



Submission in response to
ACMA Discussion Paper

**Planning of the
3700–4200 MHz band**

Public Version

September 2019

EXECUTIVE SUMMARY

1. Optus welcomes the opportunity to comment on the Australian Communications and Media Authority (ACMA) issues paper: *Planning of the 3700-4200 MHz band*.
2. In general, Optus notes that:
 - (a) The technical ecosystem to support the 3700-3800 MHz frequency range currently exists with the remainder of the band soon to follow
 - (b) The upper limit for IMT allocation would sensibly rest at 4000 MHz, leaving sufficient bandwidth for FSS and P2P services where incumbency in lower portions of the band allows
 - (c) Current sharing arrangements (separation in frequency and geography) are sufficient to deliver efficient use in the band under spectrum licence arrangements, especially in metropolitan areas. Other areas may be managed using the appropriate apparatus licencing arrangements.
 - (d) 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.
 - (e) Geographical areas for licencing in this band should be based on those used in the 3.6 GHz auction in 2018 to maximise spectrum utility and reduce the risk of spectrum dead zones.
 - (f) The international jurisdictions referred to in the ACMA discussion paper have released spectrum up to and including 3800 MHz for terrestrial WBB use.
3. Optus posits that activities in the 3700-4200 MHz band should not introduce delay to the work items currently underway or prioritised as part of the ACMA five-year spectrum outlook (FYSO). The timing of the 3700-4200 MHz band review process coincides with multiple mooted and existing work items set out in the FYSO.
4. We consider there is greater immediate benefit in progressing with the ACMA priorities already set out in the forward allocation plan in the FYSO – that is, focus on resolving the matters in relation to the 900 MHz band and 3.4 GHz defragmentation.
5. Compatibility of licences and coexistence between licensees are 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.
6. Any planning decision will need to accommodate several considerations:
 - (a) Incumbent licensees within the 3700-4200 MHz band will need time to relocate. This can be either to different frequency bandwidths within the band, and/or to another designated frequency band.
 - (b) Where relocation is to a different part of the existing 3700-4200 MHz, there should be minimal barriers to facilitate the move (e.g. any spectrum embargo should respect that relocations may take place within the existing band, and that the cost of relocating should not be unnecessarily burdensome).

- (c) Fixed satellite downlinks must continue to exist within the current C-band designation. This is an internationally harmonised band that is also required to accommodate international satellite coordination.
 - (d) Consideration of new ESPZs to accommodate existing FSS links in the band, i.e. clearing metropolitan spectrum in Perth and Sydney should be considered, noting that this is a time-consuming and potentially costly exercise. It will also require cooperation from multiple operators and agencies providing services in many bands.
7. Optus broadly supports the ACMA progressively make different segments of the band available for new services; and considers the ACMA's spectrum scenario c offers the greatest flexibility to meet the demand of new and incumbent users in the band.
8. Optus also reiterates our earlier recommendation that further work relating to the 3.7-4.2 GHz band (or even the 3.7-3.8 GHz subset) is paused until the fragmentation of the 3.4 GHz band is complete. Options in the 3.4 GHz optimisation paper allow for the potential release of additional spectrum in this band and further allocations ahead of the resolution of that paper would seem premature.

BAND PLANNING CONSIDERATIONS – 3700-4200 MHz

9. The ACMA has outlined several generic spectrum scenarios for consideration in the 3700-4200 MHz band, while also noting that planning considerations include:
 - (a) Current and future use of the band;
 - (b) Alternatives for incumbent services;
 - (c) Identifying segments of the band where there is demand for new services; and
 - (d) Ensuring that sufficient spectrum can be made available to facilitate the deployment of any identified new services.
10. Optus supports the ACMA progressively making different segments of the band available for new services. For example, Optus considers the ACMA's spectrum scenario c offers the greatest flexibility to meet the demand of new and incumbent users in the band.
11. However, Optus reiterates that any progression of band planning activities in the 3700-4200 MHz should not distract from the ACMA's priority in resolving spectrum activities in its ongoing 900 MHz band and 3.4 GHz defragmentation work programmes.
12. Optus' views on the band planning considerations are set out below.

