3.4 GHz and 3.6 GHz band spectrum licence technical framework—

Outcomes and response to submissions

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Canberra

Red Building   
Benjamin Offices  
Chan Street   
Belconnen ACT

PO Box 78  
Belconnen ACT 2616

T +61 2 6219 5555  
F +61 2 6219 5353

Melbourne

Level 32   
Melbourne Central Tower  
360 Elizabeth Street   
Melbourne VIC

PO Box 13112  
Law Courts   
Melbourne VIC 8010

T +61 3 9963 6800  
F +61 3 9963 6899

Sydney

Level 5   
The Bay Centre  
65 Pirrama Road   
Pyrmont NSW

PO Box Q500  
Queen Victoria Building   
NSW 1230

T +61 2 9334 7700 or 1800 226 667  
F +61 2 9334 7799

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Written enquiries may be sent to:

Manager, Editorial and Design  
PO Box 13112  
Law Courts  
Melbourne VIC 8010  
Tel: 03 9963 6968  
Email: [candinfo@acma.gov.au](mailto:candinfo@acma.gov.au)

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# 1. Introduction

The Australian Communications and Media Authority (the ACMA) released the discussion paper [*3.4 GHz and 3.6 GHz band spectrum licence technical framework*](https://www.acma.gov.au/theACMA/3_6-ghz-band-legislative-instruments-consultation) on 18 May 2018 (the May 2018 discussion paper). The paper sought industry feedback on the development of a single spectrum licence technical framework covering both the 3.4 GHz[[1]](#footnote-2) and 3.6[[2]](#footnote-3) GHz bands.

The instruments consulted on for the 3.4 GHz and 3.6 GHz bands spectrum licence technical framework (the technical framework) were the:

* *s*ample spectrum licence
* Radiocommunications (Unacceptable Levels of Interference — 3.4 GHz Band) Determination 2015 (s.145 determination)
* Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters — 3.4 GHz Band) 2015 (RAG Tx)
* Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers — 3.4 GHz Band) 2015 (RAG Rx)

Radiocommunications (Trading Rules for Spectrum Licences) Determination 2012 (trading determination).

A total of 11 submissions were received that commented on the technical framework, these submissions are available on the [ACMA’s website](https://www.acma.gov.au/theACMA/3_6-ghz-band-legislative-instruments-consultation). Annex A provides details of all submitters.

This paper outlines the outcomes of the consultation process and provides a response to feedback received. The paper is structured as:

* Section 2: Consultation outcomes
* Section 3: Summary and response to submissions.

# 2. Consultation outcomes

The May 2018 discussion paper consulted on three possible technical framework options for the 3.4 GHz and 3.6 GHz bands. These were:

1. **Option 1**: Have the same technical framework apply to both the 3.4 GHz and 3.6 GHz bands. Mandate a synchronisation fall-back condition to manage interference for all 3.4 GHz and 3.6 GHz band spectrum licences. No spectrum would be required for guard bands under this option. Two sub-options were identified:
   1. Sub-option 1a: A 3:1 frame structure would apply to the synchronisation requirement; however, the start of the 3.6 GHz band spectrum licence term would be delayed until some point on or before the end of the metro re-allocation period (30 March 2020). In the interim period, early access to the 3.6 GHz band for successful auction bidders would be provided via apparatus licence arrangements that ensure coexistence with existing 3.4 GHz band spectrum licensees (and NBN Co’s 3.5 GHz band apparatus licences) in a manner suitable for those licensees. At some point before or upon the commencement of the 3.6 GHz licences, the 3.4 GHz band spectrum licences and 3.5 GHz band apparatus licences would be amended to adopt the synchronisation and other new conditions.
   2. Sub-option 1b: Two frame structures would be defined on licences. A temporary 1:1 structure would be in force until a set date, then following notification to affected users and period of transition (for example, four weeks/months), the 3:1 structure (the preferred approach) would be in force for the remainder of the spectrum licence term. It is noted that an earlier transition to the 3:1 structure could occur where there is agreement to do so from all affected licensees. 3.4 GHz band spectrum licences and 3.5 GHz band apparatus licences would be amended to adopt the synchronisation and other new conditions before 3.6 GHz band licences are issued.
2. **Option 2**: The same s.145 determination and radiocommunications advisory guidelines would apply to both the 3.4 GHz and 3.6 GHz bands. A mandated synchronisation fall-back condition would apply to 3.6 GHz band licences only. A stricter out-of-band emission mask would apply at the frequency boundary between 3.4 GHz band licences, as well as 3.4 GHz and 3.6 GHz band licences to manage adjacent band interference. Under this approach, up to 20 MHz of spectrum could be required for guard bands between 3.4 GHz and 3.6 GHz band licensees.
3. **Option 3**: The new technical framework would only be adopted in the 3.6 GHz band. Existing arrangements will continue to apply in the 3.4 GHz band. This means a stricter out-of-band emission mask would apply at the frequency boundary between 3.4 GHz band licences. as well as 3.4 GHz and 3.6 GHz band licences to manage adjacent band interference. Under this approach, up to 20 MHz of spectrum could be required for guard bands between 3.4 GHz and 3.6 GHz band licensees.

