectives

Ngā mihi nui

Claire Smollett

NATIONAL MANAGER RADIO SPECTRUM MANAGEMENT

Te Whakatairanga Service Delivery

Hikina Whakatutuki - Ministry of Business, Innovation and Employment

15 Stout Street, 6011 | Wellington | New Zealand

NZBN 9429000106078

RSM-e-signature

From: Claire Smollett
Sent: Wednesday, 23 July 2025 2:12 pm
To: 'Brewer, Jonathan' <[REDACTED] 9(2)a >
Subject: RE: 6 GHz FWA trial licences request [UNCLASSIFIED]

Kia ora Jon

Thank you for the offer, at this point in time I am still reviewing and am not yet in a position to meet on specifics. What I can do, is send a more detailed response in the coming days which will set out the technical requirements RSM will need to make an assessment.

Ngā mihi nui

Claire Smollett

NATIONAL MANAGER RADIO SPECTRUM MANAGEMENT

Te Whakatairanga Service Delivery

Hikina Whakatutuki - Ministry of Business, Innovation and Employment

claire.smollett@mbie.govt.nz

[REDACTED] 9(2)a

15 Stout Street, 6011 | Wellington | New Zealand

NZBN 9429000106078

RSM-e-signature

From: Brewer, Jonathan <[REDACTED] 9(2)a >
Sent: Tuesday, 22 July 2025 9:10 am
To: Claire Smollett <Claire.Smollett@mbie.govt.nz>
Subject: Re: 6 GHz FWA trial licences request [UNCLASSIFIED]

Kia ora Claire,

Would it be useful for me to come in for a meeting or presentation re: this request?

Ngā mihi nui,

Jon

On Fri, 4 Jul 2025 at 09:29, Brewer, Jonathan <[REDACTED] 9(2)a > wrote:

Mōrena!

Keeping well and dry - though it was a close call getting out of Marlborough last Friday.

Looking forward to your response. I've got a lot more information on 6 GHz band if required, including some engineering examples and detail on how I'd implement AFC, but I didn't want to crowd the request doc or put anything confidential in a letter that could eventually be made public. So if more detail is needed by your engineering team, I'm happy to come in for a meeting.

Cheers,

Jon

On Fri, 4 Jul 2025 at 08:56, Claire Smollett <Claire.Smollett@mbie.govt.nz> wrote:

Mōrena Jon

I trust you are keeping well? Thank you for the below. I plan to meet with the team to discuss early next week and review your request. A formal response in relation to the below can be expected within our typical response timeframes.

In respect of an update for point 1 of the agenda items we discussed two weeks ago - *1.) A service desk / ticket system for RSM to handle licensing inquiries including dispensation requests, which tend to get lost.* I'm pleased to say that on 01 July 2025 the team developed a logging system to receipt incoming requests. I'm working with them to ensure the process is documented and we can trial it initially for dispensation requests and in future licensing enquiries.

I continue to assess improvements and as I said, I invite you to keep communicating with me with your suggestions.

Ngā mihi nui

Claire Smollett

NATIONAL MANAGER RADIO SPECTRUM MANAGEMENT

Te Whakatairanga Service Delivery

Hikina Whakatutuki - Ministry of Business, Innovation and Employment

claire.smollett@mbie.govt.nz | 9(2)a

15 Stout Street, 6011 | Wellington | New Zealand

NZBN 9429000106078

RSM-e-signature

From: Brewer, Jonathan <[REDACTED] 9(2)a [REDACTED]>
Sent: Thursday, 3 July 2025 9:26 pm
To: Claire Smollett <Claire.Smollett@mbie.govt.nz>
Subject: 6 GHz FWA trial licences request

Kia ora Claire,

It was great to catch up with you two weeks ago. One of the matters we discussed was the possibility of a trial of 6 GHz spectrum for Fixed Wireless Access (FWA).

The letter attached presents what I believe is a reasonable and low-risk trial that would allow my customer Inspire Net to explore use of the 6 GHz band for FWA, and would allow my company to develop an Automated Frequency Coordination (AFC) system to enable more effective use of the radio spectrum.

I also mentioned in our chat I've been advocating for dynamic spectrum use of the kind enabled by AFC for some time now. I've also attached my response to RSM's 2012-2016 Five Year Outlook, and coverage of that response by the industry journal Policy Tracker for some fun background reading. :-)

Ngā mihi,

Jon

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<https://telco2.co.nz/>

9(2)a

Released under the
Official Information Act 1982

Archived: Wednesday, 11 March 2026 2:50:57 pm

From: [Claire Smollett](#)

Sent: Thursday, 9 October 2025 10:37:28 am

To: [Brewer, Jonathan](#)

Subject: RE: 6 GHz FWA trial licences request [IN-CONFIDENCE - RELEASE EXTERNAL]

Importance: Normal

Sensitivity: None

Kia ora Jon,

Thank you for your email and for outlining your concerns.

I am happy to review the earlier applications that you have mentioned but feel it is important to note that previous applications that require dispensation for testing are likely fundamentally different and incomparable to what you are proposing to trial with an Automated Frequency Coordination (AFC) system in the 6 GHz band. We look at each application for dispensation on a case by case basis.

Your application is a 'first of its kind' for AFC in New Zealand and this has clear policy implications given an AFC is a dynamic spectrum coordination system not yet deployed here. This raises unique regulatory considerations beyond a typical test licence. Introducing such a system in New Zealand for the first time means we must carefully consider how it fits within our national spectrum planning work programme (see the [Spectrum Outlook](#)) alongside international developments. According to section 1.5 of the Radio Licence Certification Rules (PIB 38), "in special circumstances, dispensation for variation from the rules may be considered by the [RSM National Manager or delegate](#)".

This essentially means that I, as the National Manager, have the discretion to grant exceptions to the usual requirements – but do so only under exceptional conditions and after due evaluation.

Crucially, PIB 38 section 1.5 also specifies that when assessing any dispensation request, RSM must take into account broader criteria such as spectrum availability, the potential impact on other spectrum users, and the benefit to New Zealand as a whole. These considerations extend beyond purely technical parameters; they encompass policy, planning, strategic and public interest factors. In light of these broader criteria, I consider that it is both appropriate and necessary for our Radio Spectrum Policy and Planning team to be involved.

