



Australian  
Competition &  
Consumer  
Commission

# Competition in evolving communications markets

## Issues Paper

September 2016



Australian Competition and Consumer Commission

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# 1. Executive summary

- 1.1. The Australian Competition and Consumer Commission (ACCC) has commenced a market study to examine a range of interrelated matters that have been raised by the industry that may affect the development of competition and efficiency in communications markets over the next five years or thereabouts.
- 1.2. Rapidly evolving technological developments, structural change within the sector, product innovation and changing consumer preferences are all contributing to a changing communications environment. The purpose of the study is to inform ourselves and others about how these changes are affecting competition in communications markets and whether this has implications for the way or extent to which we regulate.
- 1.3. The study will examine the changing communications landscape to test whether evolving markets are structured so that there can be confidence they will operate efficiently. The study will identify any potential issues that may prevent markets working effectively for consumers and where developments are leading to greater competition in a traditionally monopolistic sector. The study will include recommendations as to the appropriate regulatory responses to these findings.
- 1.4. The purpose of this issues paper is to outline our proposed areas of inquiry and invite submissions from interested parties on the evolving communications sector, including the following aspects:
- 1.5. **Consumer trends and issues:** Consumer preferences for communications and content services are changing as technological developments and product innovation provide new services and increased choice. We will look at how consumers are affected by these developments, including the greater use of bundling by service providers and the availability of information necessary to make informed choices. Consumer trends and issues are considered in section 4.
- 1.6. **Fixed-line voice and broadband services:** Market consolidation and the changing market structure as the communications sector transitions to the National Broadband Network (NBN) is significantly changing the dynamics of competition for fixed-line services. We will look at how retail competition on the NBN is developing, the effect of economies of scale and other potential barriers to entry for smaller players.
- 1.7. We will also consider how NBN wholesale products and pricing affect competition and innovation. Retail service providers (RSPs) have raised NBN Co's wholesale pricing model as an impediment to achieving the demand and data rate growth that the NBN was intended to achieve at a price that is attractive to consumers. While recognising the constraints of the NBN policy and regulatory framework, and the bounds of NBN Co's special access undertaking (SAU), we will look at the incentives for efficient investment to meet forecast demand for data rates and growth in traffic. Fixed-line voice and broadband services are considered in section 6.
- 1.8. **Mobile voice and broadband services:** Mobile services are continuing to increase in importance for Australian consumers. We will look at investment and coverage of mobile networks and the changing consumer preference for mobile over fixed-line services. We will separately seek stakeholder views and evidence around competition and incentives to invest in regional areas as part of our inquiry into whether to declare a domestic mobile roaming service. Mobile voice and broadband services are considered in section 7, and the interaction between fixed-line and mobile services is considered in section 8.

- 1.9. **Core and transmission networks and services:** We will look at the markets for intermediate inputs in the communications sector including internet interconnection, access to dark fibre and domestic and international transmission. This will include consideration of whether access to these inputs by new entrants and smaller service providers is available on competitive terms, to support effective competition in the supply of downstream communications services. Core and transmission networks and services are considered in section 9.
- 1.10. **Over the top services (OTT):** Using the internet as a delivery platform is now a common way for consumers to access communications services and content. This has consequences for internet service providers (ISPs) and the network arrangements they have. We will consider these developments, including ISP responses to them, and whether there are consequential competition or efficiency implications for communications markets. An example is the popularity of OTT video on demand services which is driving substantial growth in demand for data. We will consider the need and incentive for investment to provide for this data growth and what this means for network operators and RSPs. Emerging services, including OTT and content delivery are discussed in section 4. Sections 5 and 8 consider the implications of these developments for network operators and service providers.
- 1.11. We are commencing the study by seeking stakeholder views through this issues paper on what are the most significant developments that we should examine and encourage stakeholders provide their views. This will assist us to reach robust conclusions, based on a full understanding of the sector. We will then focus the study on a narrower set of key issues which will be the subject of further consultation. We propose to release our draft report for comment prior to completing the market study in late 2017.
- 1.12. The study will not consider matters that are the subject of other inquiries, either internal or external, such as the inquiry by the Productivity Commission into the Universal Service Obligation (USO). It will also not consider spectrum allocation or management as these issues are currently being examined as part of the Government's response to the Spectrum Review.
- 1.13. We have been increasingly using market studies as a tool to improve our understanding of specific sectors and to complement the work we do to promote competition and efficiency in the interests of consumers. This market study will enable us to ensure that our regulatory focus is responsive to changing market circumstances in the communications sector. Further detail on the study scope, context and approach is provided in sections 2 and 3.

