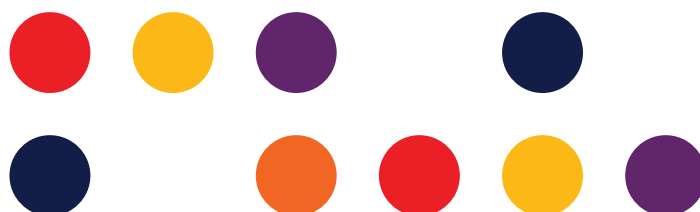


# Allocation limits advice for 3.4 GHz and 3.7 GHz bands spectrum licence allocation

ACCC

4 May 2022

Public



## Executive summary

TPG Telecom Ltd (**TPG Telecom**) welcomes the opportunity to provide input into the ACCC's consultation regarding the appropriate allocation limits to apply to the allocation of spectrum licences in the 3.4 GHz and 3.7 GHz bands (referred to as '**C-Band**' spectrum in this submission).

[c-i-c begins]

[c-i-c ends]

TPG Telecom believes an allocation limit should be applied in the 0-80% population areas so that no single party would have access to more than 120 MHz of total usable spectrum in the 3400-3800 MHz range in those areas.

In addition, a second limit of 45% of all usable mid-band TDD spectrum (ie, 2300 MHz and C-Band) should be imposed in recognition of the significant structural imbalance between Optus' spectrum holdings and other operators' comparable spectrum holdings.

These limits would balance the need to promote competition in downstream markets with the need to create competitive tension in an auction.

In regard to usable spectrum, TPG Telecom does not believe the Urban Excise spectrum ought to be considered substitutable for the 3700-3800 MHz spectrum due to its severe technical limitations.

Designing an allocation limit is complicated by the fact that the ACMA has not defined the geographic boundaries of C-Band spectrum licences to be auctioned, and that existing in-market C-Band spectrum holdings are varied between different licensees and in different areas.

To ensure the allocation limit is effective in the face of unknown licence boundaries, a bidder's existing holdings in the most populated cities and regional centres contained in a licence area, could be used for the purposes of calculating allocation limits. This would focus the application of allocation limits to where demand is likely the greatest within a licence area, and where allocation limits would have the most impact at promoting competition in downstream markets.

This could be a modified version of the '25% insignificance' test included in section 14 of the *Radiocommunications (Spectrum Licence Allocation – 850/900 MHz Band) Determination 2021*. A different percentage threshold could be used, for example, less than 50%.

Under TPG Telecom’s proposal, the three MNOs could only acquire up to the following additional amounts in the top six capital cities (rounded up to the nearest 5 MHz increments):

	<b>Optus</b>	<b>Telstra</b>	<b>TPG</b>	<b><i>Total demand</i></b>
<b>Adelaide</b>	25	60	30	<i>115</i>
<b>Brisbane</b>	30	60	25	<i>115</i>
<b>Melbourne</b>	0	60	55	<i>115</i>
<b>Sydney</b>	0	60	55	<i>115</i>
<b>Perth</b>	30	60	25	<i>115</i>
<b>Canberra</b>	55	60	25	<i>140</i>

The total demand from just the three MNOs is greater than the available supply of 100 MHz of usable C-Band spectrum (3700-3800 MHz range) in those areas, guaranteeing competitive tension in the auction.

In addition to these capital cities, the 0-80% population areas also include population centres adjacent to some of those cities, for example Gold Coast and Sunshine Coast. These areas should be considered ‘metropolitan’ for the purposes of considering allocation limits, and the above allocation limits should apply to them.

## A Demand for mid-band TDD spectrum

### 1 Uses and users of C-Band spectrum

The main use of C-Band spectrum is to provide capacity to 5G mobile networks (and potentially 6G networks in the future). This network capacity enables many downstream use cases but is primarily for network operators to provide mobility and fixed wireless access (FWA) services.

C-Band spectrum that is in-market today is already being used to deliver these services. For example:

- 1) MNOs rely on C-Band spectrum to provide 5G mobility services; and
- 2) NBN Co and MNOs rely on C-Band spectrum to provide FWA services to end-users. FWA services are currently provided across both 4G and 5G networks.

From a capacity planning perspective, there is a significant difference between capacity requirements between mobility and FWA services. Based on TPG Telecom's assessments, a FWA service uses approximately [c-i-c begins] [c-i-c ends] data than a mobility service on average.

This means that there will be an upper limit to the number of FWA services a network provider can support for a given amount of spectrum available to it. Failing to properly manage this capacity requirement could lead to congestion problems impacting the quality of both mobility and FWA services.

Demand for spectrum licences in C-Band spectrum is likely to be driven predominantly by mobile network operators (MNO). Generally, an MNOs' need for additional C-Band spectrum is driven by exponential end-user data usage growth. This forecasted capacity requirement is driven by growth forecasts for both mobile and FWA uses, and MNOs will have to manage this mix of end-users closely to ensure the network does not congest.

There could be geographic variations to this demand. Traditionally demand for spectrum licences in metropolitan areas are much greater than in regional areas due to high population densities (ie higher end-user demand for data). We do not expect the demand in this C-Band auction to be different.

Other than MNOs, there is likely demand for C-Band spectrum from parties that wish to operate a localised network to provide private network services (eg to mine sites). Some operators may also wish to acquire C-Band spectrum to provide FWAs services in a limited area rather than nationally.