While I retain the final authority to approve or decline test licences (and any related dispensations), the involvement of the Policy and Planning experts ensures that our decision making is well informed by national and international spectrum policy considerations. Our Policy and Planning team's input is essential to ensure that any action we take on your proposal aligns with New Zealand's Spectrum Outlook. In other words, their analysis will help confirm that an AFC-based approach in 6 GHz would not conflict with (and ideally would complement) the direction of spectrum management for New Zealand.

By engaging our Policy and Planning experts now, at the test licence stage, we are ensuring that any data and outcomes from your trial will be interpreted in the context of those wider policy considerations from the very beginning.

As explained in my previous message to you, RSM will evaluate the report to determine whether there is sufficient basis to further consider enabling AFC in New Zealand. This process will be led by Policy and Planning and will be subject to Ministerial priorities and available resources. This statement remains applicable.

I also want to confirm that we have received all the documentation you provided for your AFC trial proposal. Our team (including the Policy and Planning team) are assessing your submission.

We will provide you with an update on the decision-making process as soon as we have completed the evaluation.

Ngā mihi nui

Claire Smollett

NATIONAL MANAGER RADIO SPECTRUM MANAGEMENT
Te Whakatairanga Service Delivery
Hikina Whakatutuki - Ministry of Business, Innovation and Employment

claire.smollett@mbie.govt.nz | 9(2)a
15 Stout Street, 6011 | Wellington | New Zealand
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Daniel O'Grady
MANAGER

Radio Spectrum Policy and Planning
Communications, Infrastructure and Trade Branch
Ministry of Business, Innovation & Employment

9(2)a

From: Claire Smollett
Sent: Friday, 12 September 2025 4:25 pm
To: Brewer, Jonathan <jon@telco2.co.nz>
Cc: James Watts <james@staff.inspire.net.nz>
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**RADIO SPECTRUM
MANAGEMENT**



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Cc: [REDACTED] 9(2)a >
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 - Fixed link characteristics and assumptions
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Please include:

- Definition of success and failure criteria for the test
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Ngā mihi nui

Claire Smollett

NATIONAL MANAGER RADIO SPECTRUM MANAGEMENT
Te Whakatairanga Service Delivery
Hikina Whakatutuki - Ministry of Business, Innovation and Employment

claire.smollett@mbie.govt.nz | 9(2)a
15 Stout Street, 6011 | Wellington | New Zealand
NZBN 9429000106078

**RADIO SPECTRUM
MANAGEMENT**



MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HIKINA WHAKATUTUKI

From: Claire Smollett
Sent: Wednesday, 23 July 2025 2:12 pm
To: 'Brewer, Jonathan' <9(2)a >
Subject: RE: 6 GHz FWA trial licences request [UNCLASSIFIED]

Kia ora Jon

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Claire Smollett

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claire.smollett@mbie.govt.nz | 9(2)a
15 Stout Street, 6011 | Wellington | New Zealand
NZBN 9429000106078



From: Brewer, Jonathan <[REDACTED] 9(2)a >
Sent: Tuesday, 22 July 2025 9:10 am
To: Claire Smollett <Claire.Smollett@mbie.govt.nz>
Subject: Re: 6 GHz FWA trial licences request [UNCLASSIFIED]

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Ngā mihi nui,

Jon

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Looking forward to your response. I've got a lot more information on 6 GHz band if required, including some engineering examples and detail on how I'd implement AFC, but I didn't want to crowd the request doc or put anything confidential in a letter that could eventually be made public. So if more detail is needed by your engineering team, I'm happy to come in for a meeting.

Cheers,

Jon

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I continue to assess improvements and as I said, I invite you to keep communicating with me with your suggestions.

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**RADIO SPECTRUM
MANAGEMENT**



From: Brewer, Jonathan <9(2)a >
Sent: Thursday, 3 July 2025 9:26 pm
To: Claire Smollett <Claire.Smollett@mbie.govt.nz>
Subject: 6 GHz FWA trial licences request

Kia ora Claire,

It was great to catch up with you two weeks ago. One of the matters we discussed was the possibility of a trial of 6 GHz spectrum for Fixed Wireless Access (FWA).

The letter attached presents what I believe is a reasonable and low-risk trial that would allow my customer Inspire Net to explore use of the 6 GHz band for FWA, and would allow my company to develop an Automated Frequency Coordination (AFC) system to enable more effective use of the radio spectrum.

I also mentioned in our chat I've been advocating for dynamic spectrum use of the kind enabled by AFC for some time now. I've also attached my response to RSM's 2012-2016 Five Year Outlook, and coverage of that response by the industry journal Policy Tracker for some fun background reading. :-)

Ngā mihi,

Jon

--

<https://telco2.co.nz/>

9(2)a

Released under the
Official Information Act 1982

Archived: Wednesday, 11 March 2026 2:49:47 pm

From: [Brewer, Jonathan](#)

Mail received time: Mon, 1 Sep 2025 05:02:26

Sent: Monday, 1 September 2025 5:02:29 pm

To: [Claire Smollett](#)

Cc: [James Watts](#)

Subject: Re: 6 GHz FWA trial licences request [UNCLASSIFIED]

Importance: Normal

Sensitivity: None

Attachments:

[image001.gif](#); [AFC Full Proposal Telco2 Inspire Cambium Qualcomm.pdf](#)

Tēnā koe Claire,

Please find attached a response to your request for additional detailed technical information named "AFC Full Proposal Telco2 Inspire Cambium Qualcomm.pdf".

Also please download the file [tc2_afc_trial_attachments.zip](#) from my Dropbox for 32 separate supporting documents referenced in the response. I'd appreciate it if you could confirm when you're in receipt of the attachments file and have successfully opened it.

The following documents are commercial in confidence and may not be released without redaction approved by Telco2, Inspire, Cambium, and Qualcomm.

- AFC Full Proposal Telco2 Inspire Cambium Qualcomm.pdf
- 450v trial Link Budget and CN objectives.xls
- afc_trial_records_example_20250729.txt

The following Wi-Fi Alliance materials are non-public and may only be released while complying with the terms of copyright printed in the documents.