## 2. Context for the study

- 2.1. We are undertaking a market study of the communications sector in light of the changing communications landscape.
- 2.2. The study will allow us to consider a wide range of interrelated developments that have been raised by the industry and go to the effective functioning of the market. This will inform how we undertake our role under Part XIB and XIC of the *Competition and Consumer Act 2010* (CCA) to facilitate markets that provide consumers with a choice of products at a price and quality that meet their needs and circumstances.

### Changing landscape and emerging issues

- 2.3. The Australian communications sector is going through a period of significant change. In addition to rapidly evolving developments in technology and product innovation, consumer preferences are changing and the Australian industry is experiencing major structural change.
- 2.4. Industry participants have raised a number of issues with us, indicating they require investigation, both specifically and more broadly within the context of these changes in the communications sector.
- 2.5. The market study is an opportunity for us to understand the developments and emerging trends occurring in a sector that is of interest to all Australians given its importance in the underpinning the digital economy and its contribution to economic growth.
- 2.6. The study will also enable us to identify how these changes are affecting competition in markets for communications services and to ensure that economic regulation is responsive to changing market circumstances. This includes ensuring that over the longer term innovation and investment are not stifled, competition is encouraged and the interests of consumers are well served.
- 2.7. Some of the changes we are observing that suggest it is timely to undertake this market study include:
  - The changing structure of communications markets, particularly as we transition to a fixed-line market in which NBN Co will be the primary wholesale provider of services to RSPs and there is consolidation and market concentration within the retail sector.<sup>1</sup>
  - The growth and availability of services provided 'over the top' (OTT) using the internet as a delivery platform. These services include social network platforms, communications and market place apps, and music and video content streaming services and the exponential growth in the demand for bandwidth that has resulted.
  - The increased use of mobile data by consumers and the increasing preference for mobile devices as a way to access the internet. The availability of Wi-Fi services is also facilitating the use of mobile services and further improvements are anticipated with the deployment 5G.
- 2.8. Our most recent report to the Minister for Communications providing an overview of competition in the telecommunications sector in 2014-15 identified a number of these developments and emerging trends.<sup>2</sup> It also noted that consumer protection remained

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<sup>1</sup> Noting that there are other fixed-line networks which will supply NBN like fixed-line voice and broadband services, but on a more geographically limited basis.

a priority given the complexity of communications services and the broad range of products available in the market.

- 2.9. While many of these developments reflect changing preferences and the use of communication services by residential consumers, we also note the importance of these services for business consumers, particularly as they may contribute to economic growth. The market study will examine issues in relation to competition and efficient investment in the supply of services to both residential and business consumers.
- 2.10. The market study will focus on the Australian experience but will also be informed by trends and emerging issues internationally.
- 2.11. While undertaking the market study, we will also continue to progress business as usual matters. During the course of the market study there may be some interaction between those issues raised in this context and those being considered through business as usual processes under Parts XIB and XIC of the CCA. We will seek to clarify any overlap and how matters will be progressed.