The May 2018 discussion paper indicated that the ACMA’s preliminary view was to adopt Option 1 if all existing 3.4 GHz band spectrum licensees agree, and there is general support from prospective 3.6 GHz band licensees. However, in the event there was no agreement on a synchronisation fall-back approach to manage interference, the ACMA indicated a preliminary view that Option 2 should be adopted. Furthermore, Option 3 would only be considered if no agreement could be achieved with 3.4 GHz band spectrum licensees on any changes to the existing 3.4 GHz band spectrum licence technical framework.

## Ministerial direction

On 17 July 2018, the Minister for Communications signed the [Australian Communications and Media Authority (Radiocommunications Licence Conditions—3.4 and 3.6 GHz Bands Interference Management) Direction 2018](https://www.legislation.gov.au/Details/F2018L01045). This direction requires the ACMA to take all reasonable steps to ensure 3.4 GHz band spectrum licensees and 3.5 GHz band Public telecommunication Service (PTS) apparatus licensees are required to manage interference via the synchronisation of their services by 30 March 2020, unless other measures can be agreed to (the synchronisation fall-back solution).

The direction also specifies:

* adoption of a common frame structure (or equivalent in terms of duration and timing of downlink and uplink segments) if and when required to support the synchronisation fall-back solution. The frame structure specified supports a 3:1 downlink-to-uplink ratio, which was identified by a majority of the 3.6 GHz band Technical Liaison Group (TLG)[[3]](#footnote-4) participants as the preferred ratio

the arrangements must take affect from 30 March 2020.

To implement this direction, the ACMA will:

* vary existing all 3.4 GHz band spectrum licences to include the relevant condition

make or amend a licence condition determination to impose the relevant conditions on 3.5 GHz band PTS licences in the defined regional and metropolitan areas.

In addition to the condition imposed as a result of the minister’s direction, the ACMA will also propose variations to the core conditions of 3.4 GHz band spectrum licences, as well as amendments to Radiocommunications Assignment and Assignment Instruction (RALI) MS39. These changes will allow licensees to take full advantage of the synchronisation fall-back solution and remove barriers to the implementation of new technologies such as active antenna systems.

It remains a possibility that the ACMA will not include the condition on a particular 3.4 GHz band spectrum licence, or that its decision to include such a condition will be subject to judicial or merits review, or that the House of Representatives or the Senate will disallow the licence condition determination. If it is not possible to achieve uniformity of licence conditions across all 3.4 GHz band spectrum licences and adjacent apparatus licences, the ACMA may need to consider applying alternative interference management arrangements to 3.6 GHz band spectrum licences.

## Technical framework

Considering the views expressed in submissions to the May 2018 discussion paper and taking into account the minister’s direction, the ACMA has decided to adopt sub-option 1a. This includes defining a single framework across both the 3.4 GHz and 3.6 GHz bands. Refer to Section 3 for a summary of views received on this issue.

Changes to the technical framework based on the adoption of sub-option 1a and comments received from the public consultation process are detailed in Annex B.

The final legislative instruments are now available on the [ACMA website](https://www.acma.gov.au/Industry/Spectrum/Spectrum-planning/About-spectrum-planning/technical-framework-3_4-ghz)[[4]](#footnote-5), and the sample spectrum licence is contained within the [Radiocommunications Spectrum Marketing Plan (3.6 GHz band) 2018](https://www.legislation.gov.au/Details/F2018L01064).