- AFC System to AFC Device Interface Specification v1.5.pdf
- AFC_System_Reference_Model_v1.0.pdf

Please let me know if you have any further questions or requests for information.

Ngā mihi,

Jon

On Wed, 6 Aug 2025 at 10:51, Claire Smollett <Claire.Smollett@mbie.govt.nz> wrote:

Kia ora Jon,

Thank you for your email, I have taken the time to review this and discuss your query with my colleagues before responding.

I want to begin by saying that it is encouraging to hear of your interest in Automated Frequency Coordination (AFC) to enable 'standard power' RLAN use in the 5925 – 6425 MHz frequency range in New Zealand. As noted in our 2021–2022 6 GHz consultation and the New Zealand Spectrum Outlook, under monitoring, AFC in the 5925 -6425 MHz frequency range is on our work programme. While the industry had expressed some interest in AFC during consultation, RSM has not yet received any detailed proposals.

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As you will also know the 6425 - 7125 MHz is subject to later considerations and likely consultation for RLAN /Wi-Fi, Mobile (IMT) and shared models (see our Spectrum Outlook). The 7125 -8400 MHz frequency band is now also under consideration for Mobile (IMT) which New Zealand may need to take account of in the future. Consequently, this may mean in the future that some of the Fixed point to point links in these bands may need make more use of the 5925 -6425 MHz band and it is important 'Standard Power' RLAN devices adapt around any new Fixed link licences in a timely manner. Ad-hoc / bespoke licensing will make this challenging and protracted and require intervention.

RSM may be open to considering a test licence for your AFC proposal, provided its purpose is to gather technical data to support AFC development in New Zealand for standard power RLAN and is not for the purpose of delivering FWA to consumers through ad-hoc / bespoke licensing. Any test licence would fall under section 1.5.2.2 '*Test and Demonstrations*' and would not permit ongoing use beyond expiry. Equipment must be switched off or migrated to an existing permitted band once the licence ends.

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Ngā mihi nui

Claire Smollett

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claire.smollett@mbie.govt.nz | Mobile 9(2)a

15 Stout Street, 6011 | Wellington | New Zealand

NZBN 9429000106078

RSM-e-signature

From: Claire Smollett
Sent: Wednesday, 23 July 2025 2:12 pm
To: 'Brewer, Jonathan' <jon@telco2.co.nz>
Subject: RE: 6 GHz FWA trial licences request [UNCLASSIFIED]

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RSM-e-signature

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<https://telco2.co.nz/>

9(2)a

Released under the
Official Information Act 1982

Archived: Wednesday, 11 March 2026 2:50:01 pm

From: [Claire Smollett](#)

To: [Brewer, Jonathan](#)

Subject: RE: 6 GHz FWA trial licences request [UNCLASSIFIED]

Importance: Normal

Sensitivity: None

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To: Claire Smollett <Claire.Smollett@mbie.govt.nz>
Subject: Re: 6 GHz FWA trial licences request [UNCLASSIFIED]

Kia ora Claire,

Would it be useful for me to come in for a meeting or presentation re: this request?

Ngā mihi nui,

Jon

On Fri, 4 Jul 2025 at 09:29, Brewer, Jonathan <9(2)a > wrote:

Mōrena!

Keeping well and dry - though it was a close call getting out of Marlborough last Friday.

Looking forward to your response. I've got a lot more information on 6 GHz band if required, including some engineering examples and detail on how I'd implement AFC, but I didn't want to crowd the request doc or put anything confidential in a letter that could eventually be made public. So if more detail is needed by your engineering team, I'm happy to come in for a meeting.

Cheers,

Jon

On Fri, 4 Jul 2025 at 08:56, Claire Smollett <Claire.Smollett@mbie.govt.nz> wrote:

Mōrena Jon

I trust you are keeping well? Thank you for the below. I plan to meet with the team to discuss early next week and review your request. A formal response in relation to the below can be expected within our typical response timeframes.

In respect of an update for point 1 of the agenda items we discussed two weeks ago - 1.) *A service desk / ticket system for RSM to handle licensing inquiries including dispensation requests, which tend to get lost.* I'm pleased to say that on 01 July 2025 the team developed a logging system to receipt incoming requests. I'm working with them to ensure the process is documented and we can trial it initially for dispensation requests and in future licensing enquiries.

I continue to assess improvements and as I said, I invite you to keep communicating with me with your suggestions.

Ngā mihi nui

Claire Smollett

NATIONAL MANAGER RADIO SPECTRUM MANAGEMENT
Te Whakatairanga Service Delivery
Hikina Whakatutuki - Ministry of Business, Innovation and Employment

claire.smollett@mbie.govt.nz | 9(2)a
15 Stout Street, 6011 | Wellington | New Zealand
NZBN 9429000106078

**RADIO SPECTRUM
MANAGEMENT**



MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HIKINA WHAKATUTUKI

From: Brewer, Jonathan <9(2)a >
Sent: Thursday, 3 July 2025 9:26 pm
To: Claire Smollett <Claire.Smollett@mbie.govt.nz>
Subject: 6 GHz FWA trial licences request

Kia ora Claire,

It was great to catch up with you two weeks ago. One of the matters we discussed was the possibility of a trial of 6 GHz spectrum for Fixed Wireless Access (FWA).

The letter attached presents what I believe is a reasonable and low-risk trial that would allow my customer

Inspire Net to explore use of the 6 GHz band for FWA, and would allow my company to develop an Automated Frequency Coordination (AFC) system to enable more effective use of the radio spectrum.

I also mentioned in our chat I've been advocating for dynamic spectrum use of the kind enabled by AFC for some time now. I've also attached my response to RSM's 2012-2016 Five Year Outlook, and coverage of that response by the industry journal Policy Tracker for some fun background reading. :-)

Ngā mihi,

Jon

--

<https://telco2.co.nz/>

9(2)a

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Dear Minister,

I agree with the government's goal of growing New Zealand's economy and I am glad a link between effective radio spectrum management and New Zealand's prosperity has been made in the introduction to MBIE's Radio Spectrum Five Year Outlook 2012-2016.