Embargoes

13. To assist in the process of band reallocation Optus would support the modification of existing embargoes and the introduction of additional embargoes to limit opportunities for denial of spectrum while IMT allocations are being considered in the band.
 - (a) Embargo 73: update to reflect IMT consideration across the whole 3700-3800MHz band and the relevant licence types
 - (b) Additional embargo: to include 3800-4000MHz for metropolitan areas under consideration for IMT allocation

Current and future use of the 3700-4200 MHz band

14. Optus recognises there may be the need for ongoing access to parts of the 3700-4200 MHz band by a range of users including fixed satellite services and point-to-point links.

Fixed PTP links

15. Optus observes that the rapid decline in the number of P2P registrations over recent history indicates that these will be cleared from the band before any IMT allocations are implemented by licensees.

FSS services

16. Optus notes that FSS earth stations are still extensively used in the broader 3700-4200 MHz band. For example, Optus still have FSS earth receive licences in operation in several locations within the 3700-4200 MHz band; and these will continue to be required for communication with international satellite networks.
17. The importance of C Band services in operation should not be underestimated. For example, there is no alternative band for many applications currently serviced using the satellite C band. This band has been harmonised for over 50 years, with ITU retaining

coordination across all Regions. There is also ongoing need to ensure that access to C band can be retained to provided services to the Pacific.

18. Optus supports the ACMA acknowledgement for the identification of several locations as prospective ESPZ (including one or two locations in Eastern Australia) *“to provide long term options and certainty for FSS use of numerous satellite bands, including the 3700–4200 MHz band. An additional aim of these ESPZs is to promote, where practical, the siting of earth stations outside of major population centres. In this way satellite services can continue operating, while freeing up spectrum in populated areas for other uses.”*¹
19. To facilitate this ongoing need, Optus supports both an approach that allows for ongoing access to the band for FSS services, on either a shared or exclusive use basis for incumbents, and the acknowledgement that the ACMA is currently considering the establishment of Earth Station Protection Zones (ESPZ) in Eastern Australia.
20. Optus supports investigation into the feasibility of establishing sufficient and appropriately located ESPZs on the east coast, but notes that the time required, coordination between multiple satellite operators and associated cost may prove difficult to overcome within the existing ACMA work plan.

Other services – TVRO systems, radiodetermination and LIPD

21. Optus acknowledges the ACMA’s position on Radiodetermination devices.
22. Optus 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.
23. Optus supports the ACMA’s position on providing no protection to unlicensed TVRO in this band, with no change to existing arrangements

Identifying segments in the band for exclusive use by new services

24. It is generally argued that operators need 100 MHz² of mid-band spectrum for initial 5G deployments. Across many jurisdictions, large bandwidth blocks across the global 3.5 GHz (which range from 3300-3800 MHz) band have been increasingly allocated to operators. For example, in March 2019, Austria awarded 20-year licences across their inaugural 5G band (3400-3800 MHz band) to the three national mobile incumbents and to four regional players for the introduction of high bandwidth 5G wireless services. During the award process for the 3.4–3.8 GHz band, the three Austrian mobile operators A1, T-Mobile and Drei in fact acquired licences for 100 to 140 MHz of contiguous frequencies in all twelve regions put to tender.³
25. In contrast, the Australian 3.5 GHz band allocation is subject to a number of spectrum planning activities relating to the transition of licence use in the 3.4 GHz range (3400-3575 MHz) for 5G; defragmentation of the 3.4 GHz band to make existing holdings between licensees more efficient in both bandwidth and usability; and the release of spectrum allocated during the 3.6 GHz auction (3575-3700 MHz) where a number of areas remain unavailable until the reallocation period has lapsed.

