



nbn submission on 3.6 GHz band legislative instruments, IFC 14/2018

Consultation papers

Thank you for the opportunity to comment on the ACMA's questions and draft documents contained in the consultation papers on:

- the 3.4 GHz (3425 MHz to 3442.5 MHz; 3442.5 MHz to 3475 MHz; 3475 MHz to 3492.5 MHz; and 3542.5 MHz to 3575 MHz) and 3.6 GHz (3575 - 3700 MHz) band spectrum licence technical framework; and
- the draft allocation instruments for the 3.6 GHz band auction (**Allocation Instruments**).

We set out our response below and would be happy to further discuss.

Summary

nbn's consideration of spectrum is focused on ensuring that it meets the Federal Government's expectation that all Australians have access to fast broadband as soon as possible, at affordable prices, and at least cost to taxpayers, and that **nbn** will be able to ensure upgrade paths are available as required.

nbn notes the ACMA's comment in the technical framework consultation paper that a single technical framework in both the 3.4 GHz and 3.6 GHz bands would simplify network design for licensees holding spectrum, and would help reduce the complexity of any future defragmentation of all spectrum holdings (both spectrum and apparatus licenced) in the broader 3400–3700 MHz frequencies.

In respect of the technical framework options proposed by the ACMA:

- **nbn** is unable to support the implementation of option 1 (common network synchronisation requirement across both the 3.4 GHz and 3.6 GHz bands), including Sub-options 1a and 1b, given uncertainties surrounding **nbn**'s ability to move from its existing frame configuration to that proposed under option 1. Whether **nbn** can move to this new configuration at all, and if it can, the timing of such a move, is contingent on a number of factors outside **nbn**'s control.
- **nbn** supports the partial implementation of option 2 (the use of strict unwanted emission limits to manage interference between 3.4 GHz and 3.6 GHz band licences), noting that the proposed changes (in comparison to option 3) support a move towards a common licence framework across 3.4 to 3.7 GHz with changes based on 3GPP updates around in-band and out-of-band emissions to reflect the anticipated deployment of active antennas by industry.
 - **nbn** is unable to support the use of a fall-back 3:1 downlink to uplink ratio in the 3.6GHz band given uncertainties surrounding **nbn**'s ability to move from its existing frame configuration to a 6:2:2 frame configuration. [C-i-C] [C-i-C]
 - **nbn** does not support a change to the 5 MHz guard band requirement currently placed on 3.4 GHz spectrum licence holders.
- **nbn** does not support the implementation of option 3, noting that **nbn** supports a move towards a common licence framework across 3.4 to 3.7 GHz to the extent possible.

[C-i-C] [C-i-C]

nbn submits the following:

- **Licence commencement** - **nbn** supports the ACMA's proposal that all spectrum licences commence at the end of the two-year reallocation period in metropolitan areas.
- **[C-i-C] [C-i-C]**
- **Assignment stage** – **nbn** submits that external verification of results from the assignment stage is required.
- **Auction indicative timeline** – **nbn** submits that a longer period of at least 6 weeks needs to be provided between the date that applications open, and the application deadline, noting the significant implications associated with nominated lots under the proposed ESMRA format.
- **Auction format** – **nbn** submits that ample timing needs to be provided between rounds and recess periods during the auction to facilitate any necessary internal governance processes, noting the complexities of the proposed ESMRA format and the potential impact this would have on bidding strategy.

[C-i-C] [C-i-C]

Technical Framework – network synchronisation

nbn notes the ACMA's comment in the technical framework consultation paper that a single technical framework in both the 3.4 GHz and 3.6 GHz bands would simplify network design for licensees holding spectrum, and would help reduce the complexity of any future defragmentation of all spectrum holdings (both spectrum and apparatus licenced) in the broader 3400–3700 MHz frequencies.

nbn also notes the complexities identified in respect of implementing such a single technical framework covering both bands, particularly in respect of network synchronisation. The ACMA has developed the options below for 'fall-back' synchronisation where interference would otherwise occur for which affected spectrum licensees have not agreed to manage in alternative way(s):

- **Option 1**, a mandated common network synchronisation requirement across the 3.4 GHz and 3.6 GHz bands using a frame configuration achieving a 3:1 ratio of downlink to uplink capacity¹ as a fall-back measure to manage adjacent-area and adjacent-band interference.
 - > **Sub-option 1a**: a fall-back 3:1 synchronisation requirement as above, but with:
 1. the start of the 3.6 GHz band spectrum licence term delayed (to no later than the end of the 3.6 GHz band re-allocation period for Adelaide and eastern metropolitan Australia in March 2020); and
 2. prior to the commencement of the spectrum licences, early access to the 3.6 GHz band provided to those acquiring lots in the auction via apparatus licence arrangements that ensure coexistence with existing 3.4 GHz spectrum licensees in manner suitable for those licensees. At some point before or upon the commencement of the 3.6 GHz licences, the 3.4 GHz licences would also be amended to adopt the new conditions.
 - > **Sub-option 1b** - adoption of an initial temporary fall-back synchronisation arrangement, for example, a fall-back 1:1 downlink to uplink ratio, until a set date. After this date, and following notification to

¹ I.e. aligning the timing of uplink and downlink emissions with frame structure type 2, configuration 2, and employing configuration 6 for the special sub-frame, as specified in 3GPP Technical Specification 36.211.

affected users and a period of transition² (during which either the temporary (1:1), or final (3:1), configuration could be used), the fall-back 3:1 downlink to uplink ratio would come into effect.