## RALI consultation

In parallel to the release of the May 2018 consultation paper, the ACMA also consulted on changes to the following three Radiocommunications Assignment and Licensing Instructions (RALIs):

* new RALI MS44: Managing interference to Earth station protection zones (RALI MS44)
* updates to RALI FX19: Frequency Coordination and Licensing Procedures for apparatus licensed Broadband Wireless Access Services in the 1900–1920 and 3575–3700 MHz bands (RALI FX19)

updates to RALI MS39: Frequency Coordination and Licensing Procedures for Apparatus Licensed Public Telecommunications Services in the 3.5 GHz Band (RALI MS39).

These RALIs are incorporated by reference to the legislative instruments that form the 3.4 GHz and 3.6 GHz bands technical framework. Consultation on these RALIs occurred first within the 3.6 GHz band TLG in April to May 2018, followed by [public consultation](https://www.acma.gov.au/theACMA/issues-for-comment-index) during June 2018.

All three RALIs have now been finalised and are available on the [ACMA website](https://www.acma.gov.au/Industry/Spectrum/Spectrum-planning/Current-APs-info-and-resources/frequency-assignment-requirements-spectrum-planning-acma).

## Trading determination

The ACMA has included the 3.6 GHz band to the trading determination and defined a minimum contiguous bandwidth (MCB) of 10 MHz. The 27 GHz band has also been removed from Schedule 1 (because of spectrum licensing no longer being applicable in the band).

# 3. Summary of and response to submissions

This section summarises submissions to the issues for comment in the May 2018 discussion paper. The ACMA’s reply to responses and any resulting changes to the technical framework are also included. A list of all submitters is provided at Annex A. A summary of changes made to the technical framework as a result of the public consultation is provided at Annex B.

Given the ACMA’s decision to adopt sub-option 1a, submissions that commented on changes to the technical framework that relate to other options are not discussed here.

## Summary of submissions and ACMA response

### Issue for comment questions 1 and 2

1. *The ACMA seeks comment from interested stakeholders on the draft spectrum licences for the 3.4 GHz band at Attachment A (for Option 1) and Attachment B (for Option 2).*
2. *The ACMA seeks comment on the proposed sub-options 1a and 1b, including wording for the temporary synchronisation configuration. If sub-option 1b is adopted, what would be an appropriate time frame for the temporary synchronisation configuration to apply? What would be an appropriate time frame for the transition period (when both the temporary and Attachment A configuration would apply)?*

### Summary of submissions

Technical framework option

All but two submissions to the public consultation supported Option 1. These submissions also indicated a preference for sub-option 1a. This is because there is global consensus from vendors that first release 5G equipment will support a 3:1 frame structure.

There was no support for sub-option 1b because early release equipment is not expected to support a 1:1 frame structure. Its adoption could therefore delay service deployment and/or limit vendor choice. A 1:1 frame structure was also considered to be inefficient by most submitters since public fixed and mobile networks tend to have much larger downlink capacity requirements.

Both NBN Co Ltd (NBN Co) and Airspan Spectrum Holdings (ASH) supported Option 2. ASH saw benefit in identifying up to 20 MHz of spectrum between the 3.4 GHz and 3.6 GHz bands, which would otherwise be used as guard bands under Option 2, for use by small cell operators including wholesale neutral host networks. While NBN Co saw the benefits of Option 1 and adopting a 3:1 frame structure, it was unable to support it due to uncertainties surrounding its ability to move from its existing frame structure.

Most other respondents rejected Option 2 on the grounds it would be an inefficient use of the limited spectrum on offer, increase equipment costs and delay the deployment of 5G in Australia. There was, however, limited support for this option from Telstra, but only if Option 1 was not feasible.

There was no support for Option 3.

Synchronisation requirement

While there was general support for the proposed synchronisation fall-back solution, some submitters indicated that alternative frame structures that match the one proposed by the ACMA in 3GPP TS 36.211 should be allowed, including those defined for New Radio in 3GPP TS 38.211.

Telstra requested the removal of the overly prescriptive values for synchronisation (referenced to 3GPP standard TS 36.211) from the ACMA’s proposed synchronisation requirement. Its concern was that the approach proposed by the ACMA would lock licensees in to a synchronisation framework that could become obsolete within the lifetime of the licences. Telstra suggested that simply specifying the alignment of timing of uplink and downlink emissions and a downlink to uplink ratio is sufficient to achieve the objective. Telstra further indicated that if reference to 3GPP TS 36.211 is maintained, then the equivalent parameters in 3GPP TS 38.211 and any other relevant 3GPP standards should be included.