## Industry background

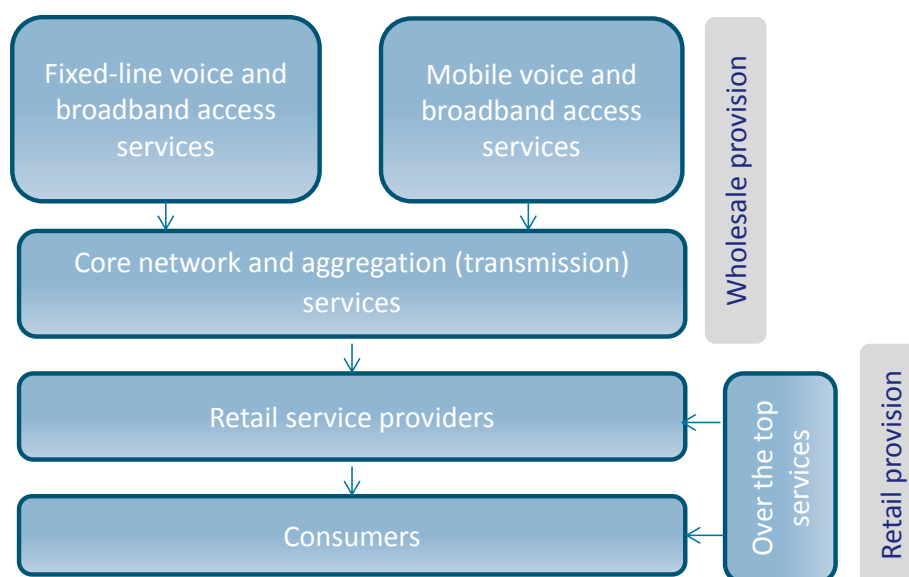
- 2.12. Since the 1990s the communications sector has evolved from a monopoly fixed-line voice service provider to now comprise a variety of service providers offering fixed-line and mobile voice and broadband services, operating at the wholesale and retail level, to meet the demands of residential and business consumers.
- 2.13. Critical to providing services utilising the fixed-line and mobile access networks, are the core and aggregation networks which enable routing and interconnection between networks and therefore consumers.
- 2.14. There has been an increase in the number of OTT services, and their data intensity, utilising the access, core and aggregation networks to provide application and content services.
- 2.15. The supply chain for the sector and the possible interactions are illustrated at a high-level in Figure 1.

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<sup>2</sup> Australian Competition and Consumer Commission, *ACCC telecommunications reports 2014-15*, ACCC, Canberra, February 2016. Accessible [here](#).



**Figure 1 – High-level communications sector supply chain**



- 2.16. In the sector, some RSPs are currently vertically integrated and have their own infrastructure, while others operate at the retail level, purchasing wholesale inputs from infrastructure owners.
- 2.17. For example, many RSPs providing fixed-line services purchase the relevant wholesale access inputs from either Telstra or next generation fixed-line access network operators.<sup>3</sup> As the NBN rollout is completed (currently forecast to be in 2020), Telstra’s fixed-line access services will be phased out and NBN Co will become the predominant provider of wholesale fixed-line access services.
- 2.18. In relation to mobile services, there are currently three infrastructure owners (Telstra, Optus and Vodafone Hutchinson Australia (VHA)) and a number of mobile virtual network operators (MVNOs) who purchase wholesale end-to-end mobile services (including transmission) from the infrastructure owners to provide retail services.
- 2.19. In some cases, RSPs may have their own transmission networks, and in other cases they will seek wholesale supply. Most RSPs will have their own core network.
- 2.20. OTT services such as communication apps and social media platforms utilise these networks, with OTT service providers interacting directly with residential and business consumers and in some circumstances forming relationships with RSPs. While consumers will generally form a relationship with one RSP (or possibly one RSP for a fixed-line service and another for a mobile service) they will often use multiple OTT service providers.
- 2.21. Beyond the above supply chain, it is also useful to think of the sector as having a ‘stack’ of services with each layer depending on the others. These can be characterised as:
- The infrastructure layer comprising the wires, optical fibre, spectrum, etc.

<sup>3</sup> Next generation networks enable communication downloads at speeds greater than 25 megabits per second, and include the NBN and other next generation fixed-line access networks. They provided the declared Local Bitstream Access Service or Superfast Broadband Access Service. For example, the fibre to the basement networks and hybrid coaxial cable networks operated by TPG and the fibre to the premise networks operated by OPENetworks and Opticomm in new developments.

- The communication network electronics layer comprising the electronics, switches, routers, etc. that provide the 'smarts' to enable transmission of communication.
  - The application layer which supports the provision of voice, e-mail, web browsing, and video streaming services as well as those provided over other applications. In some cases these applications will support access to content.
- 2.22. Devices such as fixed-line and mobile phones and tablets operate across these layers and enable end-to-end communication.

## **ACCC use of market studies**

- 2.23. We use market studies for a variety of reasons, including to improve our understanding of a specific sector where a market is rapidly changing and when evolving industry structures, practices and competitive market dynamics may raise issues across our functions. These studies enable the identification of competition issues, market problems and possible solutions. Alternatively, a market study may confirm that competition in the relevant markets is functioning effectively and that no action is needed, or that current regulation may not serve the vital function in supporting regulation that it once did.
- 2.24. We have been increasingly using market studies as a tool for this purpose. We recently completed the East Coast Gas Inquiry and are currently undertaking market studies in relation to cattle and beef markets and the new car retailing industry in Australia.
- 2.25. We may also use market studies as a tool when anti-competitive behaviour is suspected, but the exact nature and extent of the problem is unknown, or to address concerns raised about markets not functioning in a competitive way.
- 2.26. We previously reviewed the communications sector in 2003, but focused largely on competition in the market for pay TV services.<sup>4</sup>
- 2.27. We note that we do not need a formal referral power to conduct a market study.