Five years is a long time in the world of technology. In June of 2007, just five years ago, the first iPhone was released. The iPhone and its competitors have changed forever the way people interact with their phones and mobile data. This year, 3G smartphones are used by 50% of New Zealanders. Smartphones are poised to have a tremendous impact on New Zealand's economy, with huge potential to streamline communications in the agriculture and tourism sectors.

In 2007 the most recent IEEE standards for 802.11 Wi-Fi allowed speeds up to 54mbps. This year the first 802.11ac Wi-Fi chipsets shipped to customers, at 867mbps. Due to light regulations and scarcity of spectrum, Wi-Fi devices are best in class when it comes to spectral efficiency and interference rejection, while having a lower cost per chipset than 3g/4g competitors. Wi-Fi is a part of almost every mobile device on the market, and is used daily at home and across all key industries. In the last five years, Wi-Fi has had an unquestionable impact on New Zealand's economy.

Five years has brought New Zealand a new mobile carrier, but one who operates with a fraction of the spectrum tied up by incumbent carriers, not all of whom use their spectrum. As a result of the entry of 2Degrees, the cost of mobile services has dropped precipitously, and New Zealand consumers and businesses are reaping the advantages of affordable mobility.

Smartphones, Wi-Fi, and a third cellular carrier have emerged notwithstanding Radio Spectrum Management policies, legislation or changes to those over the past five years. They have developed within the bounds of very small blocks of radio spectrum when compared to traditional uses such as radio and television uses. They have shown that they are extremely efficient users of the spectrum, but all would benefit from access to more spectrum, and more effective spectrum management.

Measurements taken by University of Auckland researchers Chiang, Rowe, & Sowerby (2007) showed that in Auckland, arguably New Zealand's busiest radio spectrum environment, real spectrum use in 806-2750MHz was only 6.2%. These measurements included all of the cellular and most popular broadband bands. Almost 94% of the New Zealand's most valuable radio spectrum was quiet in its largest market. This is hardly effective management.

Taken in isolation, the UoA study might seem fantastic or flawed. Viewed in the context of studies around the world including the US and Singapore, some funded by the United States Defence Advanced Research Projects Agency, these measurements are unsurprising. It has been conclusively proven that traditional management techniques do not result in effective use of the radio spectrum.

Tradition, unfortunately, originates from New Zealand.

New Zealand's pioneering approach to treat spectrum as a property right (based on the Torrens land title system) was based on a 1988 report by London consultancy NERA. Their work in turn was highly influenced by the ideas of Ronald Coase, who in a 1959 paper equated spectrum use to land use, and considered that users who would pay the most for exclusive rights to spectrum would put that spectrum to the best use.

It is unlikely that Coase or Charles Jackson, a key NERA consultant involved in writing the report, envisioned that treating spectrum as a property right would result in the massive inefficiencies we see in New Zealand today.

It has however happened. For a sum of money enough to block smaller competitors, some companies have locked up radio spectrum for years that would have a far greater impact on New Zealand's economy if in use than the price they paid at auction. As a result of locking up the spectrum, these companies have been able to create an artificial scarcity. They have been able to use a limited amount of spectrum and equipment to provide services, while guaranteeing they were the only game in town. Resulting services and pricing, when compared to Australia or other OECD peers, has been poor for New Zealand.

The best result for the owner of the property has not aligned with growing New Zealand's economy.

In the Five Year Outlook document, it's stated that "the key operational objectives of spectrum management in New Zealand are to enable productive radio applications and minimise harmful interference between uses." If this is the case, Radio Spectrum Management should be investigating ways of enabling productive radio applications as its highest priority - above asset management, documentation reviews, compliance projects, fee reviews, and above any legislative change that would further entrench the existing system of spectrum as an exclusive property right.

Section 4.1.3 of the Outlook document holds the key to efficient, productive, and full use of the radio spectrum. Cognitive radio technologies were created to take advantage of unused radio spectrum. They end the possibility of gaming the telecommunications market by purchasing and then not using radio spectrum. And while the Outlook assumes the technology is unlikely to develop within the next five years, the reality is cognitive radio is here and available today. Chipset manufacturers including Texas Instruments already offer DSP products capable of implementing cognitive radio (including IEEE 802 standards) and commercial cognitive radio networks are in use in the United States today.

The Outlook states of cognitive radio that "facilitation of the technology may require a radical departure from existing methods of spectrum regulation". The time for a radical departure is now, and the concept that must be introduced to radio spectrum legislative and management frameworks is that of Primary and Secondary Use.

Primary Users have existing spectrum licenses which commonly allow for the right to transmit on a frequency and the right to have no harmful interference on that frequency. A primary user with a national management right could install transmitters around the country have interference-free operation everywhere they transmitted and everywhere their radio signals could reach. Their rights to offer a service would not be impeded upon.

Secondary Users are those with rights to transmit on frequencies only when their transmission would not affect a primary user, and with no protection from harmful interference on a particular frequency. Secondary Users can exist and thrive in areas where Primary Users cannot or will not, for either economic or technical reasons, use the spectrum they have licensed. Secondary use is an extremely good way of ensuring radio spectrum is used effectively.

The cognitive radio technologies now standardised by IEEE are advanced technologies that are capable of allowing safe coexistence of Primary and Secondary Users. They are likely to be adopted across all forms of radiocommunications, as innovative users meet with artificial spectrum shortages

created by property rights based management and adapt to effectively communicate. In five years, cognitive radio products will not be an emerging technology, they will be a commonplace one.

The growth of New Zealand's economy is linked to its ability to effectively communicate - not just with existing technologies, but with what's next. Radio technology is changing faster than we can forecast on a five year time scale. We can't reliably predict the next iPhone, Wi-Fi, or entrant into the New Zealand telecommunications market. We can predict that with so much of the world's radio spectrum sold off but under-utilised, what's next is likely to include cognitive radio.

The greatest impact Radio Spectrum Management could have on the economy is by ensuring management frameworks are ready for cognitive radio products. Such products will lead to greater, more efficient, lower cost communications, benefiting New Zealand in innumerable ways.

I thank you for this opportunity to comment on Radio Spectrum Management's Consultation Draft - Radio Spectrum Five Year Outlook 2012-2016 and invite you to contact me if you have any questions regarding my submission.

