Submission in response to ACCC Discussion Paper

Spectrum Competition Limits

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Contents

Section 1. EXECUTIVE SUMMARY

1.1 Optus welcomes the opportunity to comment on whether competition limits should apply for the upcoming regional 1800 MHz spectrum auction. 1800 MHz spectrum provides important network capacity and coverage for LTE data services. Given the ongoing and rapid increase in mobile data consumption, there is an ever increasing need for additional spectrum to ensure that networks can provide the services demanded by end-users.

1.2 At a simple level, spectrum can be separated into low band and high band. Low band spectrum (sub-1GHz) is preferred in the industry for coverage layer use, while high band spectrum (above 1GHz) is used primarily for providing additional capacity where required.

1.3 In the proposed 1800 MHz auction areas, Telstra held a monopoly in 4G services in regional areas[1] for approximately three years from September 2011 until October 2014, when Optus launched its first substantial regional 4G services under the "early access" regime for 700 MHz.[2] This was solely due to Telstra's monopoly on regional 1800 MHz spectrum until that date. As a result, in the proposed auction areas: **[CiC]**

1.4 Market research shows that the main driver for this market share difference is the experience and perception of regional mobile network quality and coverage. Telstra's historical monopoly holding of regional 1800 MHz spectrum is a key driver of this network advantage. In metro areas where spectrum capacity and coverage is more equal, **[CiC]**

1.5 Spectrum in the 1800 MHz band have propagation and legacy characteristics that make it more preferable than other high band spectrum in regional areas, including better:

(a) Propagation characteristics, meaning an 1800 MHz cell site can cover three times as much area as a 2600 MHz site; and

(b) Handset penetration, meaning more end-users are able to utilise LTE over 1800 MHz than through 2600 MHz.

1.6 Consequently, Optus strongly supports competition limits for the upcoming 1800 MHz spectrum auction. Absent such limits, there is a real risk that Telstra's historical advantage in regional areas will be further entrenched to the detriment of end-users.

1.7 Competition limits are a common feature of Australian spectrum auctions. Competition limits were in place during the 1800 MHz auctions in 1998 to 2000; as well as the 2100 MHz 3G auction. In the most recent digital dividend auction, limits were also imposed in order to:

(a) Prevent the spectrum band being monopolised with consequent negative impact on consumers in terms of service availability, quality and pricing;

(b) Provide a level playing field for the three bidders most likely to participate in the auction, while not precluding a new entrant; and

[1] In this submission, when Optus uses the term "regional areas" or "regional" we specifically refer to non-capital city geographic areas, i.e., Canberra, Darwin and Hobart are not included when this term is used in this submission. These cities are, however, included in the proposed auction. Optus describes Canberra, Darwin and Hobart as the "minor capitals".

[2] This excludes 15 regional sites at which Optus secured a limited amount of 1800 MHz spectrum via ACMA apparatus licences. These licences were issued to Optus solely to balance the 15 sites of regional 1800 MHz apparatus licences earlier issued to Telstra. Limited LTE services were provided at some of these sites by Optus from March 2013.

(c) Reflect the characteristics of the technology most likely to be deployed (LTE), particularly the optimal spectrum block size of 2x20MHz.[3]

1.8 The only comparable spectrum auction held in Australia which did not have competition limits was the auction of regional 1800 MHz spectrum in 1998. At the auction the full 2x15 MHz in regional areas and in Canberra, Hobart or Darwin on offer could be acquired by a single party. Without any imposed constraints, Telstra acquired the full 2x15 MHz in all regional markets and 2x10 MHz in the minor capitals of Canberra, Hobart and Darwin. The consequence of this historical failure in competition policy became evident 13 years later with Telstra's three year monopoly in regional 4G services.

1.9 Optus supports the use of the following principles to guide the imposition of competition limits on the 1800 MHz regional auction and its implementation. The proposed competition cap should be designed to achieve all three factors, namely:

(a) Provide opportunity for level playing field between MNOs;

(b) Provide opportunity for MNOs to acquire the optimal LTE channel size of 20 MHz; and

(c) Enable key non-MNO users an opportunity to acquire necessary 1800 MHz spectrum.

1.10 Optus proposes that the competition limit should be 20 MHz (paired) and include any incumbent 1800 MHz spectrum holdings – consistent with the cap imposed in metropolitan areas in the 2000 PCS auction (which also included existing holdings). Such a cap would maximise benefits to end-users and the wider public because:

(a) Applying a competition cap in regional areas for 1800 MHz would provide a level playing field across MNOs;

(b) It enables each MNO to acquire the optimal channel size for LTE; and

(c) It enables other non-MNO interested users (such as the state rail organisations and infrastructure users such as large mining companies) an opportunity to acquire spectrum which has significant public good benefits, without the risk that non-MNO users would be unable to acquire spectrum in competition with MNOs.

[3] See, for example, EXPLANATORY STATEMENT, Radiocommunications (Spectrum Licence Limits) Direction No. 2 of 2012.

Section 2. SPECTRUM HOLDINGS

2.1 This section outlines the type of spectrum used, the purposes for which they are used, and the holdings of spectrum in the Australian market. This section shows that:

(a) For the purpose of network planning, spectrum is often considered in the context of low band and high band spectrum. In general, low band provides the coverage layer and high band provides the capacity layer.

(b) 1800 MHz spectrum holds propagation and legacy factors that set it apart from the other types of high band spectrum, especially in regional areas where coverage is important given lower density of sites.

(c) Industry spectrum holdings in metro areas are largely equivalent, but there is a significant inequality of holdings in regional areas.

