OPTUS

Submission in response to ACCC Consultation Paper

Spectrum Allocation Limits – 3400-4000 MHz Band in remote areas

Public Version

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EXECUTIVE SUMMARY

1. Optus welcomes the opportunity to comment on the allocation limits that apply for the upcoming 3400-4000 MHz spectrum allocations in remote areas.

2. Additional access to spectrum within the global 3.5 GHz band is considered important to facilitate additional rollout and use cases within the important 5G mid-band spectrum frequency ranges.

3. This forms part of the overall release of additional 5G mid-band spectrum to be facilitated by the Australian Communications and Media Authority (ACMA) over the next two to three years. While the structure and allocation methodology of the proposed licences to be awarded are yet to be finalised, these will include:

   (a) 600 MHz in remote areas for apparatus licensing between 3400-4000 MHz frequency range (i.e. the subject of this consultation);

   (b) 200 MHz for wider apparatus licensing in metropolitan and regional areas between 3800-4000 MHz frequency range;

   (c) 100 MHz for spectrum licensing in metropolitan and regional areas between 3700-3800 MHz frequency range;

   (d) 75 MHz for spectrum licensing in the 3.4 GHz urban excise areas where NBN Co has indicated it will surrender its current licences; and

   (e) Between 35 MHz to 62.5 MHz of spectrum available in the 3.4 GHz band for apparatus licensing in regional areas.

4. Optus acknowledges that while there may be considerable interest in this mid-band spectrum due to its potential use in providing wireless broadband services leveraging a mix of 4G, 5G and other proprietary technologies – it remains crucial that any allocation takes into account the interactions and interference that may be caused by a large mix of different users and use cases co-existing within similar and adjacent frequencies.

5. To address this risk, we recommend that the consideration for allocation limits should adhere to a set of key principles that recognise the holistic nature of the band. This does not mean that allocation limits need to be uniformly set in all geographic areas or across different licence type. Adopting such an approach will promote competition, and with it the full consumer and economic benefits of competitive national mobile markets and the potential entry for other users and use cases.

GENERAL PRINCIPLES FOR THE 3.5 GHZ BAND

6. Spectrum is no longer managed through a narrow lens of individual spectrum ranges. Historically, mobile technology was designed to work within specific spectrum ranges with little or no vendor support for other ranges. Such an approach has long been overtaken by spectrum-agnostic mobile technology and vendor support.

7. Competition drives innovation and investment in new technology – pushing new 5G networks out to the regions. Without competition, 5G deployment is likely to be delayed and uneven, with consumers facing a lack of choice and higher resultant prices. Together, these impacts will greatly reduce the potential benefits of 5G.

8. While this Consultation Paper is focused on the potential allocation limits to be applied for the 600 MHz of available spectrum in remote areas, Optus notes that the following principles continue to be relevant in this consideration:

   (a) The entirety of the 3.5 GHz band – from 3400 to 4000 MHz frequency range – should be considered on a holistic basis, irrespective of any spectrum licensing arrangements already in place.

   (b) The 3.5 GHz band is a TDD band and distinct from any FDD deployments in the other mid-band frequencies. TDD deployments in mid-band frequencies should ideally be optimised for 100 MHz (contiguous) channels.

   (c) The history of the 3.5 GHz band has meant that its allocation to operators has been piecemeal, but significant work in recent years has been undertaken to address some of these legacy inefficiencies through a combination of defragmentation activities and other solutions. Further ongoing work is still required to address remaining spectrum issues in the band. These outcomes should not be undermined by the award of spectrum in other parts of the band.

   (d) An overarching objective that enables opportunity for the band to be configured to achieve 100 MHz (contiguous) channels per operator should be encouraged. In addition, a dedicated sub-frequency range in all geographic areas comprising of 300 MHz bandwidth should facilitate only 3GPP deployments and ensure protection for each of the current national MNOs.

   (e) For non-5G deployments, other users and use cases should be limited to the upper 200 MHz of the band. This will ensure that any proprietary technologies may continue to be deployed, while ensuring that any interference impact on national 5G networks are minimised.

9. Any decision on allocation limits will have implications for other parts of the band. On this basis, the need to impose and set appropriate limits may vary for different geographic areas within the overall 3.5 GHz band and may include additional constraints within specified sub-frequency ranges or introduction of restricted use (guard) bands.

10. These principles are further discussed below.

The history of the 3.5 GHz band

11. Technology is no longer a factor when deciding which spectrum range is to be deployed. Rather, it is the propagation characteristics that determine which spectrum band is required to deployed at any one site. As a result, spectrum is now referred to as low-

band, mid-band[1] and high-band spectrum – each with their own set of propagation characteristics that make individual ranges within each band being substitutable.