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<sup>4</sup> Australian Competition and Consumer Commission, *Emerging market structures in the communications sector*, ACCC, June 2003. Accessible [here](#).

## 3. Study approach

3.1. This section outlines the scope of the communications sector market study, including the purpose, objectives and potential outcomes. It also sets out the high level process, indicative timelines and details of our approach to consultation.

### Scope

3.2. As noted, the Australian communications sector is going through a period of significant change. The purpose of the market study is to ensure the implications of these developments are well understood. We will identify any significant risks to markets delivering economically efficient and competitive outcomes in the long term interests of consumers stemming from these developments, and identify potential options, if required, to address these issues.

3.3. The objectives of the study are to:

- Identify current and emerging trends and issues that are likely to significantly affect the efficiency and level of competition in relevant communication markets over the next five years, including issues associated with market power and the consequences of it being exercised.
- Consider these trends and issues for relevant markets, which will include, but not be limited to, those for the supply of:
  - fixed-line and mobile network services
  - core and aggregation network services such as internet protocol (IP) switching and, domestic and international transmission
  - services using OTT platforms and content delivery mechanisms.
- Consider the effect of consolidation, structural change and emerging business models in the Australian communications sector on efficiency and competition.
- Consider whether the transparency and comparability of consumer product information and costs of switching service providers impede competitive outcomes.
- Make findings and identify options that would better place us to address material issues, including in identifying any areas that will more likely require more or less focus over the next five years to ensure regulation is responsive to the requirements of the changing communications landscape.

3.4. The market study will take into account but not specifically examine issues that are the subject of other concurrent inquiries in relation to specific communications issues, including the Productivity Commission inquiry into the future direction of the Universal Service Obligation and the Government's consideration of the Spectrum Review Report.<sup>5</sup>

3.5. Following initial research and preliminary discussions with industry, we have identified possible key issues in each of the broadly defined segments within the supply chain. These are illustrated in Figure 2. This includes the potential interaction between fixed-line and mobile services and the extent to which these services are substitutes, which might dampen competition concerns. The possible further integration (vertical and horizontal) which may occur between networks and services is also of interest and

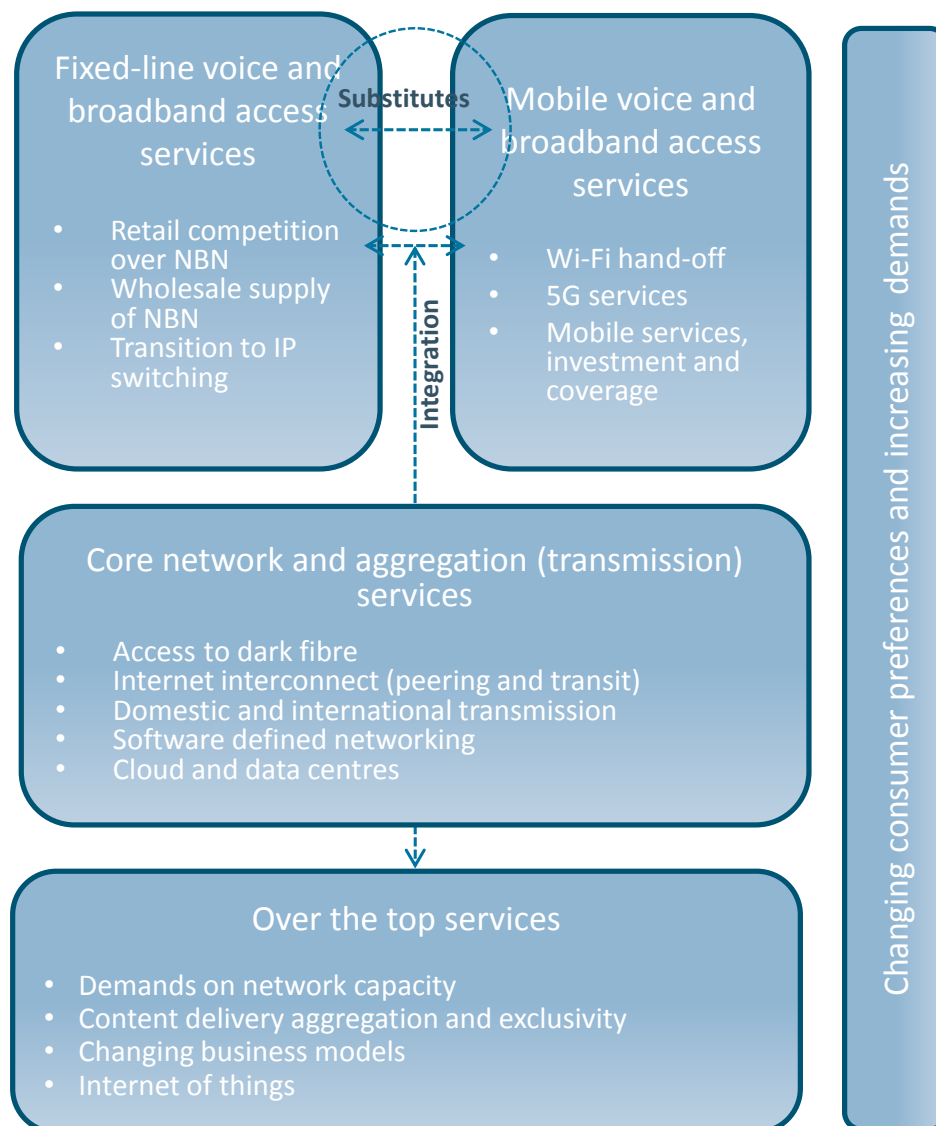
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<sup>5</sup> Productivity Commission, Telecommunications Universal Service Obligation Public inquiry. Accessible [here](#). Department of Communications and the Arts, Spectrum Review. Accessible [here](#).