Spectrum bands are used for different purposes

2.2 The mobile industry uses a variety of spectrum bands to supply mobile services across Australia. Each spectrum band holds different propagation features that make them better suited to particular network outcomes. Modern mobile network planning therefore utilise a range of spectrum bands to provide coverage and capacity.

2.3 In broad terms, while all spectrum ranges provide coverage and capacity, low band spectrum (sub-1GHz) is preferred in the industry for use as a coverage layer, while high band spectrum (above 1GHz) is used primarily for providing additional capacity where required. However, there are many factors that can alter this broad statement, including legacy deployment, handset penetration, and licence areas to name a few.

2.4 Optus' definition and use of its spectrum holdings are shown below.

Figure 1

[CiC]

Source:

2.5 Optus defines 700 MHz and 900 MHz as low band spectrum, and deploys these bands primarily to provide the coverage layer of the network. The advantages of these ranges for coverage can observed in the cell radii – 700 MHz provides almost 3 times greater cell radii than 2600 MHz, thereby significantly reducing the cost of covering the same geographic area. The ability of the coverage layer to provide necessary capacity is limited by the amount of spectrum held. For instance, Optus holds only 8.4MHz of paired 900 MHz spectrum which is used to provide both 2G and 3G services. While Optus holds more 700 MHz at 10 MHz paired, its use for LTE services means it will need to be carefully managed in conjunction with other spectrum bands to maximise capacity.

2.6 The key propagation features (including drivers of demand) for low band spectrum include:

(a) Greater on-street coverage;

(b) Increased in in-building coverage;

(c) Improved connectivity to end-users across a broad area; and

(d) Support for high mobility and low data rate applications.

2.7 The high band ranges – 1800 MHz to 2600 MHz – are used to provide capacity in additional to that provided by the coverage layer. In general, these ranges are designated to provide 3G and/or 4G capacity. It can also be observed that Optus' holdings of high band spectrum vary significantly across metro and regional areas. This is discussed in more detail below.

2.8 The key propagation features (including drivers of demand) for high-band spectrum include:

(a) Improved capacity and network depth which is particularly important in a data driven market;

(b) The prospect of greater capability and product innovations;

(c) Personalised coverage that enables the network to target more specific areas which have high levels of demand;

(d) Support for low mobility and high data rate applications.

2.9 Modern mobile networks therefore require a mixture of spectrum frequencies in order to balance the technology drivers and to ensure the level of customer experience that end-users demand. LTE can be provided over many spectrum ranges, with limitations practically at the end-user handset level in terms of what bands are supported in the end-user device. In order to better manage network capacity and utilisation, it will be important to manage spectrum layers to be able to better target network capacity upgrades at locations where there is high demand, or high growth of demand.

1800 MHz spectrum is important, especially in regional areas

2.10 The discussion above sets out in broad terms the characteristics of low band and high band spectrum. These bands are grouped together because typically they have many of the same characteristics and network use. Within the high band spectrum (1800 MHz, 2100 MHz, 2.3GHz and 2600 MHz), spectrum in the 1800 MHz band has network characteristics that provide additional benefits in regional areas.

2.11 The ACCC notes that the 1800 MHz band is the not the only band to provide 4G services. LTE can also be supplied over 700 MHz and 2600 MHz, which Optus and Telstra hold, and potentially over 850 MHz which VHA and Telstra hold. The distinction between low and high band spectrum, which is discussed above, demonstrates that the ACCC should focus on a comparison between regional high band holdings in its assessment of the need for competition limits. In addition, 1800 MHz has propagation features which make it the 'most' attractive high band spectrum to deliver LTE in regional areas.

2.12 Optus highlights two additional benefits 1800 MHz has over the other high band ranges:

(a) Additional coverage benefits that are particularly useful in regional areas;

(b) Existing base of handsets in market designed to use LTE at 1800 MHz.

2.13 In regional areas, where the costs of deploying additional sites are high (including the high cost of regional transmission) and there is less building interference, the use of 1800 MHz as the primary capacity layer has additional coverage benefits compared to other high band spectrum. This can result in significant cost savings when also using high band to supplement

coverage. Using 1800 MHz to cover a given area requires approximately **[CiC]** the number of sites than if the same coverage was provided using 2600 MHz.[4]

2.14 In addition to the coverage benefits relative to other high band spectrum, 1800 MHz also has a number of legacy advantages. LTE was first deployed in Australia using 1800 MHz spectrum, and as such is supported by a more extensive device ecosystem (e.g. there is a substantial number of handsets that use 1800 MHz) to provide LTE services.

2.15 Data from the GSA shows that 1800 MHz spectrum is the most common frequency over which LTE networks have been deployed globally. As at April 2015, 176 LTE networks used 1800 MHz, representing 45% of all LTE networks. The next most common frequency is 2600 MHz which is used in 97 LTE networks.[5] This can be compared to just 10 commercial networks using 700 MHz spectrum.[6]

2.16 The global use of spectrum impacts on the development of handsets. The majority of early release LTE handsets enabled LTE over 1800 MHz. Indeed, due to the delay in releasing digital dividend spectrum globally, 1800 MHz has almost become the de facto LTE standard.

2.17 While the number of handsets that rely primarily on 1800 MHz is expected to decline over time, in the medium term it is expected to still represent a non-trivial portion of the market. **[CiC]** So there still remains a significant non-addressable customer segment in regional areas which cannot access Optus 4G services because they do not have a device which supports 4G 700 MHz (figure 2).