Demand for spectrum licences from these users are unknown. For these types of users, the 3800-4000 MHz range may be better suited to their needs given the much lower cost of acquiring an Area-Wide Licence (AWL) and the flexibility for an AWL licensee to customise the geographic coverage of the AWL. The ACMA is proposing a licence tax rate of \$0.0041/MHz/pop for AWLs in the 3.4-4.0 GHz band. This is lower than the \$0.29/MHz/pop

weighted average price achieved at the 3.6 GHz auction.

## 2 Relevant markets & the state of competition

The most relevant downstream markets are: (1) the market for mobile services, and (2) the market for home broadband services. Both markets would be impacted by this allocation of C-Band spectrum given its importance as the 'waterfront' 5G spectrum band.

Following the Vodafone-TPG merger in 2020, infrastructure-based competition in the wireless industry has strengthened tremendously. This is evidenced by the billions of dollars of investments the mobile industry has made in pursuing 5G upgrades.

This had led to strong services-based competition in the mobiles market. For example, cost per GB data continues to fall, while end-user consumption continues to increase year-on-year. This is recognized by the ACCC in its Communications Market Report 2020-21 where it found that in 2020-21, the medium cost per GB fell by 37% in the post-paid segment and 44% in the pre-paid segment.

TPG Telecom expects the intensity of competition to continue in the mobiles market given the increase in total network capacity driven by the industry's upgrade to 5G. As a general rule, the upgrade to the best active antennas available used in 5G networks would increase network capacity by more than three times when compared to a conventional 4G network, assuming all else being the same. With the addition of new 5G spectrum, the capacity uplift would be even more.

The introduction of 3700-3800 MHz spectrum, for example, could add significant amounts of new mobile network capacity to the market. [c-i-c begins]

[c-i-c ends]

As each MNO fully upgrades its networks to 5G, the increased capacity means an increased ability to offer end-users "more for less". The MNOs would have incentives to fill that capacity as it translates to more revenue and better returns on fixed infrastructure costs.

The increased ability and incentive to service more end-users translates to increased rivalry between the three MNOs. The only way to increase subscriber counts, and financial returns, is to take market share from competing providers given the high level of mobile penetration in Australia.

In the home broadband market, the combined assets of Vodafone-TPG enabled TPG Telecom to offer 4G FWA, and 5G FWA as TPG Telecom's 5G network is progressively rolled out. Other MNOs and wireless operators are also offering FWA as an NBN alternative.

However, the competition between FWA and fixed-line services is likely limited to the lower-usage end of the market due to fundamental network capacity constraints.

NBN Co reported<sup>1</sup> pre-COVID that an average Australian consumes approximately 258 GBs of data per month, and this was growing at a rate of 25% year-on-year. There is not enough spectrum available to cater for this level of market demand if every Australian household were to adopt FWA in lieu of NBN services.

From a macro view, network capacity is agnostic whether it is used for mobile or FWA services. The three MNOs will have different strategies to optimize for the different end-user demands and to thus maximise returns on their multibillion-dollar investments in their networks.

The ACCC ought to be agnostic as to whether this capacity is used for mobile or FWA services. Fundamentally, the more C-Band a MNO has, the better its unit economics will be to provide mobile data services. This translates to an increase in capabilities to compete in downstream markets. However, the incentive to compete is not guaranteed.

### **3 Duopoly risk in 0-80% coverage areas is the key competition concern**

While the market is very competitive today, the outcome of the upcoming C-Band auction could alter this dynamic. The scenarios policy makers must prevent are:

- 1) a single MNO monopolizing usable C-Band spectrum to starve rival operators of needed network capacity, and/or
- 2) one of the three national MNOs not having sufficient 5G capable mid-band TDD spectrum, like C-Band spectrum, to be competitive in the 0-80% population areas.

Given the existing holdings within the 3400-3700 MHz range, the monopolisation risk is likely low. The ACCC (and the ACMA) should therefore focus on limiting duopoly risk.

Taking Sydney and Melbourne as an example, Optus today has access to about 100 MHz of contiguous C-Band spectrum. In addition, Optus has access to approximately 98 MHz of 2300 MHz spectrum. Both C-Band and 2300 MHz bands are TDD spectrum and are designated 5G spectrum bands by 3GPP. Importantly, modern smartphones can already use both bands for 5G. Optus is progressively rolling out 5G network equipment that uses both C-Band and 2300 MHz (source data available from RFNSA).

The competitive situation looks different for TPG Telecom and Telstra, who each have access to only 60-65 MHz of C-Band spectrum for 5G in Sydney and Melbourne. Neither TPG Telecom nor Telstra has access to other mid-band TDD spectrum.

Given this, the ACCC ought to focus on how to ensure the 100 MHz of usable spectrum available (the 75 MHz of Urban Excise spectrum is unusable for macro networks) could be allocated to minimize the risk of a duopoly in the 0-80% coverage areas.

For example, if Telstra (or TPG Telecom) acquired all 100 MHz of usable spectrum, then the duopoly risk will be high as Optus has 200 MHz of usable 5G spectrum, Telstra has 160 MHz

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<sup>1</sup> NBN Co, media release, *Australia's nbn data usage surges by almost 25%*, 2 December 2019.

of usable 5G spectrum, and TPG Telecom only had 65 MHz of usable 5G spectrum. This translates to Optus having 3.1x the spectrum advantage, and Telstra having 2.5x the spectrum advantage over TPG Telecom.