Regards,

A handwritten signature in black ink, appearing to read 'Jonathan Brewer', with a long horizontal line extending to the right.

Jonathan Brewer

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Jonathan Brewer
Telco2 Limited

9(2)a

3 July 2025

Claire Smollett
National Manager Radio Spectrum Management, Te Whakatairanga Service Delivery
Hikina Whakatutuki – Ministry of Business, Innovation and Employment
15 Stout Street, Wellington 6011

Tēnā koe Claire,

Request for Temporary Licences for 6 GHz Trial – Inspire Net Limited (Client 510440)

I'm writing to request that Radio Spectrum Management issue several temporary radio licences to Inspire Net (RSM client 510440) to support a one-year trial of a fixed wireless access technology operating in the 6 GHz band servicing rural and remote households.

The 6 GHz band is under-utilised and its use is trending down. (Appendix B). The frequencies requested for this trial are currently unused and pose no risk of interference to existing users. Internationally the band is increasingly being used or considered for Wi-Fi6e and fixed wireless broadband using Automated Frequency Coordination (AFC). Allocating some 6 GHz spectrum to a rural wireless trial is unlikely to reduce spectrum availability under the band's current designation for fixed microwave and satellite use.

Improving rural connectivity is a flagship initiative of *Te Rautaki Matihiko mō Aotearoa – The Digital Strategy for Aotearoa*. Mahi tahi, or Inclusion, is one of its core strategic themes. Recent government programmes such as RBI2 and the Rural Capacity Upgrade have recognised that a "one size fits all" model is not sufficient to address rural digital exclusion. Community-centric initiatives—like those led by Inspire Net—are vital to solving this challenge.

Inspire Net has provided innovative, low-cost fibre and fixed wireless broadband to rural communities in the Manawatū and surrounding regions for over two decades. They've been recognised by Consumer NZ for high customer satisfaction, and have won the People's Choice Award for Best ISP. They're also a significant user of the radio spectrum, with more than 300 licences for VHF and UHF digital mobile radio, microwave linking, and fixed wireless technologies.

This trial involves replacing four existing access points at three towers, and upgrading subscriber equipment at 240 rural locations. Inspire expects to invest around § 9(2)(b)(ii) in new equipment and labour on the activity. Technical parameters of the requested licence are detailed in Appendix A.

Should 6 GHz access not be available to Inspire at the conclusion of the trial period, the equipment will be reconfigured to use the 5 GHz band without the need for site visits. This protects Inspire's investment while enabling long-term continuity of service.

Although the trial equipment will operate on specific licensed channels, it is capable of choosing the channels using Automated Frequency Coordination (AFC) . Telco2 intends to demonstrate AFC capability during the trial, with its own AFC service interfacing with RSM's Registry of Radio Frequencies via API. This trial will involve withdrawing the right of use of one or more licensed 6 GHz channels from the equipment, to show that the equipment can automatically reconfigure itself to use the 5 GHz band without disruption to end users or potential new higher priority users of the spectrum.

Beyond its technical merits, this project supports regional economic development. Rather than having rural households send subscription payments offshore for satellite broadband, this initiative keeps investment in the community—supporting local jobs, local businesses, and local resilience.

We welcome the opportunity to discuss this request further and provide any additional information that would assist your decision.

Ngā mihi nui,

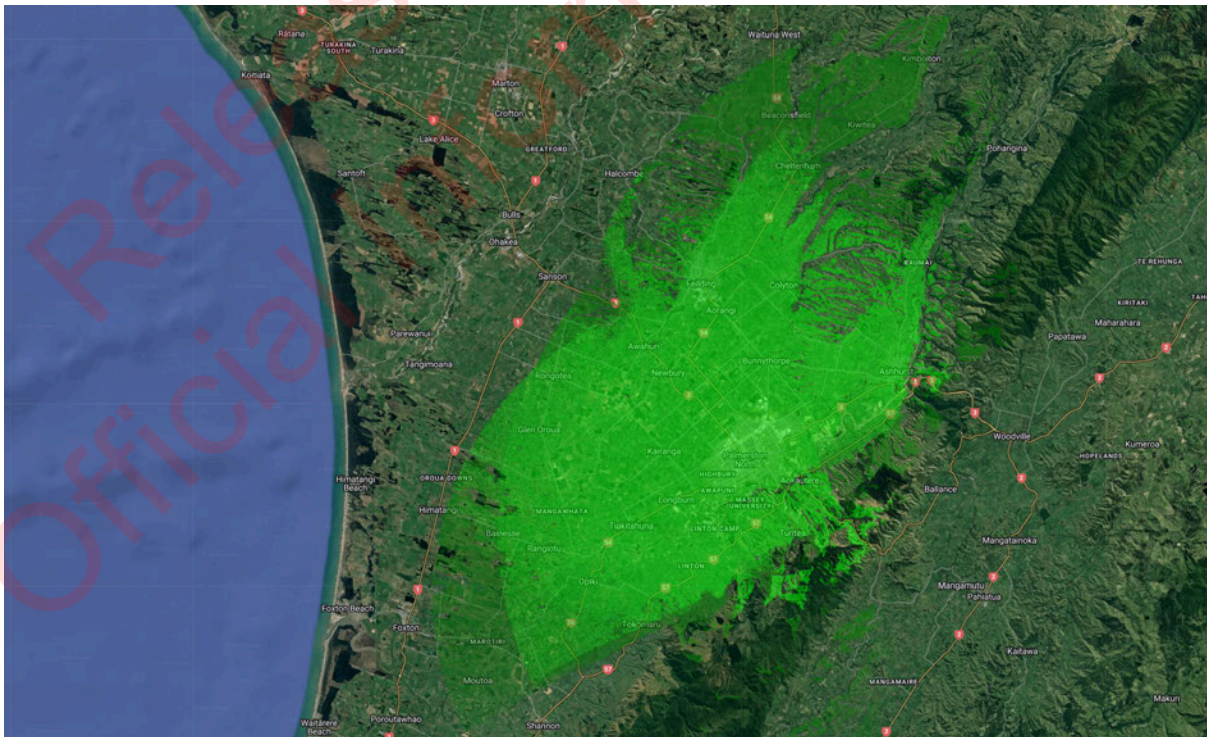
Jonathan Brewer

Appendix A: Overview of Requested Licences

Each of the four access points supports two aggregated 40 MHz TDD carriers. A total of sixteen licences (eight for the four access points, eight for the four subscriber protection areas) are requested for the trial. The table below suggests locations and channels that will be evaluated for compatibility with current and planned licences should MBIE agree to a trial.