Figure 2 Global frequency band support by devices (AU bands yellow)

LTE FDD	Devices
1800 MHz band 3	1,141
2600 MHz band 7	1,022
2100 MHz band 1	844
800 MHz band 20	605
AWS band 4	551
800/1800/2600 tri-band	538
700 MHz bands 12 or 17	499
850 MHz band 5	486
900 MHz band 8	486
700 MHz band 13	374
1900 MHz band 2	347
APT700 band 28	76

LTE TDD	Devices
2300 MHz band 40	696
2600 MHz band 38	606
1900 MHz band 39	514
2600 MHz 41	457
3500 MHz band 42, 43	26

Source: GSA, 2015, "Evolution to LTE" report, April 9.

Industry spectrum holdings

2.18 The increase in data usage, and its future growth path, means that the industry requires increasing amounts of spectrum to meet end-users insatiable demand. Consequently, the ability to provide suitable network quality depends on an MNO acquiring an appropriate level of spectrum capacity.

2.19 Figure 3 summarises the current spectrum holdings of the mobile industry. This highlights that three MNOs each hold significantly more spectrum in metro areas than regional areas. While the spectrum holdings are currently sufficient to meet current demand in metro areas, there

[4] [CiC].
[5] GSA, 2015, "Evolution to LTE" report, April 9.
[6] In the APT spectrum band.

are wide variations in the regional holdings of Telstra, Optus and VHA. Telstra has significantly more high band spectrum – 75 MHz of paired spectrum compared to 30 MHz for Optus and 10 MHz for VHA. Importantly, Telstra already has access to 15 MHz of paired 1800 MHz spectrum, compared to 5 MHz for VHA (in Canberra, Hobart and Darwin only) and none for Optus.

Figure 3

[CiC]

Source:

2.20 As discussed above, there are several key advantages of 1800 MHz in regional areas compared to 2600 MHz when supplying LTE capacity and coverage. **[CiC]** Telstra had a monopoly on 4G services in regional Australia for three years from September 2011 to October 2014 due to the fact it was the only operator holding 4G spectrum in regional areas until "early access" to 700 MHz spectrum was possible.

1800 MHz spectrum holdings in Australia

2.21 Following the government's decision to open the mobile market to full competition, a total of 2x75 MHz was initially identified in the 1800 MHz band to be suitable for PCS purposes. However, in response to industry comment, the government decided to auction only 2x45 MHz during the first two auctions and make the remaining 2x30 MHz available at a later date. In addition, the allocations to be awarded in metro and regional areas also differed.

2.22 The first PCS auction was held in May 1998, and offered 2x45 MHz spectrum in the five major capitals of Sydney, Melbourne, Brisbane, Perth and Adelaide, and 2x15 MHz in Canberra, Hobart, Darwin, and regional areas. No 1800 MHz spectrum was offered in remote or "outback" areas. A competition cap of 2x15 MHz was imposed for any single auction participant in the major capital cities, but no competition cap was imposed in Canberra, Hobart or Darwin, or in regional areas.

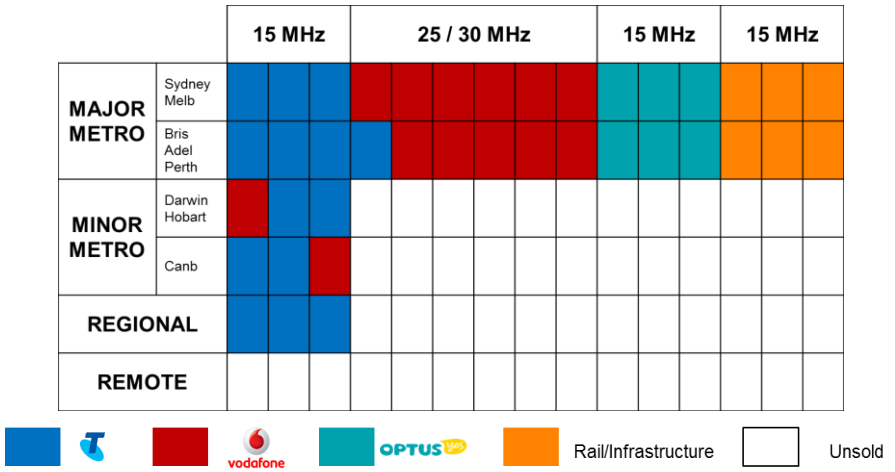
2.23 The second PCS auction was held in January 2000 and offered the remaining 2x30 MHz spectrum in the five major capitals. The Government imposed a competition cap of 2x20 MHz in the five major capitals that included incumbent holdings.

2.24 The absence of competition caps for the 2x15 MHz of spectrum being offered in regional areas in 1998 resulted in Telstra securing all of the regional spectrum, and 10 MHz in Darwin, Hobart and Canberra. Given that 4G services were not even conceived of in 1998, this spectrum was not secured by Telstra with a view to offering 4G services in regional areas some 13 years later. As a consequence, Telstra became the sole 4G provider in regional areas for three years, from September 2011 to October 2014. Neither Optus nor Vodafone had any spectrum holdings in regional areas suitable to provide competitive 4G services during this time, and were effectively locked out of the market.

2.25 Historically, spectrum in the 1800 MHz band was allocated during the original PCS and separate 1800 MHz PCS auctions in the form of spectrum licences. These licences are currently allocated among a combination of the three MNOs and State Rail Authorities – and have recently been renewed (or are in the latter stages of being renewed).

2.26 Notably, only 15MHz of paired spectrum in regional area has ever been allocated in the form of spectrum licences. The remaining spectrum in regional 1800 MHz band is currently subject to the apparatus licensing regime and is used primarily for fixed link services. It is this latter category of regional 1800 MHz spectrum that is the subject of the upcoming regional 1800 MHz auction.