This structural outcome would be incredibly harmful from a competition perspective in those key markets as the third operator will not have the ability to compete effectively. And without the credible threat of a third competitor, the first and second operator will not have strong incentives to engage in rivalry with each other.

#### **4 TPG Telecom demand for additional C-Band spectrum**

Based on TPG Telecom internal analysis, [c-i-c begins]

[c-i-c ends]

### **B In-market & available spectrum**

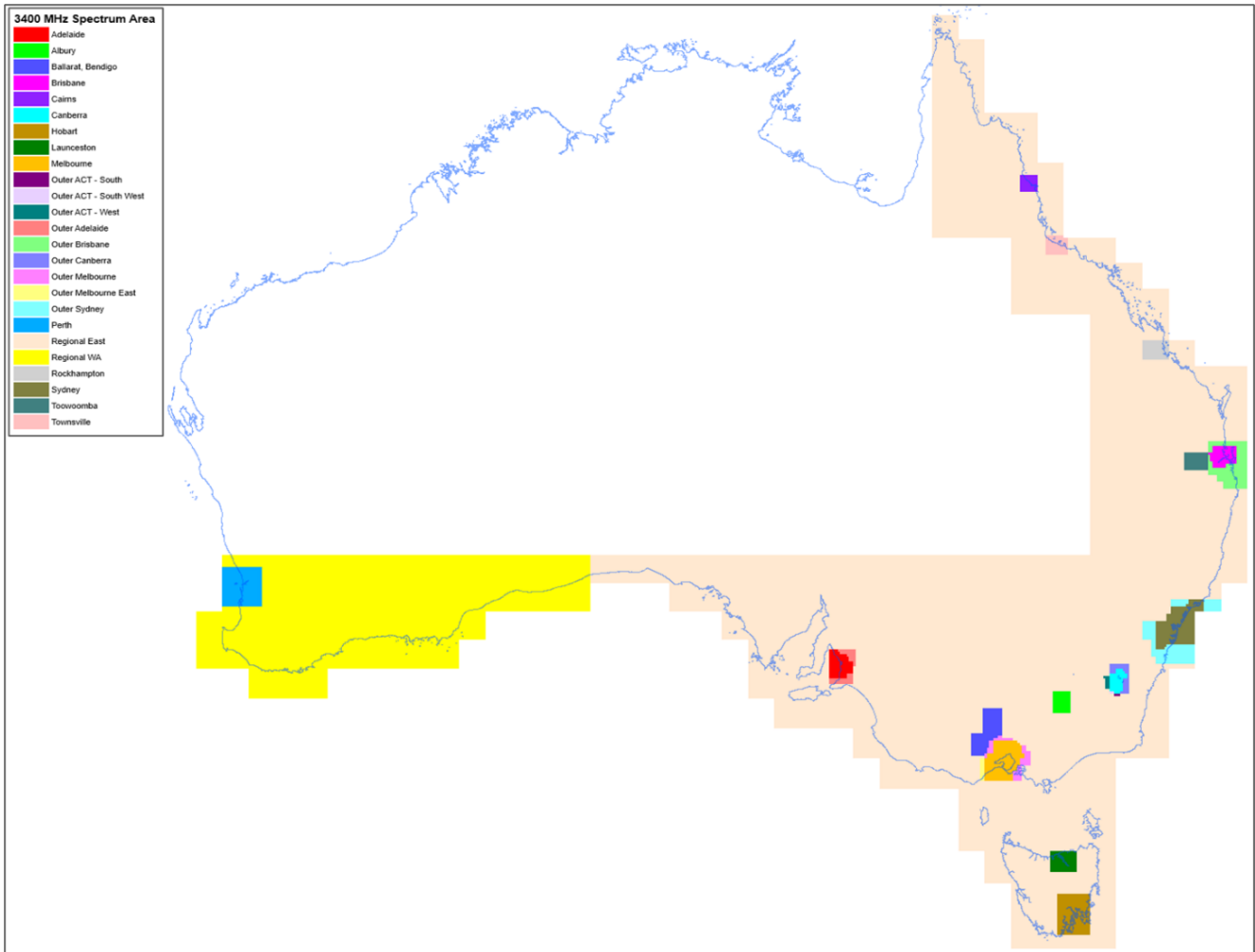
#### **1 Inconsistent geographic licence boundaries in the 3400-3700 MHz range**

The MNOs and NBN Co have varied C-Band holdings across different geographic areas. This is due to the fragmented nature of the in-market licences in the 3400-3700 MHz range.

Historically, the lower part of the band was designed around NBN Co's FWA coverage gaps in the peri-urban areas (or 'outer metro' as they were previously referred to). That meant the licence boundaries in the lowest part of the 3.4 GHz band that surrounded the major capital cities only benefited NBN Co and were not designed around maximizing the use of the spectrum holistically. This construct left significant areas of the lower part of the 3.4 GHz band underutilised and will continue to be underutilised due to the biased protections afforded to NBN Co that disincentivises wide-area mobile deployment.

From the 3475-3575 MHz, Optus and Telstra hold large blocks of spectrum in different areas and in different amounts. Importantly, Optus has access to 100 MHz of C-Band spectrum in both Sydney and Melbourne licence areas.