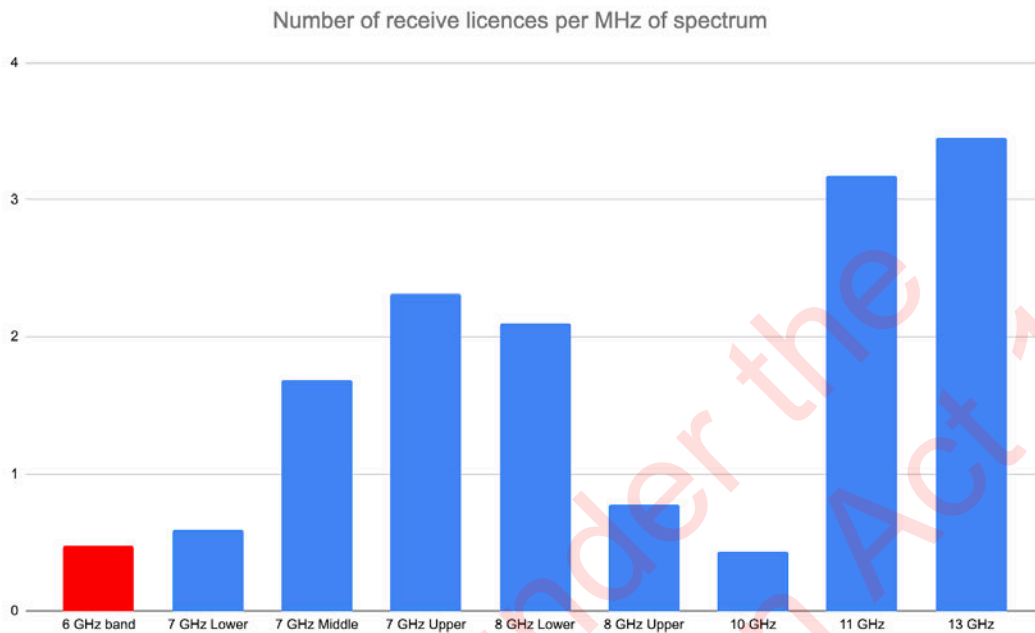
Name	ID	Azimuth	Centre Freq	Channel Size	EIRP	EIRP $\geq 30^\circ$ EL
Saddle Road	56987	300°	5965	40 MHz	6 dBW	-10 dBW
Saddle Road	56987	300°	6085	40 MHz	6 dBW	-10 dBW
North Range Rd.	73528	333°	6005	40 MHz	6 dBW	-10 dBW
North Range Rd.	73528	333°	6125	40 MHz	6 dBW	-10 dBW
North Range Rd.	73528	287°	6045	40 MHz	6 dBW	-10 dBW
North Range Rd.	73528	287°	6165	40 MHz	6 dBW	-10 dBW
Te Mata Linton	51613	300°	5965	40 MHz	6 dBW	-10 dBW
Te Mata Linton	51613	300°	5965	40 MHz	6 dBW	-10 dBW

The aggregate of coverage is plotted below. Subscribers in green areas are predicted to receive peak speeds of between 150 and 400 Mbps, depending on their distance from the access point.

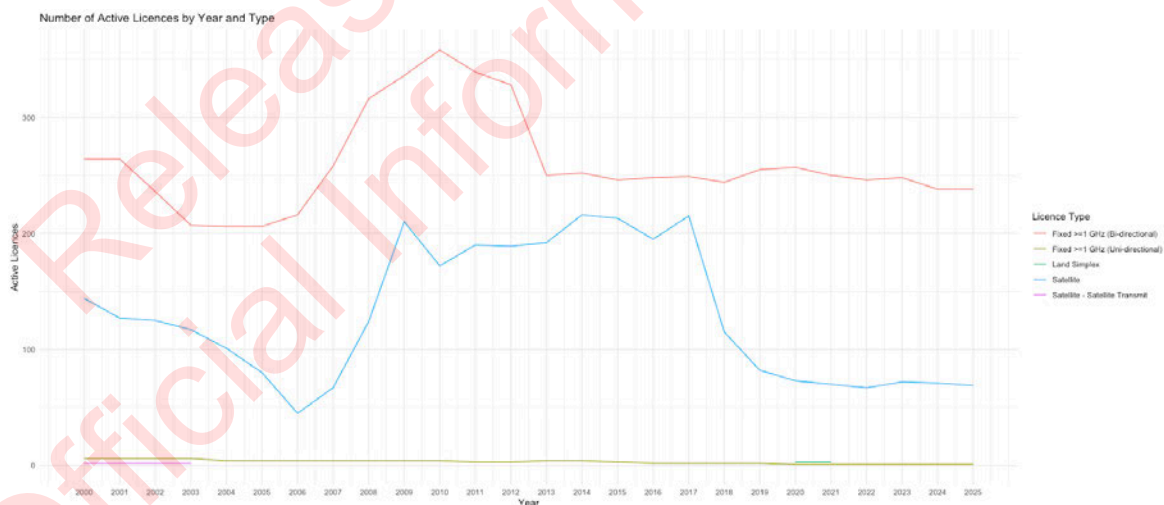


Appendix B: Use of 6 GHz Band

Compared to other microwave bands used for long-distance links, the 6 GHz band is poorly utilised, with fewer receive licences per MHz than all bands except for 10 GHz.

