

The word "OPTUS" is written in a bold, teal-colored, sans-serif font.

Submission in response to
ACMA's options paper

**Optimising arrangements
for the 3400-3575 MHz
band**

Public Version

May 2019

EXECUTIVE SUMMARY

1. Optus welcomes the opportunity to respond to the Australian Communications and Media Authority (ACMA) options paper: *Optimising arrangements for the 3400-3575 MHz band*.
2. As set out in Optus' submission to the Five-Year Spectrum Outlook, Optus supports the ACMA's renewed focus on ensuring current spectrum ranges achieve efficient use and maximise the public benefit for use. Notably, Optus welcomes the recognition of defragmentation of the 3400-3575 MHz band in the ACMA's work plan.
3. Establishing the right framework for existing 5G spectrum is a high priority. Optimising arrangements in the 3.4 GHz band should be prioritised to enable the full potential of the 3.5 GHz (3400-3700 MHz) 5G band to be realised.
4. Defragmentation of the 3.4 GHz band satisfies the ACMA's planning goals and delivers the highest value use for the band. We also reiterate the importance of this planning activity as a priority to improve the efficient use of spectrum in the band and deliver certainty for existing licensees for rollout planning.
5. Optus supports the ACMA's preferred Option 3b for several reasons including:
 - (a) Achieving defragmentation of the band;
 - (b) Grants the best overall outcome and meets the ACMA's planning objectives; and
 - (c) Grants licensees the opportunity to defragment in the highest value use areas without prerequisites from other remote area licensees. This also retains the opportunity to defragment the whole band nationally if agreement on the relevant arrangements can be reached.
6. Optus does not support Option 1 as it does not achieve any of the ACMA's planning goals and leaves fragmented, inefficiently used spectrum.
7. The proposal regarding urban PTS licence access also overstates the potential areas available and considers only the coverage areas associated with NBN Co's fixed wireless service. Along with several other factors, the interference management in these regions will be highly problematic. As such, Optus considers Approach 1 the only viable option should access to these licence areas be granted to another operator.
8. Within the NBN Co's PTS licence in urban areas, adequate protections should be considered for adjacent channel licensees in the band *not* just co-channel.
9. Optus also does not support Option 2 as it places too many dependencies on the restack of remote PMP licences before the defragmentation of areas of highest value use can be achieved.
10. In summary, Optus considers defragmentation of the 3.4 GHz band the highest priority work item for the ACMA, with implementation underway no later than March 2020 to align with other licence conditions coming into effect in this and the adjacent band.

RECONFIGURING THE 3.4 GHz BAND

Case for action

11. Optus welcomes the proposed changes to the band and supports the case for action. Resolving the fragmentation between 3400 and 3575 MHz will provide wider contiguous bandwidths, support for the latest technology, reduced guard bands and improved spectrum boundary conditions. Harmonisation of adjacent licence types will remove obstacles to the defragmentation, deliver more usable spectrum to licensees and ensuring highest value use.

Question 1: Do stakeholders have any comments on the case for action in the 3400–3575 MHz band?

12. Optus strongly supports the case for defragmentation of the 3400-3575 MHz band. Defragmenting the band will provide the most efficient and cost-effective use of the available spectrum.
13. Optus supports the defragmentation of the band across the whole country if possible, however the reconfiguration of the metropolitan spectrum areas should not be contingent upon the outcomes of negotiations with PMPs and implementation of spectrum changes in remote areas
14. Optus recommends that the processes needed to implement the defragmentation in the highest value areas should be prioritised if a national defragmentation plan is not agreed upon by October 2019.

Options for change

15. Optus supports Option 3b to be the preferred approach – as it allocates sufficient spectrum to the PMPs, provides certainty to current licensees and grants flexibility in the planning and implementation of the defragmentation while decoupling the highest value use areas from remote use if needed.

Question 2: Do stakeholders have any comments on the planning options identified? Are there any other planning options that should be considered? (Please provide reasoning.)