The geographic boundaries of different spectrum licences that are already in-market in the 3400-3575 MHz range are shown in the diagram below (Urban Excise spectrum boundaries not shown):





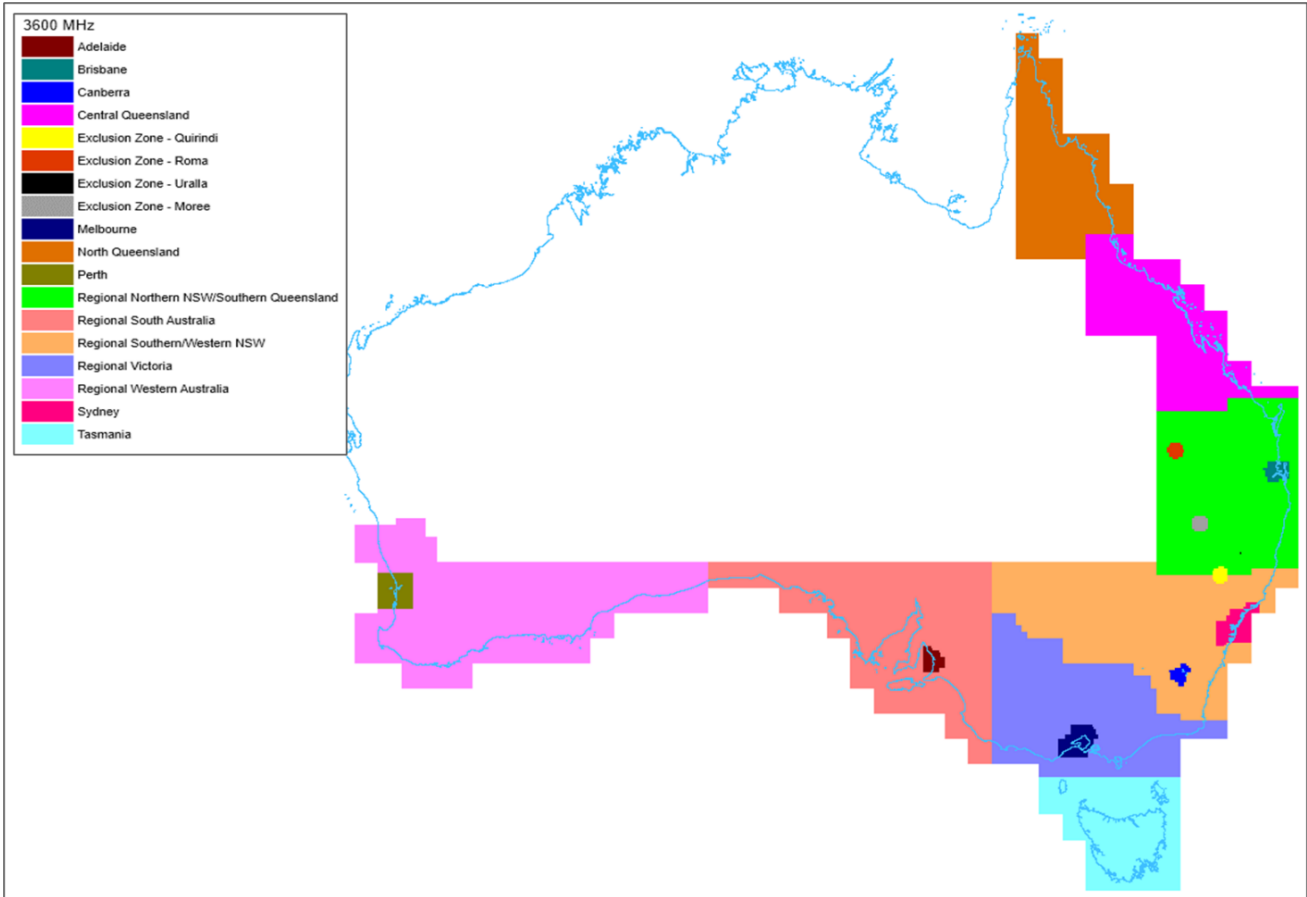
The table below shows where each existing licensee have spectrum, with the Urban Excise separated into their own rows (not to scale):

	MHz: 3400	3442.5	3475	3510	3542.5	3547	3575	Total		
								NBN	Optus	Telstra
Adelaide Urban Excise								-	72.0	28.0
Adelaide								75.0	72.0	28.0
Brisbane Urban Excise								-	67.5	32.5
Brisbane								75.0	67.5	32.5
Melbourne Urban Excise								-	100.0	-
Melbourne								75.0	100.0	-
Sydney Urban Excise								-	100.0	-
Sydney								75.0	100.0	-
Perth Urban Excise								2.5	65.0	32.5
Perth								77.5	65.0	32.5
Canberra Urban Excise								-	67.5	32.5
Canberra								75.0	67.5	32.5
Outer Adelaide								139.0	3.5	32.5
Outer Brisbane								140.0	2.5	32.5
Outer Canberra								140.0	2.5	32.5
Outer ACT - South West								140.0	2.5	32.5
Outer ACT - South								75.0	65.0	-
Outer ACT - West								75.0	65.0	-
Outer Melbourne								175.0	0.0	-
Outer Melbourne West								75.0	75.0	-
Outer Sydney								171.5	3.5	-
Cairns								67.5	-	32.5
Townsville								67.5	-	32.5
Rockhampton								67.5	-	32.5
Toowoomba								142.5	-	32.5
Albury								67.5	-	32.5
Ballarat, Bendigo								142.5	-	32.5
Hobart, Launceston								67.5	-	32.5
Regional WA West								75.0	65.0	-
Regional WA East								-	65.0	-
Regional East								65.0	-	-

In the 3575-3700 MHz range (**3.6 GHz band**), spectrum licences with a different set of licence boundaries were auctioned in 2019. The ACMA made the 3.6 GHz ‘metro’ licence boundaries in that auction with reference to the ‘metro’ licence boundaries in the 3400-3575 MHz range. However, the ‘regional’ licence boundaries were redrawn as NBN Co’s peri-urban spectrum needs were catered for already in the lowest part of the 3.4 GHz band.