Figure 4 1800 MHz spectrum licences (paired)



Source: ACMA. Each square represents 2x5 MHz

2.27 As highlighted in figure 3, there is a considerable inequality of spectrum holdings among the three MNOs in regional areas. Furthermore, within the 1800 MHz band Telstra owns the majority of the available licences in minor capital and regional areas (see figure 4). This provided Telstra with a first-mover network advantage for the deployment and utilisation of LTE services in regional areas.

2.28 Optus currently does not own any 1800 MHz spectrum licences in regional areas.[7] **[CiC]**

[7] Optus secured limited access to 15 sites of 1800 MHz in regional areas through apparatus licences awarded by ACMA. The ACMA agreed to lift the "embargo" on regional 1800 MHz spectrum and award these licences to Optus purely to balance the 15 sites of apparatus licences earlier secured by Telstra. This only provides extremely limited coverage and therefore the utilisation benefits are not at all comparable with that afforded by the certainty of awarded, area-wide, spectrum licences.

Section 3. IMPACT ON DOWNSTREAM MARKETS

3.1 This section outlines Optus' view on the impact of spectrum on downstream mobile markets.

3.2 First, Optus agrees with the traditional approach adopted by the ACCC to consider mobile services in a national market context. That is not to say, however, that the level of competition is equal in all areas of Australia. And more importantly, it is not to say that the potential for competition is equal in all areas.

3.3 Market research shows that the ability of MNOs to deliver regional network quality impacts the choice of MNO for both regional end-users and metro end-users – that is, regional network quality impacts on competition in the national market. The ACCC does not need to find a specific regional market in order to conclude that the allocation of 1800 MHz in regional areas impacts competition.

3.4 This section discusses:

(a) The proposed market definition;

(b) Why the level of competition is dependent on network availability; and

(c) How competition in metro areas is impacted by regional coverage

Commission's proposed market definition

3.5 The interim view of the ACCC is that the relevant markets impacted by 1800 MHz spectrum are the "mobile broadband retail and wholesale markets".

3.6 Optus agrees with the ACCC's reasoning for their conclusion, namely that 1800 MHz is, and will continue to be, used for the provision of LTE services.

3.7 However, Optus prefers that the ACCC define the relevant market as the retail and wholesale mobile data market – which given the bundled nature of mobile communications does not differ from the retail and wholesale mobile market. This may be semantic, but the term mobile broadband has a specific use within the industry which does not accurately capture the manner in which end-users acquire LTE services. Mobile broadband refers only to SIMs that do not have an active voice service attached – these are typically used in dongles or tablets. However, LTE is used by smartphones and other mobile data devices. Further, Optus' definition of mobile broadband excludes data SIMs that are 'attached' to voice SIMs through the new Optus data sharing plans or family sharing plans.

3.8 More importantly, LTE services are used by all 4G enabled devices to provide data services. The availability of 1800 MHz spectrum, and hence LTE services, impacts all mobile data services.

Competition dependent on network availability

3.9 Competition between MNOs is dependent on network availability. Competition in, and for, regional areas, is impacted directly by the availability of 1800 MHz spectrum. As explained above, 1800 MHz will remain the spectrum over which the majority of LTE services will be delivered for many years.

3.10 A key consideration when assessing the impact of 1800 MHz on the level of competition in regional areas is the breadth and depth of MNO's 1800 MHz holdings. **[CiC]**

3.11 The regional 1800 MHz spectrum being auctioned are located in **[CiC]** areas where Optus currently does not hold any 1800 MHz. The three MNOs have roughly similar amounts of low-band spectrum (primarily used to supply coverage) across both auction and non-auction areas. But it can be seen that the holdings of high-band spectrum (primarily used to supply capacity) vary significantly between metro and regional areas. The average mobile spectrum holdings in both auction and non-auction areas is shown below.

Figure 5

[CiC]

Source:

3.12 As can be seen, Telstra has a spectrum advantage in the auction areas. Telstra has almost double the average high band spectrum of Optus, and around ten times more than VHA.[8] The differential is not as great in the metro areas that are not subject to the upcoming auction. As a result, in the relevant auction areas Telstra is able to provide greater network capacity on the same number of towers. Given the growth in data consumption over recent years, and the future growth expectations, the ability to offer sufficient capacity for data services is important when attracting and keeping subscribers.

3.13 When assessing the extent of demand and supply side substitutability a key question is the relevant network availability of the MNOs – network quality perceptions restrict end-users moving networks; and a lack of infrastructure and capacity limits the ability of MNOs to increase supply. This is impacted by both the presence of existing mobile towers, and availability of spectrum at those towers.[9]

3.14 **[CiC]**.

3.15 **[CiC]**.

Figure 6

[CiC]

Source:

3.16 **[CiC]**.

3.17 **[CiC]**.

Figure 7

[CiC]

Source:

3.18 **[CiC]**.

3.19 **[CiC]**.

3.20 The analysis above assumes that all high band spectrum frequencies are perfect substitutes – that is, 1 MHz of 1800 MHz is equivalent to 2600 MHz – it must be highlighted that 1800 MHz has propagation and legacy characteristics that make it more preferable than other high band spectrum.

3.21 In summary, 1800 MHz is important for regional areas because of its superior:

[8] [CiC]

[9] Towers can hold one, or multiple, different spectrum services. As such, a tower can supply 900, 1800, 2100 services; or can only have 900 services.

(a) Propagation characteristics, meaning an 1800 MHz cell site can cover three times as much area as a 2600 MHz site; and

(b) Handset penetration, meaning more end-users are able to utilise LTE over 1800 MHz than 2600 MHz.