12. Low frequency bands (sub-1GHz) offer long-distance wireless signal coverage, which support widespread coverage across metropolitan and regional areas. Mid-bands typically offer a good mix of coverage and capacity benefits, e.g. low-band augmented with mid-band 3.6 GHz provides higher bandwidths but is effective over a shorter distance. mmWave bands are typically needed to meet the ultra-high broadband speeds envisaged for 5G. However, the 26 GHz band will have the shortest effective range but the potential for the fastest speeds given the large bandwidth available in the band.

13. Mid-band 5G spectrum (currently using 3.4 - 3.7 GHz, with the proposed expansion to 4.0 GHz) has propagation characteristics materially different than low-band, which results in mid-band not being directly substitutable. The use of mid-band instead of low-band to provide 5G services would result in a materially higher number of base stations to provide the same level of coverage.

14. However, this also means that the use of both low- and mid-band spectrum will become highly complementary for the delivery of a national mobile network.

15. In addition, the geographic spectrum licensed areas and the current fragmentation of holdings across the global 3.5 GHz band also limits the ability to make general comments about use of the band. For example, despite a common expiry date in all areas, consideration of the 3.5 GHz holdings needs to take into account the following considerations:

    (a) The allocation of the 3.4 GHz and 3.6 GHz bands were allocated in two separate processes, with different geographic boundaries for metro and regional areas assigned in the two processes.

    (b) The 3.4 GHz band is currently being optimised, with defragmentation, designation and other related licensing activities progressing at different stages. However, this does not address any non-alignment issues in the geographic boundaries with the 3.6 GHz band.

16. It would be counterintuitive to establish new frameworks that undermine the work that has already been undertaken to address some of these legacy inefficiencies.

100 MHz (contiguous) channels should be optimised for TDD deployments

17. Optus acknowledges that while it holds a reasonable share of the available mid-band TDD spectrum, these have not been contiguous holdings and do not uniformly traverse large geographic areas (i.e. in most cases, the metro areas assigned in the 3.4 GHz band have been smaller than the metro areas assigned during the 3.6 GHz band allocations).

18. While some may argue that additional deployments of mid-band spectrum can be used to deliver 5G services, this would only be true where spectrum licences are held in all geographic areas in a national market. Optus' mid-band holdings currently demonstrate that this is not the case. For example, prior to defragmentation in the 3.4 GHz band, Optus' metro holdings had been limited to 60 MHz channel deployments, while regional holdings are limited to 30 MHz channel deployments. This has not changed, even with

[1] Mid-band can also be broken into two categories, FDD and TDD spectrum.

the additional spectrum acquired during the 3.6 GHz auction. Similarly, Optus' 98 MHz holding of 2.3 GHz spectrum can only be used to deploy 60 MHz carriers in metro areas.

19. Any competition assessment must take into account deployable channels and not the amount of spectrum held that cannot be deployed. Unfortunately, due to legacy allocations, there remains material amount of inefficiently allocated mid-band spectrum that cannot be utilised.

Difference between 3GPP (4G and 5G) and other proprietary technologies

20. The need for access to 100 MHz contiguous channels for 5G deployments is further supported by current technology standards. Notably, 4G and 5G deployments rely on the technical frameworks set out in the 3GPP standards.

21. The 3GPP standards deliver a harmonised international technology ecosystem, keeping Australian MNOs at the leading edge of the latest generation of products and services, guaranteeing access to global economies of scale, and driving down the costs of network equipment and deployment.

22. In addition, the allow for large networks to coexist and operate effectively and efficiently, managing interference between networks. 3GPP compliance is critical maximising the utility of and unlocking the value of spectrum, along with device and user equipment at volume without need for market-specific customisation.

23. In contrast, we also understand that other use cases may rely on access to other bandwidth channel sizes and proprietary technologies. Given the likely interference impacts that these alternative technologies may result in, as well as the proliferation of different proprietary technologies that may be deployed, we consider it would be prudent to 'group' the deployment of these alternative technologies within a dedicated frequency range to minimise any interference imposed on the higher-order spectrum licensed areas in the band.

24. Other proprietary technologies generally lack support from major global equipment vendors, both in the networks and end user device domains and are normally incompatible with 3GPP standardised protocols and product offerings.

25. Non-3GPP technology is not generally adopted by major MNOs and is normally adopted by niche players to address specific markets.

Dedicated frequency ranges in all geographic areas for different deployments

26. 5G is expected to drive productivity and employment growth in both metropolitan and regional areas. We also recognise that for enterprises to benefit from 5G, sites which are far from population centres will need choice and coverage of 5G-supported services, such as farms and mines, just like their metro counterparts.