The 3.6 GHz spectrum licence boundaries are not optimal, and at the time of the 3.6 GHz auction, TPG Telecom proposed larger ‘metro’ licence boundaries that captured the surrounding peri-urban areas. The worst boundary design was between the ‘Brisbane’ and the ‘Regional North NSW/Southern Queensland’ licences where the demarcation passed through suburbs of Brisbane in many areas. The ACMA’s design decision made network management at the boundaries challenging.

A diagram showing the different 3.6 GHz licence areas are below:



The table below shows where each existing licensee have spectrum in the 3575-3700 MHz range (not to scale):

	MHz: 3575	3605	3610	3630	3665	3700	Total		
							Telstra	TPG	Optus
Adelaide	[Bar from 3575 to 3610]						35	90	-
Brisbane	[Bar from 3575 to 3610]						30	95	-
Melbourne	[Bar from 3575 to 3630]						60	65	-
Sydney	[Bar from 3575 to 3630]						60	65	-
Perth	[Bar from 3575 to 3610]						30	95	-
Canberra	[Bar from 3575 to 3610]						30	95	-
North Queensland	[Bar from 3575 to 3665]						50	40	35
Central Queensland	[Bar from 3575 to 3665]						50	40	35
Regional Northern NSW/Southern Queensland	[Bar from 3575 to 3665]						50	40	35
Regional Southern/Western NSW	[Bar from 3575 to 3665]						65	30	30
Regional Victoria	[Bar from 3575 to 3665]						50	40	35
Tasmania	[Bar from 3575 to 3665]						50	40	35
Regional South Australia	[Bar from 3575 to 3665]						75	20	30
Regional Western Australia	[Bar from 3575 to 3665]						80	45	-

If we take a non-licence specific definition of the top six capital cities across the entire 3400-3700 MHz band, the aggregate holdings of each three MNOs look like the following:

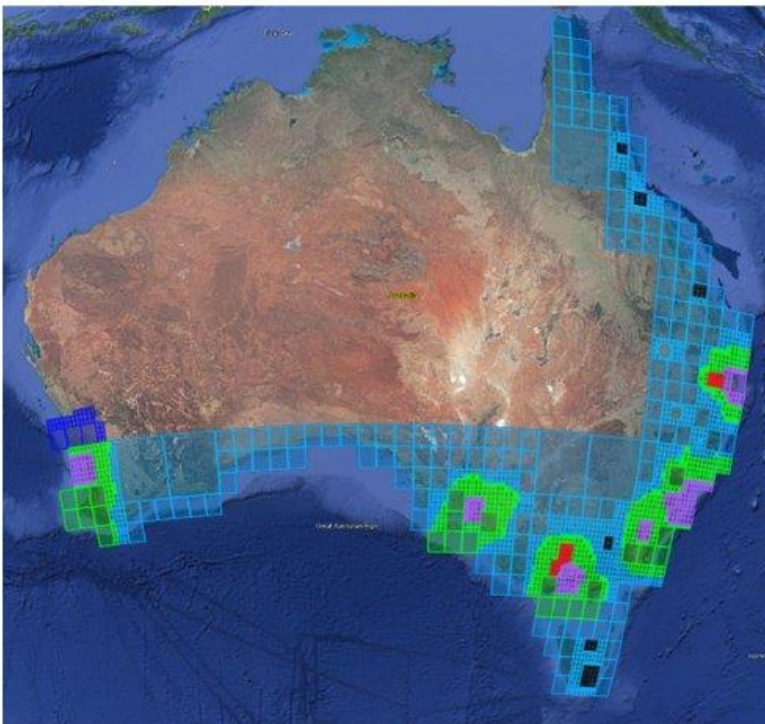
	MHz: 3475	3500	3600	3700
<b>Adelaide</b>		72.5 MHz	62.5 MHz	90 MHz
<b>Brisbane</b>		67.5 MHz	62.5 MHz	95 MHz
<b>Melbourne</b>		100 MHz	60 MHz	65 MHz
<b>Sydney</b>		100 MHz	60 MHz	65 MHz
<b>Perth</b>		65 MHz	62.5 MHz	95 MHz
<b>Canberra</b>		67.5 MHz	62.5 MHz	95 MHz
		<b>Optus</b>	<b>Telstra</b>	<b>TPG</b>

The inconsistent licence boundaries in the 3400-3700 MHz range makes the application of competition limits difficult as there are likely going to be different licence holders in different parts of a licence area regardless of the boundaries set by the ACMA in the 3700-3800 MHz range.

## 2 A threshold rule is needed for the application of allocation limits

The ACMA has set out a range of options for designing the geographic boundaries of the licences in the 3700-3800 MHz range.

