

The logo for Optus, consisting of the word "OPTUS" in a bold, teal, sans-serif font.

Submission in response to
ACMA Options Paper

**Replanning of the
3700-4200 MHz band**

Public Version

September 2020

EXECUTIVE SUMMARY

1. Optus welcomes the opportunity to provide feedback to the Australian Communication and Media Authority's (ACMA) Consultation Paper: *Replanning of the 3700-4200 MHz band* (the Options Paper).
2. The ACMA has outlined three options for consideration in the 3700-4200 MHz band, while also noting several desirable planning outcomes consistent with maximising the overall public benefit from using the spectrum.
3. Optus supports the ACMA progressively making different segments of the band available for new services. In general, Optus considers Option 3 offers a suitable starting point for the consideration of changes to arrangements in the band as it provides scope for the introduction of wide-area wireless broadband services on an exclusive basis in the lower 100 MHz segment of the band.
4. Above 3800 MHz, clearance of FSS links altogether from the 3800-4000 MHz band may still present challenges in some metro areas (e.g. Sydney and Perth) in the short term. There may also be scope to investigate IMT allocations in the 3800-4000 MHz band in other capital cities, with suitable reallocation timelines and with an appropriate relocation band for users of this frequency range.
5. Optus therefore reiterates its previous comments that the ACMA's suggested investigation of Earth Station Protection Zones (ESPZ) warrants further investigation, while acknowledging the complex, time-consuming and costly nature of such an exploit.
6. Optus likewise expects there will be harmonisation of all core licence conditions and associated instruments from 3400-3800 MHz and up to any immediately adjacent upper limit (e.g. 3900/4000 MHz) where IMT allocations are made.
7. Regardless of the outcome from this consultation, Optus submits the ACMA should prioritise avoiding further fragmentation of the 3400-4000 MHz band. Facilitating contiguous blocks of spectrum for *all* licensees should be a key consideration for current and subsequent work in this band. Such a focus is consistent with the objectives of the Act, to ensure the efficient allocation and use of spectrum.

REPLANNING THE 3700-4200 MHz BAND

8. The 3700-4200 MHz band is subject to a mix of apparatus and class licensing arrangements across Australia, with current regulatory arrangements optimised for point-to-point (PTP) links and coordinated fixed satellite services (FSS). However, the 3700-4200 MHz currently does not support wireless broadband (WBB) use cases.
9. Any licencing regime to apply in this band should be appropriate for its intended use and provide the required levels of protection, coordination and property rights.
10. Over time, as IMT technologies have developed and consumer appetite for data services continue to increase, there is growing need for access to large contiguous spectrum lots to provide the necessary capacity.
11. The ACMA has outlined three options for consideration in the 3700-4200 MHz band, while also noting several desirable planning outcomes consistent with maximising the overall public benefit from using the spectrum. These include:
 - (a) Introduce WBB uses with frameworks suitable for both wide-area and local-area deployments;
 - (b) Support a range of continuing uses in the band, such as coordinated FSS use and PTP use in some form; and
 - (c) Ensure coexistence with adjacent band services is addressed.
12. Optus supports the ACMA progressively making different segments of the band available for new services but does not support the coexistence of wide-area WBB (WA WBB) and local area WBB (LA WBB) in the same geographical areas. WA WBB should be granted exclusive access in metro areas with carefully managed apparatus licenced access for LA WBB services in the uppermost 200 MHz of the 3700-4000 GHz band outside metro areas.
13. Optus' views on the ongoing band planning considerations are set out below.

Considerations for current and future uses in the band

Q1 – Comment is sought on the case for action and desirable planning outcomes for the 3700-4200 MHz band, including the supporting information at Appendices A, B and C.

14. Optus welcomes the opening of the 3700-4200 MHz band for WA WBB uses while allowing for parts of the band to continue to be used for the range of current services.
15. In order to expedite access to the band, Optus supports the ACMA providing incumbent licensees with an appropriate physical and spectrum operating environment. As such, we consider arrangements which balance the exclusive use of WA WBB and co-existence for the other services outside the exclusive WA WBB areas should be facilitated in the short term while a home is found for incumbents.

The case for action and desirable planning outcomes

16. The ACMA has identified several desirable planning outcomes from this review of the band. Central to this is the ability to introduce WA WBB and LA WBB uses with frameworks suitable for both, while also recognising the continuation of some arrangements for existing services.