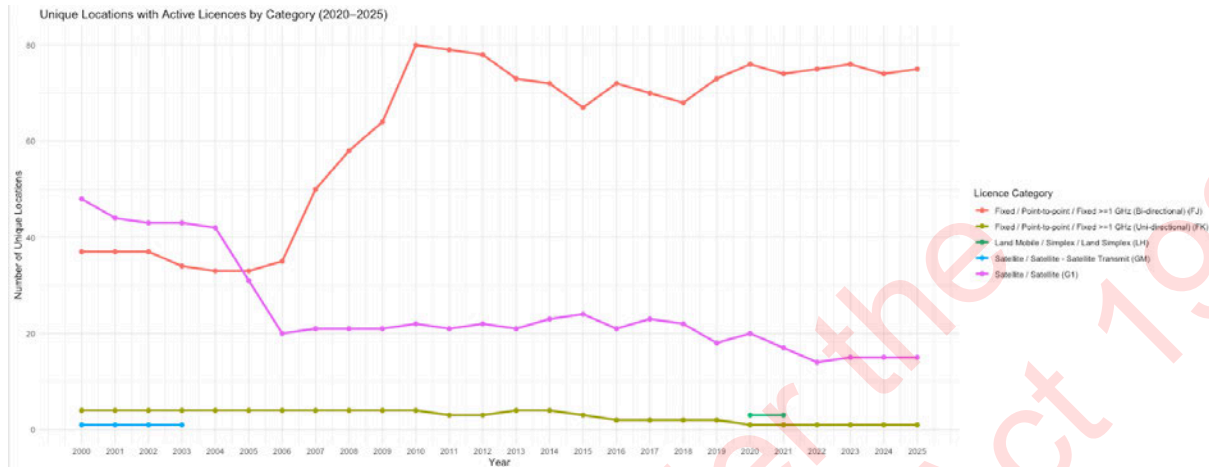


The total number of active receive licences in the 6 GHz band peaked in 2009 at 550 and has since tapered off significantly. The chart below shows the total number of licences active in any given year over the past 25 years. It includes short-lived licences - for example ones expired and re-certified - so shows a significant overcount in some years.



The total number of current receive licences in the band as of July 2025 is 238, which includes both terrestrial and space based receivers. 32 of those licences belong to Chorus who have decommissioned their systems and will be removing the licences soon.

Historic use terrestrial use of the 6 GHz band was for trunk microwave systems, with multiple channels used on each path. This type of use means there are far fewer locations to protect against when considering new use of the band. At the moment there are fewer than 80 locations in Aotearoa with terrestrial 6 GHz receive licences.








The addition of several new channels to the 6 GHz band not aligned with ITU-R F.383-10 might at first glance place an undue burden on engineers coordinating future services. The added complexity will however be de minimus; the band already contains licences using seventeen different channel sizes ranging from 0.0640 MHz through to 72.8 MHz.

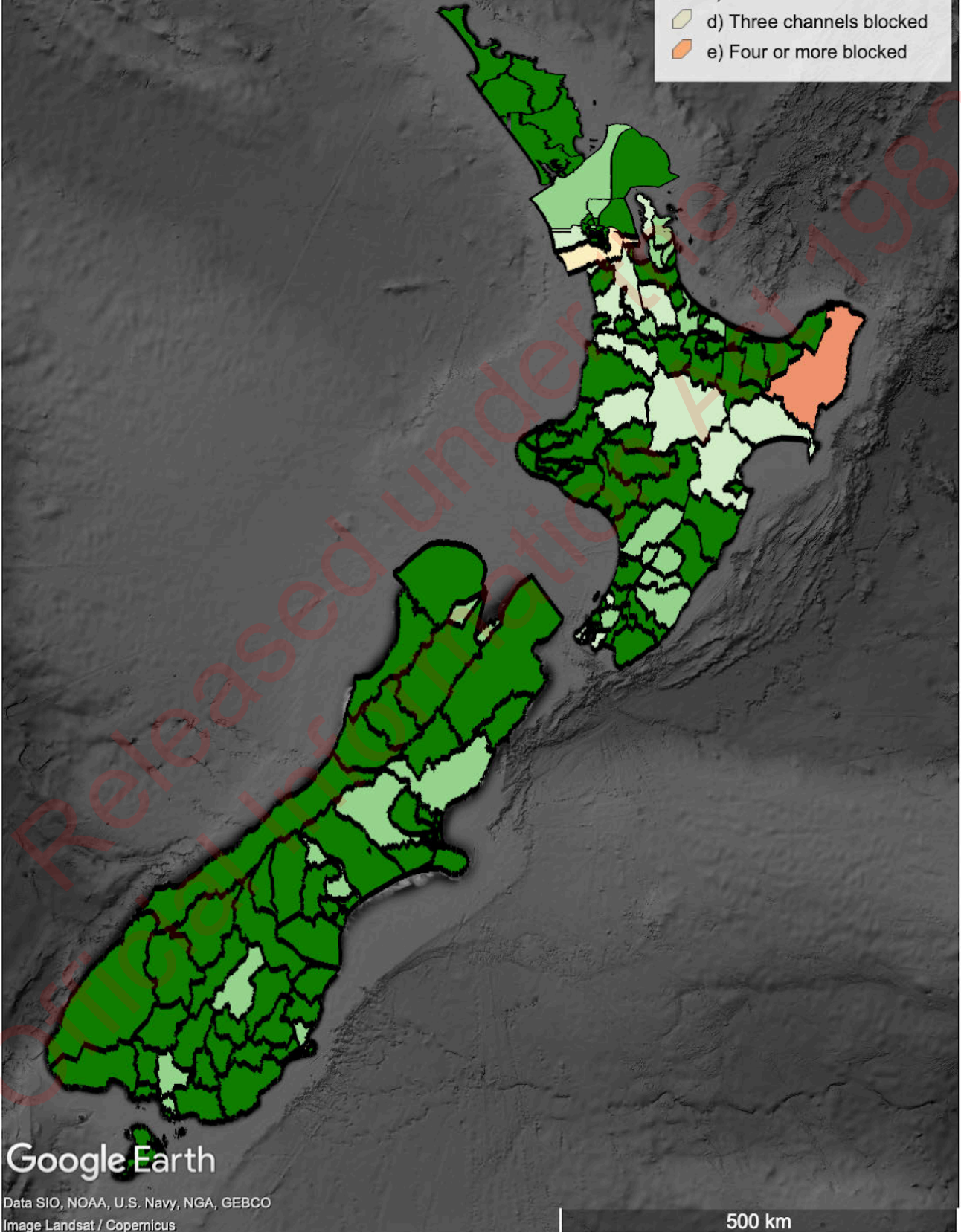
Should RSM's policies around the use of the 6 GHz plan allow coordinated use in the future, the potential for use in outdoor Fixed Wireless Access systems is high. Some regions of the country, for example Northland and the West Coast, have no 6 GHz receivers at all as shown by the map on the next page.