One option is new geographic boundaries for the 3700-3800 MHz range where the ‘metro’ licence areas are larger than the corresponding 3.6 GHz metro licence areas, and new regional population centre licence areas are introduced. An overview of this is below:



Key: purple = metropolitan, red = major regional centres 1, black = major regional centres 2, light blue = regional area 1, green = regional area 2, dark blue = regional WA central.

However, the ACMA has not yet decided on the final geographic boundaries of the licences.

Due to this uncertainty, TPG Telecom believes that a threshold rule – like the ‘25% insignificance’ test included in section 14 of the *Radiocommunications (Spectrum Licence Allocation – 850/900 MHz Band) Determination 2021* – could be considered so that the intent of an allocation limit would be resilient regardless of the final geographic boundaries of the licences that the ACMA later prescribe.

The purpose of a threshold rule is to ensure that major population centres within a licence area is given prominence so that no bidder is locked out of the opportunity to acquire the spectrum they want in the most important areas within a licence.

If the ACMA’s larger ‘metro’ licence areas were adopted, and if the allocation limits applied normally so that a bidder’s highest existing holding in a licence area is the constraint, then there inevitably will be a situation where a bidder’s holdings in a less important area would constrain their bids in a more important area. This may lead to inefficient outcomes.

### **3 Urban Excise spectrum**

In addition to the 100 MHz of 3700-3800 MHz spectrum that would be allocated, the ACMA proposes to also auction 75 MHz of Urban Excise spectrum in the 3400-3475 MHz range.

With the exception of Canberra, this Urban Excise spectrum is highly unsuitable for macro-cell deployment due to the stringent licence conditions that the ACMA will impose on this spectrum. The ACMA’s Urban excise coexistence studies in 2021 confirmed that:

- *“Macro cell network may be possible in Canberra and possibility [sic] in parts of Sydney with some mitigation measures employed.*
- *Appears difficult to deploy a macro cell network in other capital cities without significant mitigation measures being employed – starts to approach a restricted cell model”<sup>2</sup>*

In practice, this means that an operator will not be able to deploy this spectrum on antennas that point towards NBN Co’s adjacent network. On a typical 3-sector macro-cell, up to 2 sectors cannot be energised, and there would be only about 120 degrees of network coverage coming for a macro site that is designed to provide 360 degrees of network coverage. This severely hamstrings the utility of this spectrum.

In addition, the proposed licence boundaries of the Urban Excise spectrum are significantly smaller than their corresponding non-constricted licence areas. The actual usable parts of the spectrum may be even more constricted due to device boundary criteria failing for cell locations near the boundary of the licence areas, which may mean that an operator cannot register sites near the licence boundaries.

Given the above factors, TPG Telecom does not believe the Urban Excise spectrum is

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<sup>2</sup> ACMA, “3.4 GHz urban excise coexistence studies.” Australian Communications and Media Authority, TLG Presentation. 12 May 2021

substitutable for the spectrum in the 3700-3800 MHz range.

The allocation of this spectrum should be delayed because the expected utility of the spectrum could soon change. When NBN Co commits to upgrading its adjacent FWA network to 5G, we expect the utility of the Urban Excise to significantly increase as the risk of co-channel interference will dramatically decrease, and thus an operator can expect to use the spectrum on all sectors of a typical macro sites.

It is unreasonable to require bidders speculate on the timing of NBN Co upgrades, particularly as there may be significant and material information asymmetries between bidders on this issue. We therefore propose deferring the allocation of the Urban Excise spectrum until NBN has released a detailed 5G site upgrade plan and associated technical specifications.

If the ACCC were concerned about a single bidder acquiring all this spectrum if the ACMA decides to auction it, then the ACCC and ACMA should consider a separate allocation limit that reflects the unknown value of the Urban Excise.

#### **4 2300 MHz band spectrum**

We have mentioned 2300 MHz spectrum above as 5G capable mid-band TDD spectrum that is comparable to C-Band spectrum. Ordinarily, it would be difficult to include this band in the assessment of competition limits as no 2300 MHz spectrum is being allocated.

An option is to have a secondary limit which includes all mid-band TDD spectrum set at 45% of all usable mid-band TDD spectrum. This would have the effect of preventing Optus from acquiring additional C-Band spectrum in Sydney and Melbourne where it already has approximately 200 MHz.

### **C Conclusion**

TPG Telecom believes a total allocation limit should be imposed on all bidders so that no party would have access to more than 120 MHz of C-Band spectrum after the C-Band auction in the 0-80% population areas.

In addition, a second limit of 45% of all mid-band TDD spectrum (ie, 425 MHz of combined 2300 MHz and C-Band) should be imposed in recognition of the significant structural imbalance between Optus' spectrum holdings and other operators' spectrum holdings.

These limits would balance the need to promote competition in downstream markets with the need to create competitive tension in an auction.

Furthermore, given that the precise licence boundaries are unknown and the already fragmented 3400-3700 MHz range, TPG Telecom believes a generic rule proportionality rule ought to be adopted to ensure allocation limits can apply no matter the geographic coverage areas of the spectrum licences in the 3700-3800 MHz range.