17. Optus supports this stated intent. Optus also strongly supports recognition that any changes should ensure coexistence with adjacent band services. Specifically, where it applies to spectrum licensed services below 3700 MHz.
18. As identified by the ACMA, the range of continued uses in the band will comprise coordinated FSS, PTP, radiodetermination services operated by the Department of Defence, and class licensing arrangements for building material analysis transmitters/ground penetrating radar and UWB devices.
19. With the exception of coordinated FSS and PTP, the ACMA is proposing to maintain the existing arrangements for the remaining services largely unchanged. Insofar that the extent of these services remains limited, Optus supports this intent.

Embargoes

20. Optus welcomes the release of Embargo 78 on the issue of new apparatus licences in the 3700-4000 MHz range to preserve future planning options and minimise the effect that any future possible change in use might cause. We also acknowledge the notable exception that it does not apply to FSS applications in the ESPZ.
21. Optus supports revising this Embargo once a planning decision on the WA WBB frequency breakpoint has been made.

Establishment of ESPZs should continue to be a priority

22. Moving FSS away from C band entirely will be challenging due to the nature of the services provided in this band and the customers to whom these services are rendered.
23. Optus reiterates its previous comments that the ACMA's suggestion of Earth Station Protection Zones (ESPZ) warrants further investigation, while acknowledging the complex, time-consuming and costly nature of such an exploit.
24. Optus continues to support the principle of ESPZ being established to ensure that earth stations can continue to operate over the long-term even as spectrum band arrangements may change. A number of these services will continue to be required for communication with international satellite networks. In particular, we support the establishment of two diverse ESPZs in Eastern Australia with initial consideration being given to areas around Moree, Quirindi and Roma.
25. Optus notes that the Queensland State Government is looking at sites near Roma, Charleville and Augathella as potential ESPZ locations and Optus would agree to give these locations consideration.
26. Optus also considers there is still a need to establish a second geographically and connected infrastructure distinct ESPZ in Western Australia as a back-up to the current Mingenew site. We also consider establishing an ESPZ in Northern Australia in the long term should be investigated.

Considerations for the proposed replanning options

- Q2 – Comment is sought on the proposed options, including appropriate values for frequency segment breakpoints as well as any alternative options.
27. The ACMA has provided three options for future arrangements in the 3700-4200 MHz band:

- (a) Option 1 – Introduce arrangements to allow for WBB exclusively in one frequency segment, with no change to current arrangements in the remaining segment;
 - (b) Option 2 – Introduce arrangements for WBB sharing with existing services in one frequency segment, with no change to current arrangements in the remaining segment; and
 - (c) Option 3 – Introduce arrangements to allow for WBB both exclusively and shared with existing services in some segments, with no change to current arrangements in the remaining segment.
28. In general, Optus agrees with the approach to recognise the key applicable services or applications to include WA WBB applications, FSS earth receive and fixed PTP links. We also consider that Option 3 offers the greatest flexibility for the introduction of WBB applications – noting that arrangements for WA WBB should be prioritised for introduction on an exclusive basis.

The introduction of wide-area WBB arrangements should support exclusive use

29. In principle, Optus considers that arrangements for WA WBB should be introduced on an exclusive basis. In contrast, any arrangements for LA WBB should be introduced outside metro areas, limited to the upper 200 MHz of the 3700-4000 GHz band and facilitated through short-term licensing arrangements of lower order, e.g. akin to existing apparatus licence arrangements.
30. Heaviest demand for this and any additional spectrum will likely be in metropolitan and immediately adjacent areas. Spectrum in these metro regions should be allocated on an exclusive, spectrum licensed basis
31. Compatibility of licences and coexistence between licensees are also critical to the success of spectrum management in this band. To this end, Optus advocates for the harmonisation of all core licence conditions and associated instruments for any subsequent allocations in this band, mirroring those in place for the 3.6 GHz band.

The appropriate frequency breakpoint for introduction of WA WBB arrangements

32. Optus believes that the upper limit for IMT allocation would sensibly rest at 4000 MHz, leaving sufficient bandwidth for FSS and PTP services where incumbency in lower portions of the band allows.
33. Further refinement of this frequency breakpoint should take into account:
- (a) The requirement that any frequency segment to be allocated to WA WBB be based on exclusive use; recognising that spectrum licences offer the licensing certainty to support the long-term investment required by such deployments.
 - (b) The technical ecosystem to support the 3700-3800 MHz frequency range currently exists, with the remainder of the band soon to follow.
 - (c) The geographic areas for the introduction of WA WBB arrangements should ideally mirror the arrangements applied in the 3.6 GHz band. Any introduction of LA WBB arrangements should not be made available within the same frequency segment and geography as designated WA WBB areas.