Regional network matters locally and nationally

3.22 **[CiC]**.

3.23 **[CiC]**.

3.24 **[CiC]**.

3.25 **[CiC]**:

3.26 **[CiC]**.

3.27 **[CiC]**.

3.28 **[CiC]**.

3.29 **[CiC]**.

Figure 8

[CiC]

Source:

3.30 **[CiC]**.

3.31 **[CiC]**.

3.32 **[CiC]**.

3.33 **[CiC]**.

Figure 9

[CiC]

Source:

3.34 In conclusion, it is not necessary for the ACCC to find a distinct regional mobile market to conclude that regional 1800 MHz spectrum impacts the ability of end-users to move to other MNOs; or the ability of MNOs to increase their supply of mobile services.

3.35 While regional spectrum clearly impacts on network performance in the 1800 MHz licence areas – and directly impacts the experience for end-users located in these license areas – the quality of regional mobile network also has a significant impact on metro end-user network perceptions, and hence the national market.

3.36 An analysis of the evidence demonstrates:

(a) The availability of high-band (and especially 1800 MHz) spectrum is a vital element to enable MNOs to provide adequate high speed data capacity. Regional spectrum holdings vary significantly, with Telstra holding **[CiC]** of spectrum capacity in auction areas; and

(b) Network performance in regional areas impacts not only end-user demand in regional areas; but also in metro areas where metro end-users value the option to travel to regional locations and experience an equivalent level of network performance.

Section 4. COMPETITION IN RELEVANT MARKETS

4.1 The growth of data usage has re-focused the mind of consumers back to network quality and coverage as a key network differentiator. Market success depends on not only having a high level of network coverage, but also having a network that can provide consistent data services at the speed required. The end-user experience required for data usage means that operators cannot hide from bad network experiences. In the past, end-users could not readily differentiate between levels of voice quality,[10] but varying quality directly impacts on data experience through varying speeds and latency.

4.2 To date, Telstra has successfully leveraged its fixed line network and regional spectrum holding to obtain a first mover advantage to develop a larger LTE mobile network relative to its peers.

4.3 **[CiC]**.

4.4 **[CiC]** This chapter discusses:

(a) The level of competition in regional and metro markets; and

(b) Challenges to increasing competition in regional markets.

4.5 This section will show that regional spectrum holdings, and in particular the disparity of holdings in 1800 MHz in the relevant **[CiC]** areas, present a barrier to greater competition. **[CiC]**

Market concentration in relevant markets

4.6 Nationally, the ACCC has reported that Telstra had a retail market share of 45% in June 2014, Optus (excluding Virgin) at 27% and VHA at 18%.[11] This breakdown is consistent with Optus market research.

4.7 **[CiC]**

4.8 **[CiC]**.

4.9 **[CiC]**

4.10 **[CiC]**

4.11 The explanation of this difference cannot be price or plan-based – given all MNOs offer national retail pricing. A regional end-user can obtain the exact same price and usage allowance as metro end-users. As discussed in Section 3, the more likely explanation is difference in network coverage and quality (actual and perceived).

4.12 The market share data clearly shows that Telstra is more dominant in regional areas than metro areas. Indeed, in metro areas where spectrum capacity and coverage is relatively equal, the three MNOs have around **[CiC]** market share. This is reflected in the relatively low level of market concentration.

4.13 This can be contrasted to the regional auction areas, where **[CiC]**

[10] Although customers are sensitive to voice dropped call rates.
[11] ACCC, Telecommunications competitive safeguards for 2013-14, p.30

Price and network competition

4.14 Market research discussed in section 3 demonstrated that end-users in both regional and metro areas **[CiC].** Price competition is at the national level, where network experience is primarily at the local level (experience and perception).

4.15 The research is supported by industry pricing data. **[CiC]**.

Figure 10

[CiC]

Source:

4.16 **[CiC]**

4.17 Notwithstanding the constant price premium (especially for data products), Telstra maintains its **[CiC]** Section 3 demonstrated that a key reason underpinning the network performance of Telstra is its spectrum holdings in the auction areas.

4.18 Optus' analysis shows that it is disparity of spectrum holdings which drives the significant variance in maximum network spectrum capacity. **[CiC]**

4.19 **[CiC]**

Demand and supply side substitution

4.20 The ACCC notes that its assessment of competition takes into account the ability of end-users to switch networks, and alternative networks to increase supply of capacity, given a non-transitory increase in price. The evidence discussed above shows that:

(a) In the absence of network availability or equivalence of network performance, there is limited demand side substitution. Even where end-users may be willing to move to other MNOs, they will not or cannot due to lack of network or lack of equivalent network. As described earlier, high-band spectrum is required primarily for the provision of capacity. In areas where a MNO holds little 1800 MHz, but holds low-band spectrum (700 MHz or 850 MHz), the MNO will be constrained as to how much capacity can be provided. This will directly impact end-users' experience and data speeds.

(b) In addition, where there are not suitable spectrum holdings, there can be little or no supply side substitution. It is not practical for Optus, for example, to increase its presence or network capacity/quality where it does not hold 1800 MHz spectrum. In the absence of 1800 MHz, an MNO is unable to supply an effective substitute to the services of another MNO that holds 1800 MHz quickly and without significant investment in response to a price increase.

Regional 1800 MHz spectrum holdings are a barrier to competition

4.21 Spectrum holdings are a barrier to increasing competition in regional areas. These barriers are further compounded by the tower advantage held by Telstra, which is uneconomical for other MNOs to challenge.