- **Option 2** is based on the use of strict unwanted emission limits to manage interference between 3.4 GHz and 3.6 GHz band licences.
 - Coexistence amongst 3.4 GHz spectrum licensees would continue to rely on the use of a combination of restricted blocks and strict unwanted emission limits between licences.
 - Coexistence between 3.4 GHz and 3.6 GHz spectrum licences would be achieved via the implementation of strict unwanted emission limits at the 3.4/3.6 GHz boundary.
- **Option 3** is a variant to option 2 that could be used if 3.4 GHz licensees did not agree to any changes to the existing 3.4 GHz technical framework. This option would see existing 3.4 GHz licences and associated instruments left untouched. New technical framework instruments would be made for the 3.6 GHz licences.

[C-i-C] [C-i-C]

- **nbn** is unable to support the implementation of option 1, including sub-options 1a and 1b, given uncertainties surrounding **nbn**'s ability to move from its existing frame configuration³ to that proposed under option 1. Whether **nbn** can move to this new configuration at all, and if it can, the timing of such a move, is contingent on a number of factors outside **nbn**'s control.
- **nbn** supports the partial implementation of option 2 (the use of strict unwanted emission limits to manage interference between 3.4 GHz and 3.6 GHz band licences), noting that the proposed changes (in comparison to option 3) support a move towards a common licence framework across 3.4 to 3.7 GHz with changes based on 3GPP updates around in-band and out-of-band emissions to reflect the anticipated deployment of active antennas by industry.
 - **nbn** is unable to support the use of a fall-back 3:1 downlink to uplink ratio in the 3.6GHz band given uncertainties surrounding **nbn**'s ability to move from its existing frame configuration to a 6:2:2 frame configuration. **[C-i-C] [C-i-C]**
 - **nbn** does not support a change to the 5 MHz guard band requirement currently placed on 3.4 GHz spectrum licence holders.
- **nbn** does not support the implementation of option 3, noting that **nbn** supports a move towards a common licence framework across 3.4 to 3.7 GHz to the extent possible.

Technical framework questions

nbn's view on the questions in the technical framework consultation paper are set out below. **nbn** notes that it supports the partial implementation of option 2 only for the reasons set out above under 'Technical Framework – network synchronisation'. **[C-i-C] [C-i-C]**

1. The ACMA seeks comment from interested stakeholders on the draft spectrum licence for the 3.4 GHz band at Attachment A (for Option 1) and Attachment B (for Option 2).

[C-i-C] [C-i-C]

² Earlier transition could occur where there is agreement from all affected licensees.

³ 3GPP Technical Specification 36.211 frame structure type 2, configuration 1.

nbn notes that the draft spectrum licence in Attachment B appear to reflect the approach as set out in option 2 and that **nbn** can only support the partial implementation of option 2 for the reasons set out above.

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)?

nbn notes that it supports the partial implementation of option 2 for the reasons set out above under ‘Technical Framework – network synchronisation’. [C-i-C] [C-i-C]

3. 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.

nbn considers that the unwanted emission limits developed by the 3.6 GHz TLG have considered the ECC work and are appropriate. These have resulted in a fair compromise between very strict, but inefficient, emission limits and too lax emission limits which would require too much ad hoc co-ordination between networks to mitigate interference.

4. 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.

nbn notes that it supports the partial implementation of option 2 for the reasons set out above under ‘Technical Framework – network synchronisation’. On this basis, **nbn** considers that the proposed changes as they relate to option 2 are acceptable. [C-i-C] [C-i-C]

5. 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?

nbn believes the proposed text is suitable based on the information available.

6. 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).

nbn notes that it supports the partial implementation of option 2 for the reasons as set out above under ‘Technical Framework – network synchronisation’. On this basis, **nbn** considers that the proposed changes as they relate to option 2 are acceptable (attachments E and I). [C-i-C] [C-i-C]

7. The ACMA seeks comment on the suitability of the updated coexistence arrangements for earth stations?

nbn considers that the updated coexistence arrangements for earth stations are suitable.

8. The ACMA seeks comment on the suitability of the proposed amendments regarding coexistence with apparatus-licensed BWA services?

nbn considers that the proposed amendments regarding coexistence with apparatus-licensed BWA services are suitable.