- (d) Separate concessions may be required in some geographic segments, e.g. Sydney and Perth, where there continue to be incumbent services that may impact on the clean vacation of the band in the short term.
 - (e) Long term implications for band harmonisation across 3400-4000 MHz will require defragmentation and other associated processes to be undertaken in order to meet the ACMA's stated spectrum management objectives.
34. On balance, Optus supports the initial frequency breakpoint for the introduction of WA WBB arrangements to be set to *at least* 3800 MHz in the same spectrum licensed areas specified in the adjacent 3.6 GHz (3575-3700 MHz) band. However, this should not limit consideration for IMT arrangements to be introduced up to the 4000 MHz frequency breakpoint.
35. We also expect that the spectrum licensed arrangements across the 3400-4000 MHz frequency range will be harmonised.
36. Above 3800 MHz, the availability of spectrum up to 4000 MHz will need to be reassessed as the plans of heavy use incumbents become clearer, especially in areas such as Sydney and Perth. International developments, such as Intelsat's announcement on its C-band transition plan in the US, suggest that there is the possibility that alternative options may be investigated. As such, there may be scope to investigate IMT allocations in the 3800-4000 MHz band in all markets when these plans are clearer.

Maintaining arrangements for existing services and shared access approach

37. Optus notes that future band arrangements will also need to ensure that current users in the band, such as coordinated FSS use and PTP use, can be supported in some form. For example, setting suitable reallocation timelines with an appropriate relocation band for users of this frequency range.
38. Optus reiterates its comment to the 3700-4200 MHz Discussion Paper acknowledging the ACMA's position on Radiodetermination devices.
39. Optus also maintains its opposition to ground- and wall-penetrating radar operating over very high bandwidths under LIPD class licences. As previously stated, Optus would like these devices to be registered under Apparatus licences.
40. In addition, Optus does not support the introduction of any new sharing arrangements in this band. It is preferred for ACMA to monitor and assess the effectiveness of innovative sharing techniques used in other jurisdictions before attempting to implement this in Australia.

Comment on altimeters report

41. The ACMA has also provided a separate report to look at the compatibility of WBB with radio altimeters in the 4200-4400 MHz band.
42. While the study concludes that Macro Base Stations (BS), small cell BS and User Equipment (UE), i.e. handsets, may have some potential to cause interference under certain assumptions, it remains inconclusive on the extent of interference that may result. As acknowledged by the ACMA, "Consequently, for real world applications, it is

not yet clear how the potential interference identified in these studies translates into an actual risk to these systems.”¹

43. Optus therefore considers there remains insufficient information to support the 4000-4200 MHz segment of the band to be made available for IMT services at this stage.

Implementation considerations

Q3 – Comment is sought on possible variations to the proposed options and implementation considerations.

44. Optus acknowledges that while there is industry appetite to progress changes to the 3700-4200 MHz band to enable WBB uses, we are also conscious that any expedited release of additional allocations may lead to some unintended outcomes.
45. First, the completion of mid-band harmonisation activities from 3400 MHz may be impacted. There is already a work programme underway to harmonise (i.e. defragment and restack) holdings within the 3400-3575 MHz frequency ranges, as well as to ensure harmonisation with the 3575-3700 MHz band. Importantly, there is a common licence expiry that applies to the spectrum licences in both bands which will facilitate the alignment of any future licensing arrangements across the entire 3400-3700 MHz frequency range.
46. Optus strongly supports the eventual allocation of contiguous spectrum for all licensees in the 3400-4000 MHz frequency range, or any upper frequency breakpoint as determined by the ACMA as part of this consultation.
47. Second, as highlighted in the Table 10 of the Consultation Paper, separate concessions may be required in the Sydney and Perth metro areas due to the number of FSS services still active and the bandwidth required to maintain them. While this may be the case, we understand there have been recent developments that may address these concerns – e.g. Intelsat has announced plans to transition its satellite services from the 3.7 to 4.0 GHz portion of the C-band to the 4.0 to 4.2 GHz portion of the band.²
48. Additional consideration should be given to augmented satellite capacity availability in the 4000-4200 MHz band, its timing and suitability for incumbents to migrate their services to this band. This may also include making an industry decision on any ESPZs that may accommodate these services, as part of any reallocation plan for services below 4000 MHz.
49. Third, with each release of additional 100 MHz blocks the scope of work required to facilitate the new arrangements will increase in terms of the affected incumbents. Band clearance and providing suitable relocation frequencies and protected physical locations becomes more complex and time-consuming as the size of the band under reallocation increases.
50. The level of potential fragmentation in the combined 3400-4000 MHz band is likely to increase, regardless of the approach taken by the ACMA (e.g. staged by frequency band, by geography, whole 300 MHz).