4.22 Optus' analysis on **[CiC]** areas demonstrates that in the auction areas, Telstra has a greater:

(a) Number of towers than other MNOs, **[CiC]** and

(b) Amount of high band spectrum than other MNOs, **[CiC]**

4.23 **[CiC]** These network realities impose significant barriers to competition.

4.24 Telstra's holdings of 1800 MHz spectrum is a key driver in this network differential. **[CiC]**

4.25 As illustrated above, 1800 MHz has propagation and legacy characteristics that make it more preferable than other high band spectrum, including superior:

(a) Propagation characteristics, meaning an 1800 MHz cell site can cover an area up to three times more than a 2600 MHz site; and

(b) Handset penetration, meaning more end-users are able to utilise LTE over 1800 MHz than through 2600 MHz.

Section 5. COMPETITION LIMITS SHOULD BE IMPOSED

5.1 Optus observes that previous spectrum auctions for mobile services contained competition limits.[12] There are several key observation from previous auctions:

(a) Competition limits are generally set at a level to ensure a level playing field across all potential bidders, while providing some auction tension to ensure price discovery. If there were likely three bidders, the limit would be set at slightly more than one third of the total spectrum available in that auction;

(b) Where bidders already held spectrum in the same spectrum range from previous auctions, the competition limit combined these holdings with the current auction to determine total holdings;

5.2 While competition limits have been imposed in previous auctions, the original PCS auction did not extend limits to regional 1800 MHz. This resulted in Telstra acquiring a monopoly over 1800 MHz spectrum in regional areas.

5.3 This section:

(a) Outlines the limits imposed in previous auctions;

(b) Discusses the assessment criteria relevant to assessing different cap options; and

(c) Puts forward Optus' proposed competition limit.

Previous auctions

5.4 Spectrum auctions in Australia have historically always included competition limits in some form. The original PCS auctions were conducted to make spectrum available to support the government's decision to open the Australian telecommunications market to full competition from 1 July 1997. These were subsequently followed by a second PCS auction (1800 MHz), 3G auction (2100 MHz), and more recently the Digital Dividend auction (700 MHz and 2600 MHz).

5.5 A summary of these spectrum auctions and their competition limits are set out below.

PCS auctions

5.6 The original PCS auction for the allocation of spectrum in the 850 MHz and 1800 MHz spectrum bands involved 45MHz paired in the five major capitals and 15MHz paired in the three minor capitals and regional areas in 1800 MHz, and 20MHz of paired 850 MHz spectrum in metro areas and 5 MHz paired in regional areas. This spectrum was allocated over three allocation processes; with each subsequent auction being held to allocate any unsold lots from the preceding auction.

5.7 The original PCS auctions imposed the following competition limits:

(a) No party could obtain more than 15 MHz of paired spectrum in 1800 MHz in major capital cities (defined as Sydney, Melbourne, Brisbane, Perth and Adelaide) – this represented one third of available spectrum in the auction;

[12] A minor regional 850MHz spectrum auction of 5MHz in 2001 did not impose competition limits, but the only bidder was Telstra.

(b) Telstra, Optus and Vodafone could not bid on 10 MHz of paired spectrum in 850 MHz in mainland capital cities, and 5 MHz in other areas; [13] and

(c) There were **no competition limits** set for the 15 MHz of 1800 MHz spectrum in Canberra, Hobart, Darwin or regional areas.

5.8 The same competition limits applied for the third allocation of PCS spectrum in 1999, which effectively precluded Telstra, Optus and Vodafone from participating. As a result Hutchison won the available spectrum as the only registered bidder.

5.9 The 2000 PCS auction involved 30 MHz of paired 1800 MHz spectrum in metro areas that was not previously offered during the original PCS auctions. This auction imposed the following competition limits:

(a) No party could be allocated more than 20 MHz of paired spectrum in any capital city.

(b) The previous 1800 MHz allocation in 1998 for Telstra, Optus, Vodafone and One.Tel counted towards the 20 MHz limit.[14]

2100 MHz 3G auction

5.10 The 2100 MHz 3G auction in 2001 sought to allocate 60 MHz of paired spectrum nationally (expect for Canberra where 45 MHz was available with 20 MHz of unpaired spectrum). In regional Australia, 20 MHz of paired spectrum was auctioned.

5.11 The following competition limits were imposed:

(a) No party could obtain more than 15 MHz of paired spectrum in capital cities; and no more than 10 MHz of paired spectrum in regional areas.

(b) No bidder could obtain more than 5 MHz of the 20 MHz unpaired spectrum.[15]

5.12 Optus observes that the competition limits represent one quarter of the relevant spectrum in metro areas, where there were four MNOs bidding. As acknowledged by the ACMA:

> *Competition limits set for the auction meant that no bidder could acquire more than 25 per cent of the available spectrum in metropolitan areas except Canberra, where 33% was permitted; and no more than 50 per cent in regional Australia.*[16]

Digital dividend auction

5.13 The recent digital dividend auctioned 45 MHz of paired spectrum in the 700 MHz band and 70 MHz of paired spectrum in 2600 MHz band. The auction imposed the following competition limits:

(a) For 700 MHz, the competition limit was initially set at 20 MHz of paired spectrum with three expected bidders, which was subsequently increased to 25 MHz when expectations changed to there being only two bidders; and

[13] http://acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Spectrum-licences/auction-summary-800-and-1800-mhz-pcs-allocation-1-1998
[14] http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Spectrum-licences/auction-summary-1point8-ghz-pcs-2000
[15] http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Spectrum-licences/auction-summary-2300-mhz-multipoint-distribution-station-1994-1
[16] http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Spectrum-licences/auction-summary-2300-mhz-multipoint-distribution-station-1994-1

(b) For 2600 MHz, the competition limit was set at 40 MHz of paired spectrum.