Submissions also made the following suggestions:

* Full synchronisation should only be invoked when no agreements can be reached, and interference has not been resolved.
* It should be made clear that the synchronisation fall-back solution only applies to affected devices, rather than applying network-wide.
* There should be support for semi-synchronised operation.

The ACMA should consider a staged approach to managing interference between different parties, including assessment against a defined interference metric, before synchronisation is enforced. This would avoid enforcement being triggered by a single instance of interference and provide a minimum period to either investigate alternative options or implement synchronisation.

### ACMA response to submissions

Since submissions to the May 2018 discussion paper closed, the ACMA has received the minister’s direction. This direction requires the ACMA to define a specific frame structure in 3GPP TS 36.211 for adoption as part of a synchronisation fall-back solution. However, the direction also provides flexibility for equivalent frame structures, such as those defined in 3GPP TS 38.211, to be adopted by licensees (which the ACMA was always supportive of). The minster’s direction also clearly states that the synchronisation fall-back solution only applies if an agreement on alternative measures to manage interference cannot be reached between affected licensees and that it only applies to affected devices, not network-wide.

Regarding the implementation of a staged process to implementing synchronisation, the minister’s direction does not specify such a requirement be included on licences. However, during any period in which affected licensees are taking steps to resolve the interference issue or synchronise, the ACMA will generally give priority to the device registered first-in-time in any interference dispute, meaning that a device or devices registered later-in-time will generally be required to accept any interference or cease causing interference during this time. A note to this effect will be included on spectrum licences. It is also noted that the ACMA will take any other relevant factors into account when settling an interference dispute.

This approach to managing interference is considered prudent to ensure protection of services provided by licensees that do not have spectrum holdings in other bands to fall-back on in the event of interference. In particular, there are significant geographical areas where services provided by NBN Co rely solely on spectrum in the 3400–3575 MHz band. Disruption to services at just one of these locations would be considered significant.

Considering the views expressed in submissions and considering the minister’s direction, the ACMA has decided to adopt sub-option 1a. This includes defining a single framework across both the 3.4 GHz and 3.6 GHz bands and adopting a synchronisation fall-back solution consistent with the minister’s direction.

### Issue for comment question 3

1. *The ACMA seeks comment on the proposed stricter unwanted emission limit in the 3100–3380 MHz frequency range, including whether it is appropriate to follow the Electronic Communications Committee and adopt an even stricter limit should they decide to adopt one.*

### Summary of submissions

NBN Co considered that the proposed limits in the 3100–3180 MHz frequency range considered work conducted by the European Communications Committee (ECC) and are appropriate. However, all other submissions that commented on this issue preferred the ACMA to adopt unwanted emission limits that were consistent with 3GPP standards. This was because it would allow operators to realise the full benefits of global economies of scale for equipment.

It was generally felt that interference issues with radiolocation services in the 3100–3400 MHz band could be managed on a case-by-case basis. This could be facilitated by the identification of likely areas of concern. This approach was supported by the Department of Defence (Defence).

Adoption of the stricter limits was only, reluctantly, supported by some submitters if similar limits were adopted in Europe. Otherwise, submitters stated the implementation of bespoke requirements would increase equipment costs and could delay the rollout of 5G in Australia.

### ACMA response to submissions

During the TLG and public consultation process, the ACMA worked with incumbent and prospective spectrum licensees, as well as Defence, on how to manage interference to and from radiolocation services operating in the 3100–3500 MHz frequency range. The methods proposed by the ACMA as part of the public consultation included:

* defining a stricter unwanted emission limit in the 3100–3380 MHz frequency range for devices operated under a spectrum licence
* defining a level of protection for services operated under a spectrum licence that radiolocation services must not exceed

requesting Defence and spectrum licensees work together to identify areas of concern and implement measures to manage interference.

To increase flexibility and remove restrictions that may only apply in a limited set of circumstances, the ACMA also investigated defining measures that allowed case-by-case consideration and negotiation of measures to resolve interference between 3.4 GHz band spectrum licensees and Defence. This approach removes the need for the first two points of the measures consulted on, leaving only the third point. This approach was supported by numerous submissions to the consultation paper.