¹ ACMA, 2019, Planning of the 3700-4200 MHz band, Discussion Paper, August, p.11

² For example, the EU considers “Large contiguous spectrum portions of preferably 80-100 MHz facilitate the efficient deployment of 5G wireless broadband services, for example using Active Antenna Systems (AAS), with high throughput, high reliability and low latency in line with the policy objective of gigabit connectivity.”

³ RTR, “Award result: a successful step towards 5G,” Press Release, 7 March 2019

26. Optus therefore supports the ACMA in undertaking activities to progressively make different segments of the band available for new services once fragmentation of the 3400-3575 MHz band has been resolved.

Potential identification of the 3700-3800 MHz segment for exclusive use

27. Optus considers there may be scope for the identification of a 100 MHz segment for exclusive use by new services.
28. Optus supports the prioritisation of 3700-3800 MHz reallocation within the band under consideration as it offers the easiest and smoothest reallocation for the regulator, immediately adjacent to the existing 3.6 GHz band. This allows for harmonisation of all licence conditions and geographical boundaries.
29. In addition, satellite operators appear to be proactively clearing FSS links from this band, meaning earlier access may be feasible across all metropolitan areas. Global developments in reallocation all include frequencies up to 3.8 GHz for IMT, providing the economies of scale from a global market in similarly specified equipment.
30. Existing 3GPP band n78 equipment is available to support use of this band.

Potential identification of the 3800-4000 MHz segment for exclusive use by new services

31. Optus considers there may be scope for the identification of a further 200 MHz segment for exclusive use by new services.
32. Optus offers cautious support for extending the allocation of IMT spectrum in the 3800-4000 MHz frequency range as a lower priority within the overall band under consideration. The immediately adjacent 100 MHz to the existing 3.6 GHz band is considered a higher priority.
33. 3GPP band n77 includes this frequency range, with equipment vendor rapidly developing support for this band.

Identifying segments in the band for shared use by new services and incumbent services

34. Optus supports the ACMA progressively making different segments of the band available for new services, however we consider that a segment of the band be retained for the continued operation of incumbent services.
35. Optus notes that one reason that a segment of the band to be retained for incumbent services is to support the ongoing operation of satellite C band services. In particular, some C band services cannot be relocated entirely outside the 3700-4200 MHz band at this stage. Despite this, Optus has observed there has been gradual relocation and consolidation of FSS services to other parts of the band. Over time, it is may be possible for the lower 100 MHz to be cleared and repurposed for other uses.
36. On this basis, Optus considers the ACMA's spectrum scenario c offers the greatest flexibility to meet the demand of new and incumbent users in the band.

Incumbent services to be retained in segments of the band

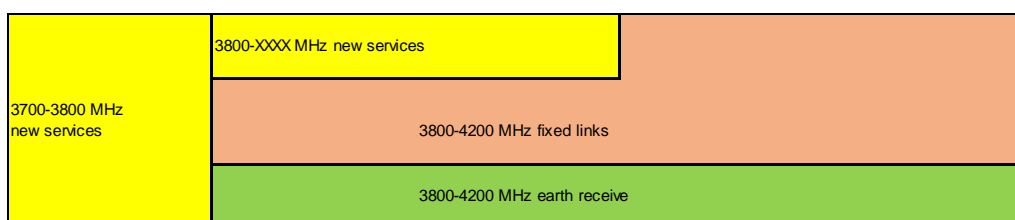
37. Reallocation of FSS in Sydney and Perth from the 3800-4000 MHz band may be problematic due to the number of services still active and the bandwidth required to maintain them. Optus suggests that any reallocation of 3800-4000 MHz in these geographies should carefully consider the impact on incumbent satellite services and incorporate any studies and industry decisions reached on ESPZs or other bands that may accommodate these services.