ITU-R F.383-10 / Wi-Fi 6e CoExistence

Considering co-channel interactions of Wi-Fi 6E against all existing and planned 6 GHz licences.

Legend

-  a) All channels free
-  b) One channel blocked
-  c) Two channels blocked
-  d) Three channels blocked
-  e) Four or more blocked





RADIO EXPOSURE TEST REPORT

FCC ID : Z8H89FT0081
Equipment : 6084HH
Brand Name : Cambium Networks
Model Name : 6084HH
Applicant : Cambium Networks Inc.
3800 Golf Road, Suite 360 Rolling Meadows, IL
60008, USA
Manufacturer : Cambium Networks, Ltd.
Ashburton, TQ13 7UP, UK
Standard : 47 CFR Part 2.1091

The product was received on Sep. 05, 2023, and testing was started from Sep. 05, 2023 and completed on Nov. 13, 2023. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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Photographs of EUT v01

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Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: **Sam Chen**

Report Producer: **Sophia Shiung**

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1 General Description

1.1 EUT General Information

RF General Information			
Frequency Range (MHz)	Ch. Bandwidth (MHz)	Operating Frequency (MHz)	Modulation Type
5150-5250 5725-5850	5	5156-5244 5731-5844	QPSK
	10	5155-5245 5730-5845	
	15	5158-5242 5733-5842	
	20	5160-5240 5735-5840	
	30	5165-5235 5740-5835	
	40	5170-5230 5745-5830	

1.2 Table for Frequency Combination Mode

Type	Mode	Frequency (MHz)
1	UNII 1 (20+20 MHz) + UNII 3 (20+20 MHz)	UNII 1 (5180+5220) + UNII 3 (5755+5795)
2	UNII 1 (30+30 MHz) + UNII 3 (30+30 MHz)	UNII 1 (5180+5220) + UNII 3 (5755+5795)
3	UNII 1 (40+40 MHz) + UNII 3 (40+40 MHz)	UNII 1 (5175+5225) + UNII 3 (5750+5800)

Note: The above information was declared by manufacturer.

1.3 Table for Radio Function

Radio (R)	Function
R1	Support UNII 1 only
R2	Support UNII 3 only

Note: The above information was declared by manufacturer.

1.4 Antenna Information

Ant.	Port			Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	R1	R2	R1+R2					
1	-	1	3	Cambium	Canopy V 4X4 Array Antenna	Array	RP-SMA	15.922
2	-	2	4	Cambium	Canopy V 4X4 Array Antenna	Array	RP-SMA	15.958
3	2	-	2	Cambium	Canopy V 4X4 Array Antenna	Array	RP-SMA	15.962
4	1	-	1	Cambium	Canopy V 4X4 Array Antenna	Array	RP-SMA	15.906

Note 1: The above information was declared by manufacturer.

Note 2: Directional gain information

Type	Maximum Output Power	Power Spectral Density
Non-BF	Directional gain = Max.gain + array gain. For power measurements on IEEE 802.11 devices Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4	$Directional\ iGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$
BF	$Directional\ iGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$	$Directional\ iGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$

Ex.

Directional Gain (NSS1) formula :

$$Directional\ iGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

$$NSS1(g1,1) = 10^{G1/20} ; NSS1(g1,2) = 10^{G2/20} ; NSS1(g1,3) = 10^{G3/20} ; NSS1(g1,4) = 10^{G4/20}$$

$$g_{j,k} = (NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2$$

$$DG = 10 \log[(NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2 / N_{ANT}/Nss] \Rightarrow 10$$

$$\log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / N_{ANT}]$$

Where ;

Cross-Polarized Antenna

5G UNII-1 G1 = 15.962 dBi; G2 = 15.906 dBi;

5G UNII-3 G1 = 15.922 dBi; G2 = 15.958 dBi;

5G UNII-1 DG = 15.962 dBi

5G UNII-3 DG = 15.958 dBi

Note 3: For 5GHz function:

For Radio 1 (R1) (2TX/2RX):

Port 1~2 can be used as transmitting/receiving antenna.

Port 1~2 could transmit/receive simultaneously.

For Radio 2 (R2) (2TX/2RX):

Port 1~2 can be used as transmitting/receiving antenna.

Port 1~2 could transmit/receive simultaneously.



For Radio 1 + Radio 2 (R1+R2) (2TX/2RX):
Port 1~4 can be used as transmitting/receiving antenna.
Port 1~4 could transmit/receive simultaneously.

1.5 Accessories

Wall bracket*1.

1.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2.1091
- KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- 47 CFR Part 1.1307
- 47 CFR Part 1.1310

1.7 Testing Location

Testing Location Information	
Test Lab. : Sporton International Inc. Hsinchu Laboratory	
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)
(TAF: 3787)	TEL: 886-3-656-9065 FAX: 886-3-656-9085
	Test site Designation No. TW3787 with FCC.
	Conformity Assessment Body Identifier (CABID) TW3787 with ISED.

2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1500	-	-	f/300	<6
1500-100,000	-	-	5	<6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1500	-	-	f/1500	<30
1500-100,000	-	-	1.0	<30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



2.3 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth.

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}}(d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance R between the person and the antenna / radiating structure, where R > λ / 2 π.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R ² .
1.34-30	3,450 R ² /f ² .
30-300	3.83 R ² .
300-1,500	0.0128 R ² f.
1,500-100,000	19.2R ² .

Note: R is in meters, f is in MHz.



2.4 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL EIRP (dBm)
5.2G;G7D	15.962	19.97	35.93	0.06	35.99	20	0.79019	1.00000	B	37.006
5.8G;G7D	15.958	20.01	35.97	0.02	35.99	20	0.79019	1.00000	B	37.006

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—————THE END—————