9. 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).

nbn notes that it supports the partial implementation of option 2 for the reasons as set out above under ‘Technical Framework – network synchronisation’. On this basis, **nbn** considers that the proposed changes as they relate to option 2 are acceptable (attachments G and I). [C-i-C] [C-i-C]

10. 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?

nbn understands that under option 2, the ACMA proposes that:

- Coexistence among 3.4 GHz spectrum licensees would continue to rely on the use of a combination of restricted blocks and strict unwanted emission limits between licences.
- Coexistence between 3.4 GHz and 3.6 GHz spectrum licences would be achieved via the implementation of strict unwanted emission limits at the 3.4/3.6 GHz boundary.

nbn does not support any increase in guard bands for 3.4 GHz spectrum licences, including at the boundary of 3.4 / 3.6 GHz. **nbn** has procured, designed, and deployed its fixed wireless network based on existing spectrum licence conditions.

nbn understands the ACMA’s proposal to be that in the event an agreement cannot be reached with all 3.4 GHz band licensees to share the 20 MHz guard band, the existing 3.4 GHz emission limit and the equivalent TRP limit will apply at a 5 MHz offset for 3.4 GHz and 3.6 GHz respectively.

nbn notes that the ACMA has provided example 3.6 GHz band limits as set out below:

- For non-AAS transmitters: a radiated maximum true mean power of -25 dBm/MHz EIRP at a frequency offset of ≥ 5 MHz
- For AAS transmitters: a total radiated mean power of -47 dBm/MHz at a frequency offset of ≥ 5 MHz.

Further, that ACMA has proposed that it should be noted that frequency offsets for the adjacent channel selectivity and blocking requirements of the notional receiver may also need to be adjusted depending on how the additional unwanted emission limits are ultimately specified.

nbn’s notes that the vendor equipment that aligns with 3GPP standards would be more readily available and likely more commercially feasible as a result and submits that the relevant limits should reflect the 3GPP standards.

11. 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.

nbn agrees with the proposed amendment to define a minimum contiguous bandwidth of 10 MHz for the 3.6 GHz band.

12. 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.

nbn has no comment based on the available information and understands that the proposed change is due to the 26.5 – 27.5 GHz (27 GHz) band no longer being subject to spectrum licensing.

Draft allocation instruments

nbn notes that it supports the partial implementation of option 2 for the reasons as set out above under ‘Technical Framework – network synchronisation’. [C-i-C] [C-i-C]

1. Issue for comment 1—Licence commencement

The ACMA seeks stakeholder views on whether spectrum licences for the 3.6 GHz band should commence as soon as possible after the auction, or at the end of the two-year reallocation period in metropolitan areas.

nbn supports the ACMA’s proposal that all spectrum licences commence at the end of the two-year reallocation period in metropolitan areas.

nbn notes that if spectrum licences commence at the end of the two-year reallocation period in metropolitan areas, it is proposed that licensees will be able to apply for ‘early access’ apparatus licences in the intervening period in any unencumbered areas.

nbn submits that device registration criteria for early access should, to the extent possible, be the same as the criteria that would be adopted in the spectrum licences to ensure the smooth transition from early access apparatus licence to spectrum licence.

2. Issue for comment 2— Amendment to the Tax Determination

The ACMA seeks stakeholder views on the proposal to amend the Tax Determination to incorporate an annual licence tax rate of \$0.0039/MHz/pop.

- **nbn** understands that the ACMA is proposing to amend Part 7A of the *Radiocommunications (Transmitter Licence Tax) Determination 2015* (the Tax Determination) in order to apply an annual licence tax rate of \$0.0039/MHz/pop for operation of a transmitter in the frequency range 3575–3700 MHz.
- It seems that 3.6 GHz auction participants could place a similar value on spectrum access rights under the two different options for licence commencement. As such, the basis for the early access apparatus licences is not clear to us.

3. The ACMA seeks stakeholder views on the draft marketing plan, especially geographic lot configurations and multiple lot categories in Perth.

[C-i-C] [C-i-C]

4. Issue for comment 4—The draft allocation determination (3.6 GHz band) and auction rules

The ACMA seeks stakeholder views on the draft allocation determination and the auction rules.

nbn supports the ACMA’s proposal for a 10MHz minimum bid requirement cap.

Assignment stage

- **nbn** submits that external verification of results from the assignment stage is required.
- [C-i-C] [C-i-C]

Auction indicative timeline

nbn submits that a longer period needs to be provided between: the date that ACMA advertises the auction, publishes the Applicant information pack and applications open; and the date of the application deadline.

nbn submits that at least 6 weeks should be provided as opposed to the current proposed 4 weeks.



nbn understands that under the proposed ESMRA format that the lots nominated by a bidder on the application form would be effectively the opening round bid and that a bidder's ability to reduce demand within a particular product, and the ability to transfer demand between different products is limited. As such, the timeframe that a bidder has to consider the nominated lots on its application form needs to be longer than the proposed 4 weeks given the potential significant implications.

Auction format

nbn submits that ample timing needs to be provided between rounds and recess periods during the course of the auction to facilitate any necessary internal governance processes.

nbn notes that under the proposed ESMRA format, complexities include, for example, that the auction is proposed to end for all lots simultaneously in the primary stage, that a bidder's ability to reduce demand within a particular product, and the ability to transfer demand between different products is limited. As such, **nbn** considers that the need to engage in particular internal governance processes during the course of the auction is high given the complexities that this could potentially introduce to any bidding strategy.