16. Optus supports the ACMA's view that Option 3b is the preferred option to deliver outcomes in line with the ACMA's planning goals. While Optus would prefer for the defragmentation of the band to take place in a simultaneous, nationwide fashion, it is acknowledged that Option 3b also allows for the defragmentation of metropolitan areas independently of remote and regional areas.
17. A metro-first approach would place delivery the fastest, highest value use of the spectrum before resolution of the regional restack, but this could create issues for compliance and licence grandfathering on spectrum area boundaries subject to co-channel interference.
18. A compromise approach may prove suitable where a metropolitan defragmentation can take place when the physically adjacent NBN licence region requires little or no restacking to accommodate PMPs operating in or close to that NBN licence area. Under these circumstances, coordination or co-existence between NBN and the PMPs could be viable until the final outcomes of a restack are agreed upon an implemented.
19. Option 3b allows Optus and NBN Co to deal with the areas where the densest deployments of network have taken, and are planned to, take place. In particular,

- (a) Expedient implementation of Option 3b will reduce the exposure of incumbents to incur unnecessary costs and additional implementation complexity for network augmentation to accommodate defragmentation. A significant number of new deployments are currently planned in this band.
 - (b) The later the defragmentation takes place, the more network equipment will need to be reconfigured or changed to implement the new band plan, leading to greater expense for licensees.
 - (c) The prioritisation of areas with the densest populations and deployments will deliver the greatest benefit to the largest number of end users.
 - (d) The preference is still for resolution of all facets of the defragmentation in metropolitan, regional and remote areas for the avoidance of possible spectrum boundary co-channel complications.
20. Optus does not support Option 1 as there is a clear need for the band to be defragmented to deliver against the ACMA's planning goals and provide access to large contiguous spectrum for high-bandwidth, high-throughput services.
21. Optus does not support Option 2 as a viable pathway to timely defragmentation of the band. Option 2 imposes too many prerequisites on the defragmentation of the highest value spectrum licence areas – including: a delay associated with moving the PMPs from the band; the costs of delay incurred by all stakeholders; the need for all parties to agree on all issues before defragmentation can take place; and the impact on other stakeholders. Too many dependencies exist for this to be considered a viable option.
22. Another option could be considered, whereby Optus and NBN Co could use third party authorisations to self-implement defragmentation in urban areas, assisted by the ACMA for registrations spanning multiple licence types. However, this option will require agreement by both parties – Optus and NBN Co – to the authorisations until a full defragmentation can be completed and guarantee that the conversion will be completed.
23. Access to urban area spectrum that is currently unused by NBN Co within the NBN fixed line footprint will present limited opportunities for any potential licensee. Optus believes that the areas available for a potential licensee to use the NBN PTS- licenced spectrum have been over-stated.
24. For example, NBN Co have deployed sites in the 3.4 GHz band inside metropolitan spectrum areas. The ACMA database shows registrations for NBN sites up to 40 km 'inside' the Metro Spectrum boundaries, e.g. Melbourne. These sites are typically placed immediately adjacent to the NBN fixed line footprint where the provision of fixed line services are not economically viable.¹
25. The areas available for access to this spectrum would be very small, with challenges for both co-channel and adjacent-channel interference and management
- (a) Optus submits that the reasonable path here is Approach 1, where third party access is negotiated under existing licence conditions.
 - (b) This approach delivers the best interference and co-existence outcomes, minimising the impact to NBN Co's ability to meet their service obligations.

¹ The ACMA deals with the location and quantity of these sites on pages 31-38 of the 3.4 GHz reconfiguration consultation paper