the implications of this for competition, economically efficient investment and use of telecommunications infrastructure and ultimately the interests of consumers.

- 3.6. The market study will primarily focus on competition in the supply of services to residential and small and medium enterprise (SME) customers who take 'off-the-shelf' communications services. This includes availability and competition in the supply of the intermediate inputs necessary to service these customers. However, we are also interested to understand whether there are any competition issues associated with the supply of communications services to large business and government customers.
- 3.7. The issues paper is structured to discuss each of the key segments of the supply chain and related issues. Structuring the paper this way enables the issues to be examined separately, however, we note that there is a significant degree of interaction and interdependency between the segments of the supply chain and the various issues. Where this is the case those issues will be explored.

**Figure 2 – Key segments of the supply chain and issues for the communications sector**



## Study process and timelines

- 3.8. We invite submissions to this issues paper from interested parties and will release our draft findings for comment prior to completing the market study in late 2017. The dates provided below are indicative and as the market study progresses, we will publish further information with confirmed dates on the [Communications sector market study website](#).

**Table 1 – Indicative timeline for the communications sector market study**

Activity	Date
Issues paper released	5 September 2016
Issues paper submissions due	14 October 2016
Issue identification, refinement and information/evidence gathering	October 2016 – March 2017
Further consultation as required, including potential public forums / roundtables	January 2017 – March 2017
Draft report released	July/August 2017
Consultation on draft report findings as required	August – September 2017
Final report released	November 2017

## Issues Paper

- 3.9. This paper outlines the issues we propose to explore as part of the market study. This reflects our observations of key changes in the sector and our initial research and preliminary discussions with a variety of interested parties. The issues discussed in this paper are a guide to assist interested parties in making submissions and are not intended to be exhaustive. We encourage interested parties to raise other relevant issues in submissions.
- 3.10. Following consideration of submissions made to the issues paper and targeted information gathering and assessment, we intend to narrow the focus of the market study to the key areas that we consider most warrant attention. This will enable us to concentrate on those areas that we consider of most significance for the development of competition and economically efficient outcomes in the communications sector over the next five years.

## Submissions

- 3.11. We encourage submissions to this issues paper from all interested parties. Submissions may address some or all of the issues raised, noting as above that the list of issues included in this paper is not exhaustive and the submissions on any other issues which impact on competition in the communications sector are encouraged.
- 3.12. Stakeholders are asked to support submissions made on particular issues with relevant data and information.
- 3.13. Submissions are due by **5.00pm, Friday 14 October 2016**.