5.14 The explanatory statements to the instruments noted that limits were imposed in order to:

(a) Prevent spectrum band being monopolised with consequent negative impact on consumers in terms of service availability, quality and pricing;

(b) Provide a level playing field for the three bidders most likely to participate in the auction, while not precluding a new entrant; and

(c) Bear in mind the characteristics of the technology most likely to be deployed (LTE), particularly the optimal spectrum block size of 20 MHz.[17]

5.15 The Regulatory Impact Statement (RIS) provides further insight into the reasons for the limits imposed, including:

(a) Absent limits, there is a strong incentive to purchase more spectrum than required in order to gain a competitive advantage.

(b) The relative financial strengths of the potential bidders present a risk of monopolisation.

(c) Spectrum blocks of 20 MHz are also optimal for technical efficiency. Larger blocks of spectrum provide operators with the ability to organise networks for greater efficiency enabling greater peak data rates and data traffic-carrying capacity. A four-fold increase in capacity may be possible when utilising a 20 MHz block compared to a 15 MHz block.[18]

(d) A competition limit set 25 MHz was still within the range of recommended limits, but is less desirable from a technical perspective. The utility of a 25 MHz allocation depends on the ability to aggregate the extra 5 MHz with the 20 MHz block. There is a risk that a 25 MHz competition limit would lead to 20 MHz being used and 5 MHz lying dormant.[19] Optus notes that even though a 25 MHz was finally adopted for the auction, no operator bided for spectrum above 20 MHz, supporting the initial view that 20 MHz was the technically optimal amount.

Setting limits for the 1800 MHz auction

5.16 Optus believes that the reasoning put forward to support competition caps for the digital dividend auction by the ACCC and the Department of Communications, is relevant to the upcoming 1800 MHz auction. This is especially so given that LTE is the technology to be deployed over 1800 MHz in regional areas.

Inclusion of existing 1800 MHz regional holdings

5.17 There is currently a significant inequality of 1800 MHz holdings in regional areas. Telstra as the incumbent beneficiary of this (owning 100% of the existing 1800 MHz spectrum licences in regional areas) also has had a significant first-mover advantage in the deployment and utilisation of this spectrum band. This means that it is important that any existing regional 1800 MHz holdings need to also be taken into account.

[17] See, for example, EXPLANATORY STATEMENT, Radiocommunications (Spectrum Licence Limits) Direction No. 2 of 2012; and EXPLANATORY STATEMENT, Radiocommunications (Spectrum Licence Limits) Direction No. 1 of 2012.
[18] DBCDE, Competition limits on the sale of digital dividend (700 megahertz) and 2.5 gigahertz spectrum, Regulation Impact Statement, p.7
[19] DBCDE, Competition limits on the sale of digital dividend (700 megahertz) and 2.5 gigahertz spectrum, RIS, p.10

5.18 Including incumbent holdings in this auction is consistent with the approach taken in the 2000 PCS auction, where existing holdings in the same band were included in the competition cap of 20 MHz. MNOs will be able to combine holding acquired in the upcoming auction with existing 1800 MHz regional holdings to deliver services in regional areas. Because of this, one cannot assess the competition impacts of upcoming auctions results without having due regard to the non-auction holdings.

5.19 The 2000 PCS auction failed to include competition caps for 1800 MHz spectrum acquisition in regional areas. While it was not foreseeable at the time that 1800 MHz would be used for LTE services, the ACCC has an opportunity to correct that historical error by imposing competition caps in this auction which include incumbent holdings.

Level playing field

5.20 A key objective of competition caps is to ensure a level playing field. Imposing a spectrum cap that takes into account current holdings of 1800 MHz would ensure that MNOs are granted an equal opportunity to acquire the spectrum needed to provide effective competition in regional areas. Failure to do so will provide Telstra with the opportunity to acquire more spectrum than it requires to provide efficient network capacity. It is possible that Telstra may acquire excess 1800 MHZ spectrum for the purpose of preventing the other MNOs from offering competitive network services in the auction areas.

5.21 Optus notes that the same reasoning put forward in the RIS for the digital dividend auction applies to the upcoming 1800 MHz auction.

Optimal channel size for LTE

5.22 A factor which was not relevant for the previous PCS auctions is the need to ensure an opportunity for MNOs to acquire sufficient spectrum to achieve the optimal channel size for LTE services. The digital dividend RIS analysis stated a four-fold increase in capacity may be possible when utilising a 20 MHz block compared to a 15 MHz block.[20] While there are many factor influencing capacity, Optus agrees that a 20 MHz block is more efficient for LTE and provides more capacity and higher end-use peak speed potential compared to a 15 MHz block.

5.23 Optus submits one of the key factors when deciding on the competition cap is whether all three MNOs have an ability to acquire a 20 MHz channel across all regional 1800 MHz spectrum. Failure to do so will result in network inefficiencies to the detriment of end-users.

Maintaining potential for new entrant

5.24 A final factor which also must be considered is designing competition caps to maintain potential for new entrant. Typically, this has assumed to be a new MNO. But in the context of regional 1800 MHz spectrum, the new entrant is likely to be rail or infrastructure providers. These potential users have publicly indicated their interest in regional 1800 MHz spectrum throughout the various ACMA public consultations.

5.25 Optus sees public benefits in the acquisition of some regional 1800 MHz for rail or infrastructure providers. Given the disparate financial strengths of MNOs and rail/infrastructure providers, and the commercial value of mobile use, absent competition limits it would not be expected that rail/infrastructure provided would outbid MNOs. The ACCC should take the ability of rail/infrastructure providers to acquire regional 1800 MHz spectrum into account when deciding how to set competition limits.