- (c) Optus agrees that a more detailed view of NBN Co's current and future deployment, frequency planning and capacity plans would be needed to provide a definitive response to this matter.
26. While the coverage associated with any cell in NBN Co's fixed wireless network is informative in determining the service area, it is not sufficient for the determination of interference. Limiting the assessment of the impact of potential interference, be it co-channel or adjacent channel, to the coverage area of a cell will not adequately protect either NBN Co or other licensees in the band from interference.
 27. The radiated power from a cell travels much, much further than the published coverage boundaries associated with any cellular network. Instances of co-channel interference in TDD networks have been experienced with site-to-site distances in excess of 100 km.
 28. The management of co-channel and adjacent channel interference under these circumstances, with the small areas within the NBN Co fixed line footprint available for urban PTS spectrum access, will present very significant challenges to NBN and any mooted network in these regions. The ability to use this small area *and* resolve both co-channel and adjacent channel interference is uncertain.
 29. TDD synchronisation as a mitigation for interference has additional considerations, such as: large Guard Periods in small cells; ineffectiveness when Guard Period is exceeded; widespread network outages in multiple networks if synchronisation faults occur in one network; and restrictions on 5G performance. This should be considered as a per cell solution and not a network wide solution
 30. Optus reiterates that the most appropriate way of dealing with these interference challenges is by the application of Approach 1 should access be granted to the PTS licence areas identified.

Planning goals

Question 3: Do stakeholders have any comments on the planning goals for the 3400–3575 MHz band? Are there any other planning goals that should be considered?

31. Optus agrees with the ACMA's planning goals and notes the previous work on a defragmentation plan. In particular, **[CiC]**

Reallocation period for option 2

Question 4: If Option 2a or 2b are adopted, do stakeholders have views on how long the reallocation period should be?

32. Optus reiterates its opposition to Option 2 for the defragmentation of the band, as it imposes unnecessary delay and dependencies on the resolution of the PMP question before defragmenting the highest value areas using the band.
33. That said, Optus acknowledges that the minimum reallocation period of two years is unlikely to be sufficient for PMPs to swap out equipment and services. However, the 7 years that were granted to WISPs as part of the 3.6 GHz spectrum auction is excessive.
34. Optus therefore suggests a reallocation period of no more than three years.

Restack implementation period for option 3

Question 5: If Option 3a or 3b are adopted, do stakeholders have views on the period of time incumbent apparatus licensees should be given to implement restack? (Noting affected licences would not be reissued on existing frequencies beyond this point.)

35. Optus reiterates its support for Option 3b and highlights the following considerations for restack implementation:
- (a) In instances where apparatus-licensed equipment is demonstrated to be capable of co-existence or can coordinate with defragmented spectrum licensed equipment, the defragmentation implementation should be *completed* within a timeframe of no more than three years from defragmentation direction from the Minister.
 - (b) For instances where co-existence or coordination between licensees does not overcome interference issues the maximum period for implementation should be 12 months.

Reallocation period for option 3

Question 6: If Option 3a or 3b are adopted, do stakeholders have views on how long the reallocation period should be?

36. Please refer to Optus' response to Question 4.
37. Under Option 3b, the reallocation period for PMPs should, as far as possible, be decoupled from the defragmentation in metropolitan areas.

Assessment of planning options against the principles

Question 7: Do stakeholders have any comments on the assessment of planning options against the principles?

38. Optus agrees with the ACMA's assessment of the planning options against the principles.
39. Please refer to Optus' response to Question 3 for further comments on the principles.

Question 8: Is there any relevant evidence that provides an indication of the value wireless broadband operators place on how additional spectrum is made available (i.e. under spectrum or apparatus licensing arrangements)?

40. Optus considers spectrum licensing remains the option most likely to ensure the efficient allocation and use of the spectrum and to provide licensees with the flexibility and security of tenure needed to encourage investment in infrastructure.
41. Optus requests that, regardless of the licence type chosen, the licence conditions are aligned with the existing harmonised spectrum licence core conditions for the 3.4 GHz and 3.6 GHz bands.

ACMA preferred planning option

42. Optus fully supports the ACMA's preferred planning option: Option 3b

Remote areas

Question 9: Do stakeholders have any comments on the preferred planning option for remote areas?

43. Optus supports the simultaneous defragmentation and restack of the whole 3.4 GHz band, on a nationwide basis. Providing additional spectrum to assist PMPs migrate from their existing holdings could also assist in expediting the process.
44. Optus therefore supports Option 3b to achieve the ACMA's planning goals in the 3400-3575 MHz band.

Question 10: Should the broader 3400–3700 MHz band be considered when expanding arrangements for PMP in remote areas?