- 3.14. Submissions can be made to [commsmarketstudy@acc.gov.au](mailto:commsmarketstudy@acc.gov.au) with the title: **Submission re: communications market sector study**. Alternatively, you can contact the following people directly:

Ed Seymour  
[ed.seymour@acc.gov.au](mailto:ed.seymour@acc.gov.au)  
(03) 9290 1886

Claire Preston  
[claire.preston@acc.gov.au](mailto:claire.preston@acc.gov.au)  
(03) 9290 1995

## Confidentiality of submissions

### *Treatment of submissions generally*

- 3.15. To facilitate an informed and open consultation, we will treat all submissions as public and publish them on the ACCC website unless a confidentiality claim is made over all or part/s of the submission and we accept the confidentiality claim.

### *Confidentiality claims*

- 3.16. We are mindful that commercial sensitivities may be present in this sector and recognise that some interested parties may wish to make a confidentiality claim over certain information provided in their submission. Confidential information might include the source of the information (e.g. your identity or the identity of a third party) or the content provided.
- 3.17. If you have concerns about the disclosure of certain information in your submission, you may make a confidentiality claim over all or part/s of your submission. Any information which you consider confidential should be provided in a separate document to your main submission and should be clearly marked as “confidential” on each page.
- 3.18. The fewer the number of confidentiality claims that are made over submissions to the market study, the more easily we can test information provided and reach accurate conclusions about the markets. The information you claim confidentiality over must be genuinely of a confidential nature and not otherwise publicly available. Reasons must be provided in support of your claim, to assist us to better understand your claim and assess the information you provide.
- 3.19. If we consider that the confidentiality claim cannot be upheld, we will provide you with an opportunity to withdraw the submission (or part of the submission) containing the information. If the submission (or part of the submission) is withdrawn then we will not take it into account. If you elect not to withdraw the submission (or part of the submission) then we may disclose the information publicly.
- 3.20. We are committed to treating confidential information responsibly and in accordance with the law. Where we accept a confidentiality claim, we will handle the confidential information in accordance with the following terms:
- There is no restriction on the internal use, including future use, we may make of the information consistent with our statutory obligations.
  - Confidential information may be disclosed to our external advisors and consultants on condition that each such advisor or consultant will be informed of the obligation to treat the information as confidential.
  - We may disclose the confidential information to third parties (in addition to our external advisors or consultants) if compelled by law or in accordance with section 155AAA of the CCA.
  - We may include the confidential information in any public report published by us in the course of this inquiry, or any inquiry under the *Telecommunications Act 1997* (Telco Act), where we consider that disclosure of the information in the report is necessary in the public interest.
- 3.21. Where we are proposing to disclose confidential information publicly or to third parties (other than our external lawyers or consultants, or the Australian Energy Regulator (AER) or AER staff), we will notify and consult with you further before doing so.

- 3.22. We invite interested parties, where appropriate, to discuss confidentiality issues further with us in advance of making a written submission to the market study.
- 3.23. For further information on our treatment of confidential information, please refer to the ACCC/AER Information Policy available on [our website](#).

## Consultation

- 3.24. We recognise that communications industry participants have a depth of knowledge and level of understanding of key issues affecting their sector. We intend to avail ourselves of this knowledge in order to ensure the greatest benefit is derived from the market study. We will do this by engaging with interested parties in a variety of ways, including seeking written submissions, meetings and at potential public forums/roundtables. We will determine the need for, and benefit of, holding public forums/roundtables, and their specific nature, following initial submissions and the further identification and refinement of issues. We will advise interested parties of details once they are established.
- 3.25. We will also directly engage with some industry participants to request specific information.
- 3.26. Information collected from interested parties will be analysed and we will use this to prepare a draft report in July/August 2017, prior to finalising our report in November 2017. We will make both the draft report and the final report publicly available.

## Information gathering

- 3.27. We encourage the provision of supporting information and evidence by interested parties to assist with this market study. It is our preference to obtain information on a voluntary basis as a part of the market study process, including through responses to issues papers and specific requests for information. This will enable the process to be faster, more flexible and less intrusive.
- 3.28. We have power to obtain material on a compulsory basis under section 155 of the CCA where that material is relevant to the ACCC's telecommunications functions and powers (including under the Telco Act or Parts XIB or XIC of the CCA), or is relevant to a contravention or possible contravention of the CCA.. This includes circumstances where interested parties would otherwise be restricted from providing relevant information due to confidentiality obligations owed to other parties. We invite interested parties, where appropriate, to discuss this issue further with us in advance of making a written submission to the study.