Spectrum scenario c offers a suitable compromise for the future planning of the band

38. Optus supports the progressive consideration of segments in the 3700-4200 MHz to be made for exclusive use by new services. In particular, Optus considers the ACMA's spectrum scenario c offers the greatest flexibility to meet the demand of new and incumbent users in the band (Figure 1).

Figure 1 Spectrum scenario c – hybrid

Spectrum scenario c, exclusive use in one band segment by new services. Shared use in another segment by new services and incumbent services. Incumbent use only in the rest of the band



Source: ACMA

39. Optus reiterates its above views that there may be scope for the identification of a 100 MHz segment for exclusive use by new services to be allocated between 3700-3800 MHz on a primary basis.
40. On a secondary basis, Optus notes that a further 200 MHz may be considered for exclusive use in a number of specified geographic areas.

ISSUES FOR COMMENT

41. Optus addresses the ACMA's questions below.
1. Are there any other international developments in the 3700–4200 MHz band that the ACMA should be aware of?
42. The Ofcom allocation of spectrum under a shared local licencing arrangement in the 3800-4200 MHz band should be carefully qualified as there are geographical, duration and MNO proximity constraints associated with the concept of sharing in the band.
43. Beyond that, Optus has no additional information on international developments beyond what is discussed in the ACMA paper.
2. What are the future requirements of point-to-point links and FSS earth stations in the 3700–4200 MHz band? Does this differ by geographical area and/or segment of the band?
44. In the 3700-3800 MHz band it has been observed there has been an ongoing decline in the number of FSS links and P2P, as evidenced in the ACMA discussion paper. This would indicate that the band is being cleared by incumbents in acknowledgement and preparation for IMT allocation of this portion of the band.
45. Other segments of the band will need to be assessed, especially in Sydney and Perth as demand for links persists from 3800 MHz upwards. There may be scope to investigate IMT allocations in the 3800-4000 MHz band at a later date in other capital cities.
3. If licensed point-to-point links and FSS earth stations are affected by replanning activities in the 3700–4200 MHz band, what alternative deployment options could be considered?
46. As per Optus response to question 2, Optus believes that the reallocation of P2P services into other bands is already underway and further replanning activities to migrate these services to another band may be unnecessary.
47. International momentum is moving FSS links out of the 3700-3800 MHz band, as is occurring in Australia. Clearance of the 3800-4000 MHz band may be possible in certain metro geographies but will present challenges in Sydney and Perth.
48. ACMA's suggested investigation of ESPZs warrants further investigation, while acknowledging the complex, time-consuming and costly nature of such an exploit.
49. Moving FSS away from C band entirely appears unlikely due to the nature of the services provided in this band and the customers to whom these services are rendered.
4. In the event arrangements are made for new services in the 3700–4200 MHz band, do stakeholders have any comments on the ACMA's proposal to maintain the existing arrangements for Radiodetermination and LIPD devices, and the existing policy around TVRO systems?
50. Optus acknowledges the ACMA's position on Radiodetermination devices.
51. Optus 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.
52. Optus supports the ACMA's position on providing no protection to unlicensed TVRO in this band, with no change to existing arrangements