The ACMA recognises the benefits of this approach as it allows spectrum licensees to buy equipment that aligns with 3GPP standards and thereby reduce costs. It also removes a coordination requirement that can be complex (or even impractical) for Defence to meet and may only have a limited effect due to the (typically) itinerant nature of interference caused by radiolocation services.

On the basis that existing and prospective spectrum licensees in the 3400–3700 MHz frequency range are prepared to work with radiolocation licensees to manage interference and accept the risks associated with this, the ACMA has relaxed the unwanted emission limits in the 3100–3380 MHz frequency range and removed the specific coordination requirements for Defence. This approach to managing interference to and from the radiolocation service has been captured in final updates to the RAG Tx, RAG Rx and RALI MS39.

### Issue for comment questions 4 and 5

1. *The ACMA seeks comment from interested stakeholders on the proposed changes to the arrangements for unacceptable levels of interference in the 3.4 GHz band set out in the draft Radiocommunications (Unacceptable Levels of Interference – 3.4 GHz Band) Determination 2015 at attachments C, H and I.*
2. *The ACMA seeks comment on potential methods to improve the device boundary criteria for paths over water. Is the text proposed by the ACMA suitable?*

### Summary of submissions

Those submissions that commented on the draft s.145 determination supported the proposed changes.

There was also support to include a clause that gives an automatic pass for any device boundary radials that extend beyond the licence area and only pass over water (the new clause). While the potential unintended consequences of the new clause were acknowledged, submitters indicated that the current device boundary criteria often fail for devices on or near the coast. Given most of the Australian population lives on the coast, submitters felt the benefits of the new clause outweighed the negatives. Optus also provided a proposed modification to the new clause to account for known areas of ducting between Adelaide and Yorke Peninsula, as well as between Victoria and Tasmania across Bass Strait.

### ACMA response to submissions

As indicated in the May 2018 discussion paper, the ACMA sees merit in adopting the new clause. However, it was felt important that existing 3.4 GHz band spectrum licensees and prospective new licensees acknowledged and accepted any risks involved before adopting it. This included the likely risk of interference to and from services deployed in Adelaide and Yorke Peninsula, as well as between Victoria and Tasmania, due to frequent and long periods of ducting.

The ACMA notes that all current 3.4 GHz band spectrum licensees supported the inclusion of the new clause in their submissions. In addition to this, the edits to the new clause proposed by Optus assist in reducing the known interference risks previously described. As such, the ACMA has adopted all changes to the s.145 determination consulted on, including the new clause with the amendments proposed by Optus.

### Issue for comment questions 6, 7 and 8

1. *The ACMA seeks comment from interested stakeholders on the draft Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 3.4 GHz Band) 2015 at attachments D and H (for Option 1) and attachments E and I (for Option 2).*
2. *The ACMA seeks comment on the suitability of the updated coexistence arrangements for earth stations?*
3. *The ACMA seeks comment on the suitability of the proposed amendments regarding coexistence with apparatus-licensed BWA services?*

### Summary of submissions

Most submissions that commented on the draft RAG Tx were generally comfortable with the proposed changes. Foxtel did not support the changes proposed as they would allow an unacceptable risk of interference to earth station operators.

Optus requested that additional clarification regarding use of active antenna systems be included in line with the guidance provided in the s145 Determination.

Protection of earth stations

Regarding the RF filter defined in Table 1 of section 4.3 of the RAG Tx:

* Foxtel expressed a preference for maintaining the existing radiofrequency (RF) filter definition due to the difficulty in achieving the steep initial roll-off required by the proposed new filter response.
* Foxtel and the Communications Alliance Satellite Service Working Group (SSWG) indicated that one antenna may support multiple licensed signals across C-band. For this reason, it is not practical to assume RF filter roll-off from the lower and upper frequencies of every licence on a single antenna. Consequently, there was support for the RF filter only applying from the lowest licensed frequency on a single antenna.
* Foxtel and the SSWG indicated that, in practice, off-the-shelf filters start rolling off from 3700 MHz or 3800 MHz. They suggested these points should be adopted for the RF filter response that applies to earth stations operating above 3700 MHz.
* Multiple submissions identified an error in the RF filter equation for frequency offsets between 50-150 MHz. The equation should be:  
  ‘30.5 + 0.25\*(foffset (MHz)-50)’.

Optus proposed to maintain the 45.5 dB RF filter rejection for frequency offset between 50–110 dB. This is on the basis that the updated filter should not be less stringent than the current filter.