## 4. Consumer trends and issues

- 4.1. Australian consumers increasingly want and expect affordable, ubiquitous and seamless connectivity to meet their evolving communication needs.
- 4.2. Technological innovation and improved network infrastructure and capability have fuelled a proliferation of choice and convenience for consumers who are using more communications services across more devices and platforms than ever before.
- 4.3. We are interested to understand whether there are any impediments to competition in communications markets delivering benefits to consumers, in terms of quality, availability, affordability and choice of competitive product offerings. We are also interested to understand how consumer preferences for communications products/services are changing and whether this has any implications for communications markets.
- 4.4. Business communication needs and preferences are also evolving. The expansion of the digital economy and a focus on flexibility, mobility and productivity is seeing the virtualisation of work places, increasing use of cloud services and storage, video conferencing and telepresence, and demand for high symmetrical data speeds and capacity. Businesses generally have more specialised needs than consumers, and place higher value on security, and are often prepared to pay more for reliability and quality of network performance.
- 4.5. Businesses are also taking advantage of technological developments to improve productivity, reduce costs and respond to changing consumer preferences by offering more online services and products. The growth of e-commerce has seen many businesses offering features to improve consumer experience such as customisable offerings, 24-7 online customer service (e.g. chat with sales representatives), mobile payment methods (e.g. paypass, tap and pay, BPAY), mobile tickets/coupons, mobile purchasing and ordering, and other application offerings.
- 4.6. Education providers are utilising platforms to offer services to a wider audience, and supplement traditional classes with interactive video lectures and podcasts. The 2016 NBN Co *Digital Parenting Report* found that 75 per cent of school students engage in online learning at home and 80 per cent of parents believe high-speed internet is important in allowing children to keep up with the demands of school work.<sup>6</sup> As education resources increasingly move online, access to reliable and fast internet becomes essential to the learning needs of Australians, particularly those in rural and remote areas. Broadband networks must be able to support and promote e-learning with fast, reliable and affordable services.
- 4.7. Health providers are now working with broadband service providers to take advantage of improved video technology and network infrastructure to offer more innovative services to consumers including telemedicine services, which offer 24-7 GP consultation service and specialist appointments via video conferencing for regional and rural patients.

### Current and emerging consumer preferences

- 4.8. Consumers are showing an increasing preference for wireless devices (smartphones, tablets, laptops) with mobile phones becoming the preferred communication device with 94 per cent of Australians using a mobile phone to make calls or send texts.<sup>7</sup>

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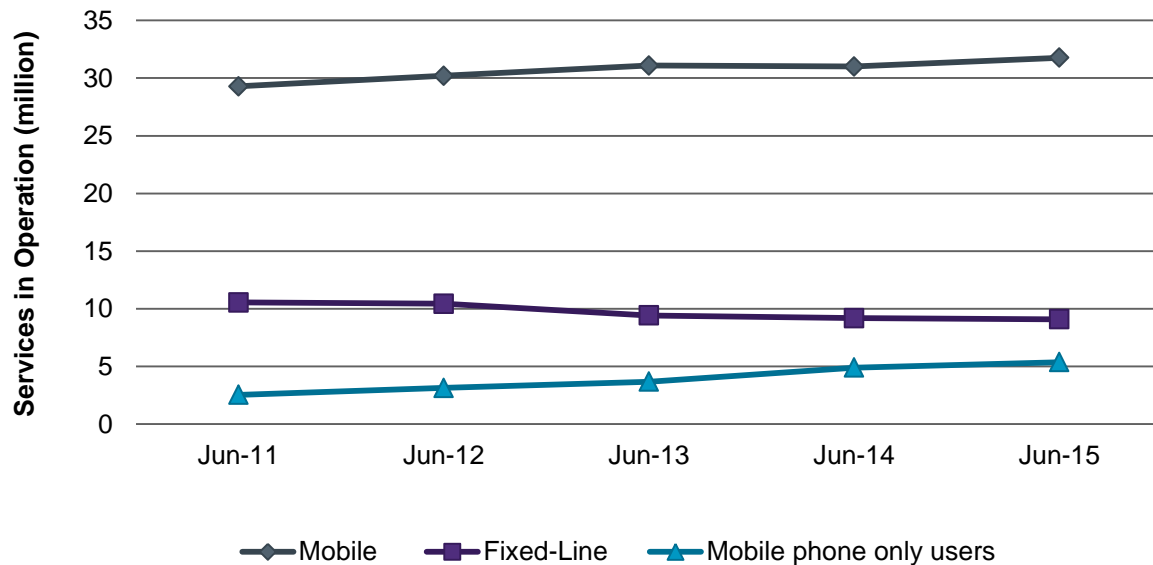
<sup>6</sup> NBN Co, *Digital Parenting Report*, NBN Co, 2016, p. 5 and p. 7. Accessible [here](#).