5. What are the future requirements for WBB services in the 3700–4200 MHz band and what arrangements should be considered? Does this differ by geographical area and/or segment of the band?
53. WBB operators are likely to require a 100 MHz spectrum holding in the 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 and be based on the licence areas in the 3.6 GHz band
6. What WBB deployment scenarios should be considered for the 3700–4200 MHz band? Should use be limited to one scenario or should more flexible arrangements be implemented?
54. Optus believes that the frequency ranges in question are flexible enough to allow for multiple deployment scenarios, including but not limited to macrocells, small cells, in-building systems and low power deployments where needed.
55. Certain licence allocations (e.g. close to satellite installations in Sydney and Perth) may require restrictions on some deployment scenarios that would require assessment as part of a TLG process.
7. What is the current and planned availability of fixed and mobile WBB equipment in the 3700–4200 MHz band?
56. n78 network equipment and user devices are already available, capable of operating up to 3800 MHz. Network equipment and devices operating above this frequency, up to 4200 MHz will soon be available
8. Is there interest in the use of other new service types in the 3700–4200 MHz band?
57. Optus supports the allocation of metropolitan IMT in the band. The lower 100 MHz (3700-3800 MHz) could be allocated as a priority, ahead of other parts of the band in this Discussion Paper, on an exclusive, spectrum licensed basis using the metropolitan and regional geographic areas defined for the 3.6 GHz band. ACMA should consider allocating an additional 200 MHz (3800-4000 MHz) in the same fashion but with a lower priority.
9. What services/applications should be accommodated in the 3700–4200 MHz band?
58. The primary use will be for provision of metro WBB cellular services, requiring the allocation of spectrum under a spectrum licencing regime on an exclusive basis as per the response to question 8. Additionally, sufficient bandwidth is required to sustain existing and potential future FSS in the band once the reallocation is completed. Options for achieving this are dealt with in other questions and within the body of this response.
10. Which frequencies ranges should be made available for these services/applications?
59. First priority in the band should be metropolitan IMT allocation of 3700-3800 MHz, with up to 200 MHz above this considered for allocation at a later date. The reallocation of spectrum above 3800 MHz should only be considered following further studies of where licence areas are not heavily encumbered.
11. Which geographic areas should be made available for these services/applications?

60. Optus recommends that geographical areas should be based on those used for the 3.6 GHz band to assist in licence harmonisation and coordination, thereby minimising areas where spectrum cannot be effectively or efficiently used.
12. On what basis should access be provided? Should access be granted on an exclusive or shared basis, on a coordinated or uncoordinated basis, et cetera?
61. IMT allocations should be granted using an exclusive spectrum-licensed approach. Licence areas and conditions should align with those in the 3.6GHz licences. Consideration should be 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.
13. What licensing mechanisms are appropriate (spectrum, apparatus or class licensing)?
62. Optus supports the use of spectrum licensing areas for the 3700-3800 MHz band, in line with the arrangements for the 3.6 GHz band allocated in 2018. Licence regimes for other parts of the band can be explored once more is understood about the incumbents use and adjacent band characteristics and requirements. Any allocation above 3800 MHz in metro areas should also be based on the metro areas used in the 3.6 GHz licences.
14. If arrangements for WBB specifically are implemented in the 3700–4200 MHz band, are the proposed interference management techniques with services in the 3.6 GHz band suitable? Are any other techniques proposed? Are there any other compatibility issues with the 3.6 GHz band the ACMA should consider?
63. Insufficient network equipment has been deployed by multiple operators in co-channel boundary or adjacent-channel proximity areas to warrant any changes to the interference management licence conditions in the 3.6 GHz band.
64. Optus therefore proposes that the conditions in the 3.6 GHz licences – where it is incumbent upon licensees to resolve interference issues otherwise synchronisation and frame structures will be imposed on licensees – should be used for IMT allocations in the 3700-4200 MHz band.
65. Optus supports harmonisation of all core licence conditions and associated instruments across the 3.3 to 4.0 GHz band where IMT allocations are made. This will ensure compatibility between licensees.
15. Should the ACMA consider extending existing apparatus and spectrum licence arrangements in the 3.6 GHz band into the 3700–3800 MHz band or another segment of the 3700–4200 MHz band?
66. This should be considered where other licence types, bands of operation and the geography in question is better suited to the use of apparatus licensing arrangements.
16. Is there any additional information available that would assist the ACMA in assessing compatibility of potential new WBB services in the 3700–4200 MHz band with WAIC and radio altimeter systems in the 4200–4400 MHz band?
67. Optus considers that any investigation on IMT allocations between 4000-4200 MHz should carefully consider the implications with WAIC and radio altimeter systems in the adjacent 4200-4400 MHz band.