¹ ACMA, 2020, Wireless broadband and radio altimeter compatibility study, Spectrum Planning Paper, July, p.1

² Intelsat, “Intelsat Files C-band Spectrum Transition Plan with FCC to Accelerate America’s 5G Buildout,” Media Release, 19 June 2020, <https://www.intelsat.com/newsroom/intelsat-files-c-band-spectrum-transition-plan-with-fcc-to-accelerate-americas-5g-buildout/>

51. The ACMA should consider how the efficiency and effectiveness of spectrum in the entire subset of the 3GPP n77 band under discussion can be maximised, whether by direction, instrument or other method, as to avoid the situation where one or more licensee is materially disadvantaged in any geography as a result of band fragmentation.
52. Optus suggests that, when considering allocations in the band and the potential for spectrum fragmentation, the following principles should be adhered to:
- (a) Maintain or establish contiguous spectrum holdings for each licensee within each spectrum licence area. Maximise the availability of contiguous spectrum holdings for all licensees.
 - (b) Minimise the need for investment in replacement equipment.
 - (c) Deliver the most efficient use of spectrum holdings, minimising the number and size of guard bands and reducing licensees' exposure to potential interference.
 - (d) Wherever possible, establish and/or maintain contiguous or co-channel spectrum frequency holdings over the entirety of a licensee's geographical areas if licences are not held nationally.
 - (e) Deliver certainty on the practicality and timing of the solution to enable licensees to make appropriate infrastructure investment decisions.
53. Regardless of the outcome, timing or licensing regime resulting from this consultation, the ACMA should consider the risk of further fragmentation of the 3400-4000 MHz band. We remind the ACMA that one of the key outcomes is the efficient allocation and use of spectrum. The facilitation of contiguous blocks of spectrum for *all* licensees should be a key consideration for current and subsequent work in this band.

Assessment of the proposed options

Q4 – Comment is sought on the discussion and outcomes of the assessment of options, including the cost benefit analysis and its assumptions. This includes any evidence for the value placed on the band for WBB and FSS use.

54. The ACMA provides an initial cost benefit analysis (CBA) for the assessment of options at Appendix F of the Consultation Paper. Notably, the CBA approach assesses each option on the basis that the lower 200 MHz segment (i.e. 3700-3900 MHz) will be subject to the new arrangements. For Option 3, it assumes:
- (a) The lower 100 MHz will be subject to full band clearance by FSS and PTP in metro and regional areas. As a result, WA WBB gains access to 3700-3800 MHz on an exclusive, spectrum licensed basis in the metro and regional areas.
 - (b) FSS and PTP can continue to maintain existing services in 3800-3900 MHz but may have limited opportunity to deploy new services due to the need to coordinate with WA WBB services around areas of high population. There is no change to current FSS and PTP arrangements in 3900-4200 MHz.
 - (c) LA WBB gains access to 3700-3800 MHz on a shared coordinated basis with FSS and PTP in remote areas, as well as in 3800-3900 MHz on a shared coordinated basis with FSS and PTP on a national basis.
55. On the benefit inputs considered, the ACMA estimates that for WA WBB the total benefit is based on \$0.29 MHz/Pop for the first 100 MHz, and between \$0.03-\$0.145 MHz/Pop

for the second 100 MHz excluding any remote areas. The lower range price point is also applied to estimate the total benefit for LA WBB in all areas.

56. Optus agrees that while it may be difficult to estimate a uniform proxy to estimate the benefit of releasing spectrum for WBB services, when viewed in conjunction with the costs inputs for the displacement of FSS and PTP links, the overall net beneficial outcome to support reallocation will remain positive.
57. It follows that while the number of displaced links may be small, the ratio split of both retuning and relocating these services can also be highly variable – with retuning costs dependent on the satellite it communicates with and relocation costs dependent on the location and any auxiliary connectivity costs at the location that the service is required to move to. It is unclear on what basis the different ratio splits have been derived for the different options. Nonetheless, we agree with the ACMA that the benefits accrued from band clearance will outweigh any perceived costs.