Optus noted the protection requirements for incumbent earth stations in Section 4.4 (3) of the RAG Tx and sought clarification on the derivation of 0.005% as it is not in ITU-R Recommendation SF.1006.

Protection of broadband wireless access services

Optus suggested that protection requirements for NBN Co PTS apparatus licences in the 3400–3425 MHz and 3492.5–3542.5 MHz (3.5 GHz) bands are clearly separated from other PTS licences. This is because NBN Co’s 3.5 GHz band PTS licences are more like a wide area licence and have implications for any future defragmentation of spectrum holdings in the 3400–3700 MHz band.

### ACMA response to submissions

The ACMA notes the concerns raised by Foxtel about the potential risk of interference to their earth stations. However, the measures proposed by the ACMA are commonly used internationally. Also, the ACMA believes adoption of some of the additional changes proposed in submissions to the May 2018 consultation paper (discussed further below) will help to alleviate the most significant concerns raised by Foxtel.

Regarding comments received on the proposed update to the definition of the RF filter:

* The revised RF filter performance proposed by the ACMA encompasses the performance of the existing one and is consistent with what is defined for earth stations use by the FCC. The main benefit of the change is that it defines a continuous curve for RF filter performance rather than a step function. This is expected to improve spectrum utility and coexistence between earth stations and other services. Therefore, the ACMA believes the proposed change is appropriate.
* The ACMA acknowledges that multiple licensed services can operate within the same satellite band from a single antenna. Such use creates additional complexity for earth station operators if RF filters are required to notch out various segments of the 3400–4200 MHz band. Given Inmarsat’s earth stations in Perth are the only incumbent satellite services remaining below 3700 MHz, the ACMA will modify the RF filter definition to only apply from the lowest frequency edge of licences operating on a single antenna (that is, it will act as a high pass filter).
* While off-the shelf products may support RF filter roll-offs starting from 3700 MHz and 3800 MHz, their application would have a material effect on the ability of earth stations to share with other services. The application of the RF filter is also in-line with those defined by the FCC. This indicates filters can be made that start rolling-off at different frequencies. Consequently, while earth station licensees are free to implement the level of filtering they see fit (at their own risk), the ACMA has decided to define a high pass RF filter that applies from the lowest licensed frequency on a single antenna.

The ACMA acknowledges and will correct the error in the equation for frequency offsets between 50–150 MHz. On the basis that the updated filter should not become less stringent than the current filter, the ACMA will also define a level of RF filter rejection of 45.5 dB for frequency offset between 50–110 dB.

Regarding Optus’s request for clarification on the derivation of 0.005% in Section 4.4 (3) of the RAG Tx, this value is the value of *p2%* for digital systems contained in Table 1 of ITU-R Recommendation SF.1006. It is noted that according to ITU-R Recommendation SF.1006, the actual value to use when modelling propagation is actually 0.005/3 = 0.0017%. However, a value of 0.005% was the value presented in the 3.6 GHz band TLG and is considered reasonable in this case.

Regarding Optus’s suggestion to separate coordination requirements for NBN Co’s 3.5 GHz band PTS licences with other 3.5 GHz band PTS licences, the recent minster’s direction has changed the situation in this case. The direction requires the ACMA to implement the same synchronisation fall-back solution as proposed under sub-option 1a to all 3.5 GHz band PTS licences in defined regional and metropolitan areas. As a consequence, this solution will apply to all NBN Co’s 3.5 GHz band PTS licences and any other PTS licences that may be issued in the defined regional and metropolitan areas.

Based on Optus’s request, the ACMA will include notes in relevant sections providing guidance on how devices with active antenna systems can be considered when managing interference.

### Issue for comment question 9

1. *The ACMA seeks comment from interested stakeholders on the draft Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers – 3.4 GHz Band) 2015 at attachments F and H (for Option 1) and attachments G and I (for Option 2).*

### Summary of submissions

Those submissions that commented on the draft RAG Rx were generally comfortable with the proposed changes under sub-option 1a.

Optus requested that additional clarification regarding use of active antenna systems be included in line with the guidance provided in the s145 Determination.

Optus also indicated that the date defined in Part 3.1 (5)(a), 14 December 2015, was the licence renewal date of 3.4 GHz band spectrum licences and that spectrum licensing has been in effect in the band since the year 2000. Optus further indicated that as spectrum licences have been in effect before the issue date of many of the existing apparatus licences issued in and adjacent to the 3.4 GHz band, they should be afforded in-band protection from such licences. Based on this, Optus proposed that the original issue date of spectrum licenses in the 3.4 GHz band should instead be used in Part 3.1 (5)(a).