27. This can be supported through the introduction of dedicated frequency ranges in all geographic areas for different deployment models. In part, this can be applied through the different licensing arrangements, however additional recognition should be given to ensure that apparatus licensing arrangements within the spectrum licensed frequency ranges in adjacent geographic areas should be respected.

28. Expecting or demanding 3GPP-compliant MNOs and equipment suppliers to co-exist, manage interference and many complex spectrum and geographical boundaries with networks using proprietary equipment will result in an inefficient and low value use of spectrum, resulting in a lose/lose situation for 3GPP and proprietary standards operators.

Finally, why are these principles important?

29. The principles articulated above are important for the effective and efficient use of the extremely scarce and valuable resource that is radio spectrum. As Australia's MNOs and NBN can attest, especially in the 3.4-3.7GHz band, the management of many complex frequency and geographical boundaries creates extremely time-consuming spectrum management requirements and diminishes user experience in areas where the licence conditions and allocation arrangements prove difficult.

30. These principles continue to be prosecuted through all ACMA TLGs, public consultations and policy discussions and are consistent with the approach from AMTA and all Optus' previous submissions relating to spectrum utility, highest value use assessment and efficiency.

ALLOCATION LIMITS SHOULD BE MADE ON A HOLISTIC BASIS

31. Optus acknowledges that while there will be some remote areas where demand will be greater than the supply available, these locations are limited, and a general allocation limit may not be necessary for the current proposed allocation in remote areas.

32. Optus recommends the general principles for the 3.5 GHz band should be applied – in particular, the opportunity for licensees to access 100 MHz (contiguous) channels for proposed deployments and without constraining other users from applying for other bandwidth amounts.

33. Given the form of the administrative allocation is yet to be determined for the licences in the remote areas, Optus also considers that the ACMA currently has the flexibility to address this issue via their licensing mechanism, for example,

    (a) Adopt AWL approach similar to Round 1 AWL for mmWave allocations where applications were assessed through a multiple staged approach (negotiate, adjusted, then offered based on demand). If any spectrum areas remain, then this can be open to over-the-counter applications after the initial awards are done. Ideally this would also take into account larger HCIS spectrum areas to mitigate the issues observed regarding reduced utility of spectrum in adjacent areas (remaining fallow, or otherwise) that may arise.

    (b) Propose to introduce a separate allocation similar to the 1800 and 2100 MHz PTS regional/remote licences where options are offered in defined bandwidth slices. This is to ensure that 5G deployment is still enabled and that any interference impacts may be mitigated upfront.

34. Finally, a medium licence term period could be adopted to December 2030 – expiring at the same time as existing spectrum licences in the 3.4 GHz and 3.6 GHz band. This will better facilitate consideration of any overall band changes (or outstanding issues in the band) needed to take place in a single process at that time.

35. These issues are further discussed below.

Allocation limits should only apply where potential excess demand exists

36. Optus broadly supports the introduction of allocation limits where the spectrum on offer is subject to excess demand in all available locations and there is no alternative mechanism to mitigate risks of spectrum hoarding by one or more licensees.

37. Where spectrum is to be assigned through price-based allocations, such as spectrum auctions, the case for setting allocation limits will always be stronger. Under an auction setting, the use of allocation limits would prevent the monopolisation of this important mid-band spectrum while enabling the MNOs to compete on a level playing field.

38. We agree that allocation limits are important tools to ensure that spectrum allocations promote competition in downstream markets that rely on spectrum as an essential input and in certain circumstance, they can also assist in maximising the public benefit derived from the use of spectrum (i.e. assigning spectrum to its highest value use).

39. Importantly, Optus expects that services (both 4G and 5G) relevant to the national mobile market will continue to be delivered through low- and mid-band spectrum, largely due to the propagation characteristics offered across these spectrum ranges.

40. In contrast, administrative allocations may be designed to achieve similar outcomes without the need to specify uniform allocation limits and risk leaving spectrum fallow in areas of very low demand. This would not be in the long-term interest of end-users.

41. Scenarios that give rise to the award of the entire (or significant proportion thereof) of available spectrum in a given location should also be avoided. This is particularly true where the prospective licensee does not hold any intention to utilise (or actively deploy) the spectrum it wishes to acquire. A pure over-the-counter application process, with no ability for the ACMA to consult, negotiate or augment applications made, may also lead to unintended consequences and the inefficient use of the spectrum in the long term.

42. Equal opportunity should be given to prospective licensees to obtain a minimum spectrum requirement (or bandwidth slice within a defined geographic area for a 5G or non-5G deployment). Once assigned, any excess supply should then be made available after a short period to all applicants. While we note that this may result in a spectrum imbalance in some areas, the risk of affecting competitive investments in such areas is likely to be minimal due to the very low demand.