45. Optus considers that the broader 3400-3700 MHz band should only be considered once agreement and implementation planning has been reached and the Minister has provided direction on defragmentation of the 3400-3575 MHz band.
46. The addition of apparatus-licensed spectrum in remote areas associated with Option 3b is sufficient incentive to migrate from existing holdings to elsewhere in the band in a timely fashion, thereby facilitating the defragmentation as outlined in Option 3b.
47. In the execution of this defragmentation exercise, Optus contends that the ACMA's full attention should be on management of the 3400-3575 MHz band and its existing licensees. A change in scope or increase in the frequency bands under consideration could result in a delay in the defragmentation and restacking exercise.

Metropolitan areas, regional areas and major regional centres

48. Multiple routes from the current fragmented band to a defragmented outcome have been presented by ACMA. Optus supports the ACMA's choice of Option 3b, phase 1 as it clearly offers the most flexible opportunity to defragment the band, meeting the ACMA's planning objectives and providing the opportunity to address the highest value use areas as a priority.

Question 11: Do stakeholders have any comments on the preferred planning option for metropolitan areas, regional areas and major regional centres?

49. Optus supports the selection of Option 3b as the ACMA's preferred planning option for the defragmentation of the 3.4 GHz band.
50. Option 3b grants the most flexibility in achieving defragmentation of the band, as well as offering the opportunity to decouple the needs and timelines of PMPs from the highest value outcomes of the defragmentation exercise.
51. The flexibility of Option 3b also allows for individual regions to be defragmented according to an agreed priority between affected licensees.

Question 12: Would an earlier conversion of NBN Co's PTS licences in metropolitan areas provide greater certainty for negotiations on defrag to occur?

52. Optus agrees that an earlier conversion of NBN Co's metropolitan licences would provide greater certainty in defragmentation negotiations.

53. This is not to say that *all* metropolitan areas would necessarily need to be converted early. Priority should be given to metropolitan areas achieving the maximum value from the defragmentation and the minimum impact on other services.
54. NBN licence areas that are physically adjacent to any prioritised metropolitan areas are candidates for simultaneous defragmentation where NBN Co's interference risk with PMPs can be coordinated or co-existence can occur due to geographical or band separation between registered devices.
55. Assessment of the exposure of NBN Co and the incumbent PMPs should be undertaken on a case-by-case basis with an effort to maximise the opportunity for defragmentation to occur in a timely fashion.

Use of urban areas in NBN Co's PTS licences

56. Optus notes that there is limited opportunity for access to urban areas currently unoccupied by NBN Co base stations in the 3.4 GHz band.

Options for facilitating access to urban areas

57. Optus urges the ACMA to ensure that adequate provisions are made for interference protection for adjacent channel licensees in the same urban areas in accordance with the spectrum licences in this band, should access to these urban areas be granted.
58. Optus highlights the specifics of adjacent channel interference as the options paper only refers to co-channel interference. This is considered a significant omission.

Question 13: Are the existing third-party authorisation arrangements (Approach 1) sufficient to facilitate access to urban areas of NBN Co's PTS licences by other operators? If not, should the ACMA investigate what, if any, urban areas might be available under Approach 2?

59. Optus is of the opinion that, if access to urban areas of NBN Co's PTS licences is considered for other operators, Approach 1 is the best way to proceed.
60. Optus notes that NBN Co has extensive experience in managing co-channel TDD interference in multiple geographical regions and deployment scenarios. Allowing NBN Co to assess the potential for devices to cause or suffer co-channel interference in urban areas would ensure that deployments by other operators are appropriate in location and extent in order to mitigate co-channel interference.
61. Please refer to paragraphs 23 to 30 for further details on Optus' views on this question.

Question 14: Do stakeholders have any views on what co-channel interference management technique should be applied under Approach 2?

62. Optus believes that Approach 2 provides insufficiently large areas for effective interference management to take place in all but a few instances.
63. As per paragraph 57 above, Optus urges the ACMA to consider the effects and management of adjacent channel interference in these areas. The ACMA should provide for adequate protection from adjacent channel interference if Approach 2 is considered.