[20] DBCDE, Competition limits on the sale of digital dividend (700 megahertz) and 2.5 gigahertz spectrum, Regulation Impact Statement, p.7

Proposed Competition limit

5.26 The proposed competition cap should be principles based and designed to achieve the following three factors:

(a) Provide opportunity for level playing field between MNOs;

(b) Provide opportunity for MNOs to acquire the optimal LTE channel size of 20 MHz; and

(c) Enable key non-MNO users an opportunity to acquire necessary 1800 MHz spectrum.

5.27 Optus proposes that the competition limit should be 20 MHz (paired) and include any incumbent 1800 MHz spectrum holdings on the basis that:

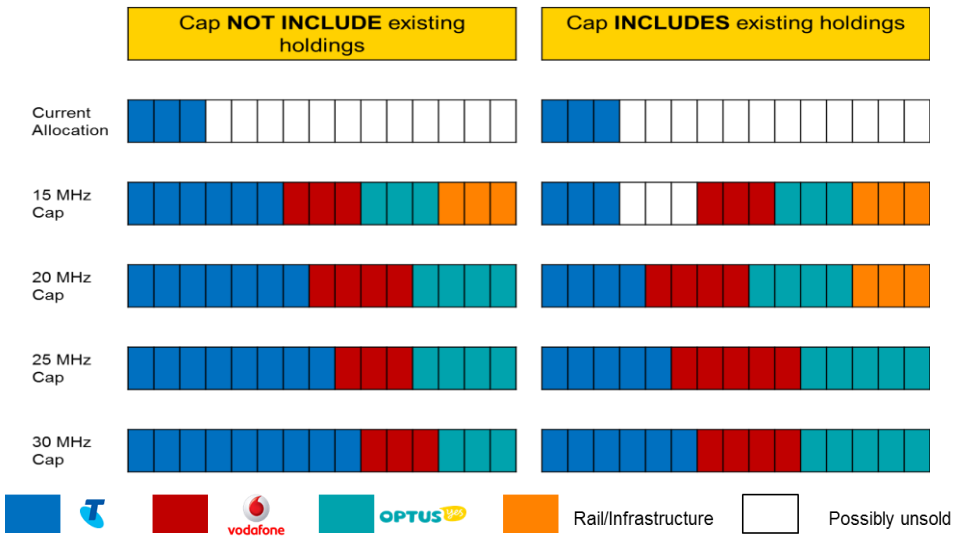
(a) A competition cap of 20 MHz including incumbent 1800 MHz spectrum holdings is consistent with the cap imposed in metropolitan areas in the 2000 PCS auction;

(b) Applying a competition cap in regional areas for 1800 MHz would provide a level playing field across MNOs, and would enable each MNO to acquire the optimal channel size for LTE; and

(c) It would enable other non-MNO interested users (such as the state rail organisations and infrastructure users such as large mining companies) a realistic opportunity to acquire spectrum, which has significant public benefits, without the risk that non-MNO users would be unable to acquire spectrum in competition with MNOs.

5.28 It is instructive to consider the range of possible outcomes from the auction should various competition caps be imposed, with or without the inclusion of incumbent holdings. Figure 11 below illustrates some possible outcomes, assuming that the three MNOs (Telstra, Optus and Vodafone) will bid to acquire the maximum amount of spectrum permitted under the cap. These diagrams are for illustrative purposes only, and no inference should be taken from them as to Optus' bidding intent.

Figure 11 Possible auction outcomes for various competition caps



Note: Each square represents 2x5 MHz

5.29 First, it can be seen that there are only three scenarios where it will be likely that non-MNO parties would be in a position to acquire 1800 MHz spectrum – 15 MHz cap with and without existing holdings and a 2x20 MHz cap including existing holding.

5.30 An assessment of the two possible 15 MHz caps shows:

(a) In the scenario where existing holdings are not taken into account, only Telstra will be able to acquire sufficient spectrum to ensure optimal channel size for LTE. In fact, Telstra will be able to acquire 30 MHz – arguably 10 MHz more than it optimal requires. Given its market incentive to do so, combined with its financial position this outcome is most likely. As a result, both VHA and Optus will not be able to provide LTE services on a level playing field to Telstra.

(b) In the scenario where included existing holdings are taken into account, no MNO will be able to acquire the optimal channel size for LTE. Rail/infrastructure provider would also be able to acquire 15 MHz. However, 15 MHz would remain unsold unless another bidder takes part.

5.31 The other scenario that enables non-MNO participation is the 20 MHz cap including existing holdings. First, Optus notes this is consistent with the competition caps that applied for the 2000 PCS auction. Second, it would provide an opportunity for all three MNOs to acquire the optimal channel size for LTE, thereby maximising end-user benefits from MNO use of the spectrum. Third, it provides non-MNOs an opportunity to acquire up to 15 MHz of spectrum (assuming the three MNOs bid to their limit), thereby enabling significant public benefits as a result of rail or infrastructure use.

5.32 Finally, Optus notes that larger competition caps will potentially increase auction tension at the expense of excluding rail and infrastructure bidders from acquiring spectrum. For example, a 25 MHz cap including existing holdings, or a 20 MHz cap excluding existing holdings, will enable all MNOs to acquire optimal channel size for LTE but also enable exclusion of non-MNO bidders. This may ultimately increase revenue from the auction but it is likely to result in fewer public benefits due to rail and infrastructure companies not being able to utilise spectrum.

5.33 For these reasons, Optus proposes that the competition limit should be 2x20 MHz and include any incumbent 1800 MHz spectrum holdings.