As an illustration, under TPG Telecom’s proposal, the three MNOs could only acquire up to the following additional amounts in the top six capital cities (rounded up to the nearest 5 MHz increments):

	<b>Optus</b>	<b>Telstra</b>	<b>TPG</b>	<b><i>Total demand</i></b>
<b>Adelaide</b>	25	60	30	<i>115</i>
<b>Brisbane</b>	30	60	25	<i>115</i>
<b>Melbourne</b>	0	60	55	<i>115</i>
<b>Sydney</b>	0	60	55	<i>115</i>
<b>Perth</b>	30	60	25	<i>115</i>
<b>Canberra</b>	55	60	25	<i>140</i>

## Annexure – consolidated list of questions and responses

### 1. What are the likely intended uses of spectrum in the 3.4 GHz and 3.7 GHz bands in metro and regional areas?

The most likely intended uses of spectrum in the 3.4 GHz and 3.7 GHz bands are for (1) mobile services and (2) Fixed Wireless Access services (**FWA**). The spectrum is likely to be predominately used in public mobile networks to supply those services. The spectrum may also be used in private mobile networks.

### 2. If you intend to acquire the spectrum to deploy wireless services:

- a. In which geographic areas do you intend to use the spectrum?
- b. What do you consider is the optimal allocation of 3.4–4.0 GHz spectrum to support your likely intended uses? What is the minimum allocation necessary?

[c-i-c begins]

[c-i-c ends]

Other spectrum users may have a more limited demand. However, if a spectrum user only intends to operate a local network of limited capacity requirements, then that the ACMA's Area Wide Licence (intended for the 3800-4000 MHz range) may be more suitable given its relatively low cost and flexibility.

### 3. How is the spectrum licensing arrangement and the intended use of price-based allocation likely to impact your demand for spectrum at this allocation?

N/A

### 4. How is the term of the spectrum licences likely to impact your demand for spectrum at this allocation?

20-year licence terms are desirable for spectrum licences above 3700 MHz. This will promote certainty and licensees' ability to undertake long-term investments. Furthermore,

the ACMA proposes a 5-year reallocation period, this would make the spectrum very low value if a shorter licence term, for example until 2030, were adopted. It would mean that the usable life of the licence would only be from 2028-2030. This is not enough time for licensees to make investment decisions around.

For spectrum allocated below 3700 MHz, a shorter licence duration to 2030 is reasonable so they could be aligned with the 2030 expiration of 3.4-3.6 GHz licences that are already in-market. This would promote voluntary de-fragmentation as licensees will be aware of the 2030 expiration date acting as a backstop for a forced de-fragmentation (restacking to make contiguous holdings) by the ACMA.

**5. How is the differing utility of the urban excise spectrum likely to impact your demand for spectrum at this allocation?**

Given the use of the Urban Excise spectrum is highly restricted and their undesirable geographic coverage limitations, TPG Telecom does not believe the Urban Excise spectrum can be considered substitutable for C-Band spectrum in the 3700-3800 MHz range.

The technical limitations of the urban excise spectrum are insurmountable at this time and will continue to be so until: (1) NBN upgrades its geographically adjacent network to 5G, and (2) the ACMA relaxes the licence conditions attached to the Urban Excise spectrum.

However, NBN's plans are unknown and therefore a bidder cannot fully assess the utility of the Urban Excise spectrum at this time. [c-i-c begins]

[c-i-c ends]

TPG Telecom believes the urban excise spectrum should be withheld from allocation until such time as NBN's FWA upgrade plans are known, ie when the value of the spectrum can be reasonably assessed.

**6. What are the relevant downstream markets for the purpose of assessing the impact of the 3.4 GHz and 3.7 GHz bands allocation on competition?**

The relevant downstream markets are: (1) national market for mobile services, and (2) national market for home broadband services.

There may also be some demand from private network operators, who desire spectrum to



supply wireless services to retail and/or enterprise end-users. However, it is likely that the ACMA's Area-Wide Licences (to be issued in the 3800-4000 MHz range) are better suited for this use case given its targeted design.

**7. Are there likely to be future relevant markets that have not been identified?**

N/A

**8. Do you have any comment on the state of competition in the relevant downstream markets that you consider should be taken into account? What do you think are the key competition issues arising from the 3.4 GHz and 3.7 GHz bands allocation in these downstream markets?**

*Mobile services*

The level of competition in the mobile services is high. This is evidenced by: (1) the multibillion-dollar investments the mobiles industry has already made, and continues to make, in upgrading to 5G, and (2) the continuing product-based competition between service providers. The consequence is consumers are receiving better services and 'more for less'. The ACCC has recognised that the unit cost per GB of mobile data continues to significantly decline year-on-year in its Communications Market Report 2020-21.

There are geographic variations however between population centres and regional/rural parts of Australia. The defining feature is the population density spread between the most populated parts of Australia to the least, and the vast areas of highways and wilderness that surrounds population centres.

Whilst this makes infrastructure-based competition uneconomic in some parts of Australia, service-based competition can continue to exist with targeted infrastructure sharing arrangements between operators.

In the context of considering allocation limits for the upcoming C-Band spectrum, the primary focus should be on ensuring that MNOs continue to have both the capability and incentives to compete on an infrastructure basis in the 0-80% population coverage areas.

*Home broadband*

In the home broadband market, FWA products can only be assessed by reference to the NBN Co monopoly. Infrastructure-based competition with NBN Co using wireless access technologies can exist but only to a limited degree. Wireless access technologies are limited by spectrum, which caps how much capacity there is to provide internet access to end-users, and therefore how many customers can be served.