### ACMA response to submissions

The ACMA will adopt all changes proposed to the RAG Rx and include notes in relevant sections providing guidance on how devices with active antenna systems can be considered when managing interference.

For the proposed changes to Part 3.1 (5)(a), the ACMA notes the 14 December 2015 date was put in the RAG Rx as part of the revision of the technical framework in 2015. This was done because the in-band interference criteria were changed as part of the 2015 review. To ensure apparatus licences issued between the time the 3.4 GHz band was originally re-allocated for spectrum licensing on 17 June 2000 and the re-issue of spectrum licences on the 14 December 2015 (which would have met the old criteria), suddenly being deemed to cause unacceptable interference, the date in Part 3.1 (5)(a) was amended from 17 June 2000 to 14 December 2015. For this reason, the ACMA believes the date in Part 3.1 (5)(a) should remain as is.

### Issue for comment question 10

1. *The ACMA seeks comment on the proposed additional out-of-band emission limit in cases where a synchronisation requirement does not apply. Is it appropriate to share the 20 MHz guard band equally between adjacent band licensees? If agreement cannot be achieved with all 3.4 GHz band licensees to share the 20 MHz guard band, are the proposed alternative limits suitable?*

### Summary of submissions

This issue for comment related to changes that only applied to the adoption of the Option 2 technical framework. Since sub-option 1a has been adopted, responses to this question have not been considered further.

### Issue for comment questions 11 and 12

1. *The ACMA seeks comment from interested stakeholders on the proposed amendment to the Radiocommunications (Trading Rules for Spectrum Licences) Determination 2012 to define a minimum contiguous bandwidth of 10 MHz for the 3.6 GHz band, as detailed in attachments H and I.*
2. *The ACMA seeks comment from interested stakeholders on the proposed amendment to the Radiocommunications (Trading Rules for Spectrum Licences) Determination 2012 to remove the minimum contiguous bandwidth for the 27 GHz band, as detailed in attachments H and I.*

### Summary of submissions

All submissions that commented on the amendments to the trading determination supported the proposed changes.

### ACMA response to submissions

The ACMA has included the 3.6 GHz band to the trading determination and defined an MCB of 10 MHz. The 27 GHz band has also been removed from Schedule 1 (because of spectrum licensing no longer being applicable in the band).

# Annex A—Submissions received

* Airspan Spectrum Holdings Ltd and Dense Air Limited
* Australian Mobile Telecommunications Association (AMTA)
* Carriers Alliance Satellite Service Working Group (SSWG)
* Department of Defence
* Ericsson
* Foxtel
* Huawei
* NBN Co Ltd
* Optus
* Telstra
* Vodafone Hutchinson Australia (VHA)

# Annex B—Summary of changes

This annex provides a summary of changes to the instruments that form the 3.4 GHz and 3.6 GHz bands technical framework, as a result of submissions received to the May 2018 discussion paper. The changes are based on the adoption of sub-option 1a and submissions received that commented on that sub-option.

The instruments that form the 3.4 GHz and 3.6 GHz bands technical framework are:

* sample spectrum licence
* Radiocommunications (Trading Rules for Spectrum Licences) Determination 2012
* Radiocommunications (Unacceptable Levels of Interference — 3.4 GHz Band) Determination 2015 (s.145 determination)
* Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters — 3.4 GHz Band) 2015 (RAG Tx)

Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers — 3.4 GHz Band) 2015 (RAG Rx).

## Changes

Changes as a result of public consultation on a per instrument basis are provided below.

### Spectrum licence

The following changes were made as a result of the public consultation process (excluding simple editorial changes):

* Corrections to 5(1) and 11-14 of Schedule 1.
* Updating to spurious emissions limits in 3100–3380 MHz frequency range to match 3GPP standards. This has resulted in the merging of tables 5 and 6 as well as subsequent changes to following table numbers.
* Including a note to the synchronisation requirement indicating that the device or devices registered first-in-time have priority during any period of re-planning or negotiation until the interference issue is either resolved or operation is synchronised.
* Including a note to the synchronisation requirement indicating that it only applies to the cell/sector that is causing/receiving interference. It does not mandate network-wide synchronisation.
* Including a reference to 3GPP TS 38.211 in the synchronisation note. This is to clarify that other frame structures can be applied (including those defined for 5G) provided they only transmit and receive (or have no emissions) during the same periods as defined in the synchronisation requirement.
* Inclusion of PTS licences in the 3400–3700 MHz band to the synchronisation condition, consistent with the minister’s direction.
* General editorial changes to the synchronisation requirement to make it consistent with the minister’s direction.