Comments on the ACMA’s preferred Option 3

Q5 – The ACMA invites comments on its preliminary preferred option.

58. Figure 1 below sets out the ACMA’s preliminary preferred option.

Figure 1 Illustration of Option 3



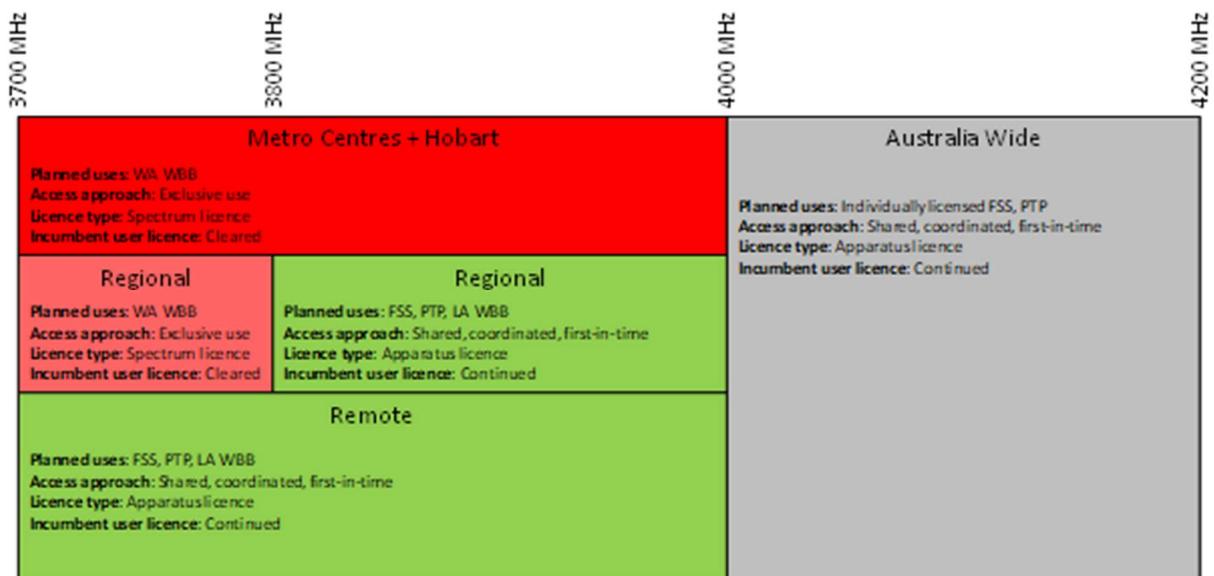
Source: ACMA

59. In general, Optus supports the ACMA adopting Option 3 as its initial starting point for changes to arrangements in the band. Specifically, Optus supports clearing incumbent users in a frequency segment in metropolitan and regional areas to enable exclusive use of the frequency segment for WA WBB use.
60. Optus also considers the initial frequency breakpoint for the introduction of WA WBB arrangements to be set to *at least* 3800 MHz in the same spectrum licensed areas specified in the adjacent 3.6 GHz (3575-3700 MHz) band. Heaviest demand for this and any additional spectrum will be in metropolitan and immediately adjacent areas. Spectrum in these regions should be allocated on an exclusive, spectrum licensed basis.
61. Licence areas and conditions should therefore align with those in the 3.6 GHz licences, with consideration given to apparatus licensing arrangements in other geographic areas.

Optus contends that sharing mechanisms other than those already in place by the ACMA are unnecessary in this band.

62. As highlighted in the implementation concerns above, any future arrangements may also need to take into account some incumbency issues in the short term. For example, beyond the 3800 MHz segment, clearance of FSS links altogether from the 3800-4000 MHz band may still present challenges in some metro areas in the short term. However, this should not restrict consideration of the full 3700-4000 MHz being investigated.
63. Optus supports the harmonisation of all core licence conditions and associated instruments from 3400-3800 MHz, up to any immediately adjacent upper limit (e.g. 3900/4000 MHz) where IMT allocations are made. The long-term objective should be to ensure there is harmonisation across the entirety of the 3400-4000 MHz band.
64. In summary, Optus also considers merit in the Australian Mobile Telecommunications Association (AMTA) proposed hybrid version of Option 3 set out in Figure 2 below, which addresses many of the observations noted above.

Figure 2 Hybrid version of Option 3



Source: AMTA