Currently, C-Band provides the most utility as it is already deployed on mobile networks. There are reasonable amounts of C-Band available such that a mass market FWA service is viable. Furthermore, C-Band spectrum has good propagation properties that it can deliver internet access using plug-and-play consumer-premise equipment that are readily available today.

Given how nascent this market is (ie the vast majority of home broadband connections are via the NBN), the primary focus on this market is to allow MNOs and other FWA providers to be able to test business models and wireless products. Given sufficient time to develop, this could lead to effective competition with the NBN in the low usage segment of the market where end-users may not have a need for, or ability to pay for, a higher cost NBN100+ product.

It is likely that FWA services can only compete against NBN Co's fixed access technologies in targeted ways in the next 5 years. There is insufficient mid-band spectrum available to the industry to provide FWA to every household in Australia. Furthermore, the technology is not good enough where mmWave spectrum can be used to supply a mass market FWA service. However, where NBN Co currently provides FWA or Satellite services, non-NBN Co wireless operators may be able to compete effectively against NBN Co, assuming those operators have network coverage.

**9. How would the allocation of spectrum licences in the 3.4 GHz and 3.7 GHz bands in metropolitan and regional areas impact competition and investment in these markets?**

In metropolitan areas and surrounding 'outer urban' or 'peri-urban', downstream infrastructure-based competition will continue to be fierce and depends on 5G C-Band offerings. Investment in 5G (6G and beyond) will continue.

[c-i-c begins]

[c-i-c ends]

**10. Should existing spectrum holdings in the 3.4–4.0 GHz band be considered in the ACCC's assessment of allocation limits?**

Yes.

**11. Should existing spectrum holdings in bands other than the 3.4–4.0 GHz band (i.e. other mid-band licences) be considered in the ACCC's assessment of allocation limits?**

Yes, the 2300 MHz should be considered given it is a mid-band TDD spectrum that has similar utility to C-Band spectrum. Both bands are generally considered high suitable for increasing capacity to a mobile network.

A separate allocation limit should be imposed so that no operator should hold more than 45% of all available mid-band TDD spectrum (ie, 425 MHz of combined 2300 MHz and C-Band). This would prevent Optus from acquiring additional C-Band spectrum in Sydney and Melbourne, where it already has 200 MHz of mid-band TDD spectrum.

**12. How should the variations in geographic boundaries for both existing and, potentially, new licences be taken into account in determining the operation of any allocation limit?**

It is difficult to be definitive given the ACMA has not designated the geographic boundaries of spectrum to be auctioned.

A general rule should be applied such that in a geographic area of new licence “A”, the most populated area with, for example, at least 51% of the total population within coverage area A (or combination of areas that make up the majority of the population), should be used for the purposes of assessing allocation limits and how much additional spectrum a bidder can bid for at auction.

This general rule would be resilient to any future ACMA decision about geographic boundaries.

**13. How should the ACCC take Telstra and TPG’s proposed network sharing arrangement into account when assessing the need for and nature of allocation limits? Are there other third party authorisations in place for licenses in the 3.4–4.0 GHz band or other mid-bands?**

The proposed network sharing agreement would only have direct impact on the 80-98.8% coverage areas, assuming it completes.

In the context of this allocation, the primary focus should be to ensure that *all* three MNOs have the capability and incentive to continue to compete effectively in the 0-80% population areas.

The proposed network sharing arrangement should have limited impact on the ACCC’s assessment in the 0-80% population areas.

[c-i-c begins]

[c-i-c ends]

**14. Do you think allocation limits are necessary for the 3.4 GHz and 3.7 GHz band spectrum allocation? Relevantly, would allocation limits promote competition and encourage investment in infrastructure, including in regional Australia?**

Allocation limits are necessary in the 0-80% population areas where infrastructure-based competition is fierce. Without limits, inefficient allocation of key 5G spectrum is a real risk. Such outcome would have significant competition implications in downstream markets.

Subject to ACMA’s decision regarding geographic boundary of ‘metro’ licences, an overall allocation limit of 120 MHz should be set. No bidder should, following the auction, have access to more than 120 MHz of usable spectrum in the 3400-3800 MHz range.

**15. If so, do you think a cross-band limit or an in-band limit would be more appropriate? What do you think the quantum of the allocation limit should be? Do you think different allocation limits should apply to metropolitan and regional areas? How would the application of these allocation limits affect the relevant downstream markets?**

In the 0-80% population areas, a two-step limit should be used, being the lower of either: (1) 120 MHz limit in the 3400-3800 MHz range, or (2) 45% of the 425 MHz of available spectrum in both 2300 MHz and C-Band.

Under TPG Telecom’s proposal, the three MNOs could only acquire up to the following additional amounts in the top six capital cities (rounded up to the nearest 5 MHz increments):

	<b>Optus</b>	<b>Telstra</b>	<b>TPG</b>	<b><i>Total demand</i></b>
<b>Adelaide</b>	25	60	30	<i>115</i>
<b>Brisbane</b>	30	60	25	<i>115</i>
<b>Melbourne</b>	0	60	55	<i>115</i>
<b>Sydney</b>	0	60	55	<i>115</i>
<b>Perth</b>	30	60	25	<i>115</i>
<b>Canberra</b>	55	60	25	<i>140</i>

**16. Are there other factors that you consider the ACCC should consider in assessing the possible allocation limits to apply?**

N/A