For the condition requiring licensees to manage interference with incumbent apparatus licensees, specific reference is now made to the parts of the RAG Tx that contain the relevant protection criteria.

### Radiocommunications (Trading Rules for Spectrum Licences) Determination 2012

No change from the issues that were consulted on.

### Radiocommunications (Unacceptable Levels of Interference — 3.4 GHz Band) Determination 2015 (s.145 determination)

The following change was made as a result of the public consultation process (excluding simple editorial changes):

Including a new subclause 9(4) that states sections of the device boundary that extend beyond a licence area and only pass over water are not considered to fail the device boundary criteria.

### Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters — 3.4 GHz Band) 2015 (RAG Tx)

The following changes were made as a result of the public consultation process (excluding simple editorial changes):

* Including notes in relevant parts providing guidance on how devices with an active antenna system can be considered for the purposes of managing interference.
* Maintaining the current text for the note below subclause 4.3(3) as this more accurately defines how to calculate interference from unwanted emissions.
* Correction to the definition of the RF filter rejection over the 50–150 MHz frequency range in Table 1 of Part 4.
* In Table 1 of Part 4.3, modification of the RF filter performance at 50–110 MHz offsets to increase rejection to 45.5 dB. This matches the RF filter performance over this frequency range that is defined in the current RAG Tx.
* Including a note below Table 1 of Part 4 clarifying how the RF filter applies to an antenna with multiple earth receive licences on it.
* Rewording of the last sentence in subclause 4.3(5) to provide clearer guidance on the reasoning for notifying earth receive licensees of new deployments under a 3.4 GHz band spectrum licence.
* Inserting a new subclause 8.2(4) providing guidance on how cross-border interference is managed between 3.4 GHz band spectrum licensees if there is no agreement on alternative measures.

Note: RALI MS44, RALI FX19 and RALI MS39 are incorporated by reference into the RAG. The making of the new RALI MS44 and updates to RALI FX19 and RALI MS39 occurred via a parallel consultation process. These RALIs are now available on the [ACMA website](https://www.acma.gov.au/Industry/Spectrum/Spectrum-planning/Current-APs-info-and-resources/frequency-assignment-requirements-spectrum-planning-acma).

### [Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers — 3.4 GHz Band) 2015](http://www.comlaw.gov.au/Details/F2015L00729) (RAG Rx)

The following changes were made as a result of the public consultation process:

* Removing the definition for non-AAS as it is not used in the instrument.
* Including notes in relevant parts to provide guidance on how devices with an active antenna system can be considered for the purposes of managing interference.
* Inclusion of guidance on how interference is managed with devices operating under a class licence.

Correction to the definition of receiver blocking characteristics in clause 5 of Schedule 1 to match 3GPP standards.

1. The 3.4 GHz band is currently allocated via spectrum licences in metropolitan and regional areas of Australia and covers the 3425–3492.5 MHz and 3542.5–3575 MHz frequency ranges. [↑](#footnote-ref-2)
2. The 3.6 GHz band covers the 3575–3700 MHz frequency range. [↑](#footnote-ref-3)
3. The outcomes of the 3.6 GHz band TLG are available on the [ACMA website](https://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Spectrum-licences/spectrum-licence-technical-liaison-groups-1). [↑](#footnote-ref-4)
4. The [Radiocommunications – 3.4 GHz Band Omnibus Variation 2018 (No.1)](https://www.legislation.gov.au/Details/F2018L01063) that varies the technical framework commenced on the 28 July 2018. While these variations take affect from 28 July 2018, it takes up to 28 days for each individual technical framework instrument on the Federal Register of Legislation (FRoL) to be amended to incorporate the changes. In the interim period, the FRoL will show the previous instruments and point to the unincorporated amendments contained in the [Radiocommunications – 3.4 GHz Band Omnibus Variation 2018 (No.1)](https://www.legislation.gov.au/Details/F2018L01063). [↑](#footnote-ref-5)