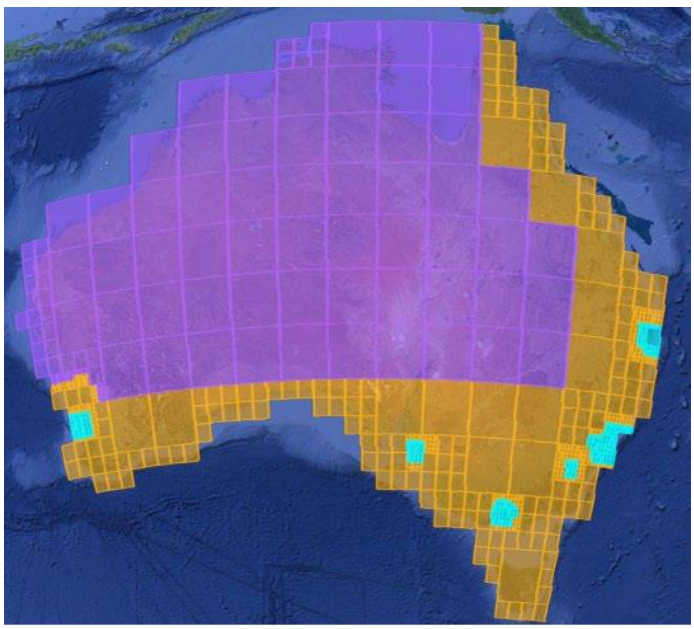
Demand may differ in remote locations but can be addressed through licensing

43. Given the lack of further detail on the geographic boundaries, technical framework and licensing arrangements for the spectrum on offer in remote areas, the imposition of allocation limits in the remote areas may not be required.

44. Instead, there exists the flexibility for the ACMA to address any spectrum hoarding concerns in the remote areas through the design of their licensing arrangements.

45. As shown in Figure 1, spectrum demand may differ across different areas or geographic subsets, due to the vast coverage of the remote licences. It is likely that demand will be more concentrated in populated areas, or significant economic sites such as mine sites, transport corridors and commercial hubs.

Figure 1 Indicative map of geographic areas for 3400-4000 MHz band



Source: ACCC / Note: Remote areas in purple, Regional areas in orange, Metropolitan areas in blue

46. The remote area release will make available mid-band spectrum in some areas that have never been available before – for example, Darwin in the Northern Territory. In these locations, any spectrum awarded should be guided by demand and the ability for operators to extract efficient utility from the spectrum licensing arrangements.

47. Under an administrative allocation approach, the ACMA will have greater flexibility to give effect to an allocation limit without the need to impose formal allocation limits for a specific licence type. As noted above, the licensing arrangement may also be designed to account for different demand scenarios in remote areas. For example,

    (a) Different apparatus licence arrangements;

    (b) Format of the administrative assignment process; and

    (c) Licence duration.

48. Each of these features may be used to give effect to an allocation limit in areas of high demand. It also holds the advantage of enabling fallow spectrum to be assigned to users in areas of excess supply once the initial application and assessment period has closed.

49. The ACMA currently has the flexibility to set licensing arrangements or conditions for assigning apparatus licences. This can include, but is not limited to, the following licensing arrangements and processes:

    (a) Adopt AWL approach similar to Round 1 AWL for mmWave allocations where applications were assessed through a multiple staged approach (negotiate, adjusted, then offered based on demand). If any spectrum areas remain, then this can be open to over-the-counter applications after the initial awards are done. Ideally this would also take into account larger HCIS spectrum areas to mitigate the issues observed regarding reduced utility of spectrum in adjacent areas (remaining fallow, or otherwise) that may arise.

    (b) Propose to introduce a separate allocation similar to the 1800 and 2100 MHz PTS regional/remote licences where options are offered in defined bandwidth slices. This is to ensure that 5G deployment is still enabled and that any interference impacts may be mitigated upfront.

50. Either of these approaches facilitates the ability to introduce the key principles outlined in the previous section. Namely, for 5G deployments, it can ensure the initial opportunity for national MNOs to acquire 100 MHz channels within the current spectrum licensed frequency range with any applications assessed upfront. Once initial allocations are made, any excess spectrum can then be opened to over-the-counter applications.

51. In the same way that apparatus licensees can surrender licences, the ACMA should have similar flexibility to cancel licences that are not used.

52. Licence duration can also be limited to align with the current expiry term of existing spectrum licences in the band. While apparatus licences can now be issued for up to a maximum 20-year licence term, Optus considers setting a licence term that enables for a holistic review of the band in line with the expiry of existing spectrum licences in the band should be encouraged. This will best address the legacy spectrum licensing issues that continue to plague the band.