<sup>7</sup> Australian Communications and Media Authority, *Communications report 2014-15*, ACMA, November 2015, p. 48. Accessible [here](#).

Consumers in regional Australia have a higher dependency on mobiles than their urban counterparts, with the number of exclusively mobile users being 50 per cent higher than in capital cities.<sup>8</sup>

- 4.9. Many Australian consumers are moving away from fixed-line telephony, with the number of operating fixed-lines expected to continue to decline over the next five years.<sup>9</sup> The shift in consumer preferences from fixed-line to mobile services, particularly for voice services, reflects the pace of change in the communications sector as technological improvements drive the rapid convergence of previously discrete markets.

**Figure 3 – Mobile and fixed-line services in operation and mobile phone only users**



Source: ACMA Communications Report 2014-15.

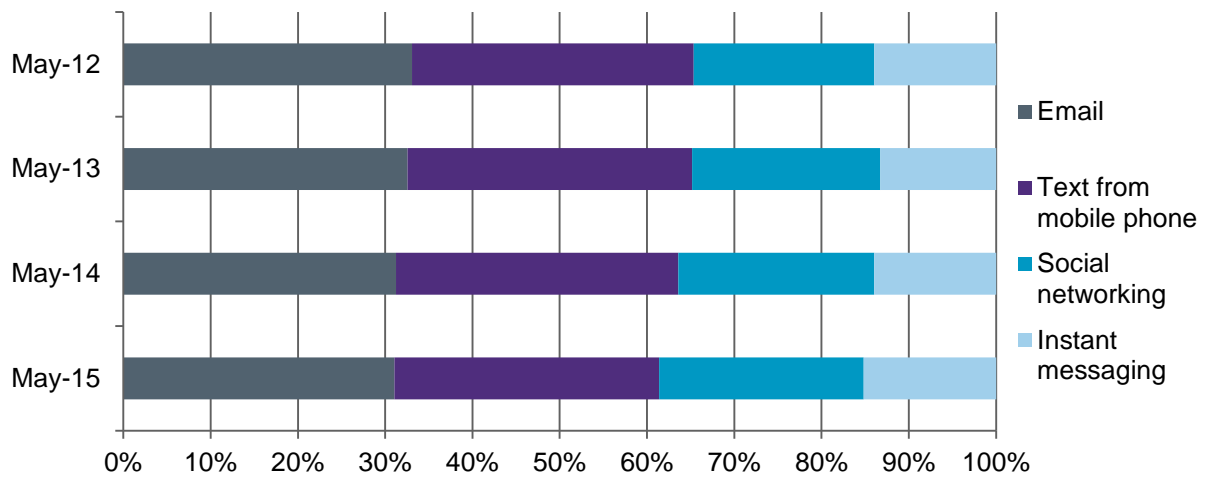
- 4.10. The growth of in the provision of OTT services is also changing communications markets by increasing consumer choice and offering new services and products that are convenient, low-cost and customisable. The variety of services available and minimal switching costs has seen consumers adopt different applications for different communication activities.<sup>10</sup> In particular for non-voice communications, as shown in Figure 4.
- 4.11. OTT communications services, such as Facebook Messenger, Skype, Apple iMessage, Facetime, Viber, WhatsApp and Snapchat, are increasingly displacing traditional voice and text services with free messaging applications using existing network/internet services. Many consumers are benefiting as RSPs seek to compete by offering plans with unlimited call minutes and text messages.

<sup>8</sup> Shiff, Deena, McCluskey, Su, Somerset, Georgie and Eckermann, Robin, *Regional Telecommunications Review 2015*, Canberra, 2015, p. 13. Accessible [here](#).

<sup>9</sup> Whytcross, David, *IBISWorld Industry Report J5800 Telecommunications Services in Australia*, 2015, p. 8.

<sup>10</sup> ACMA, *Communications report 2014-15*, p. 55.

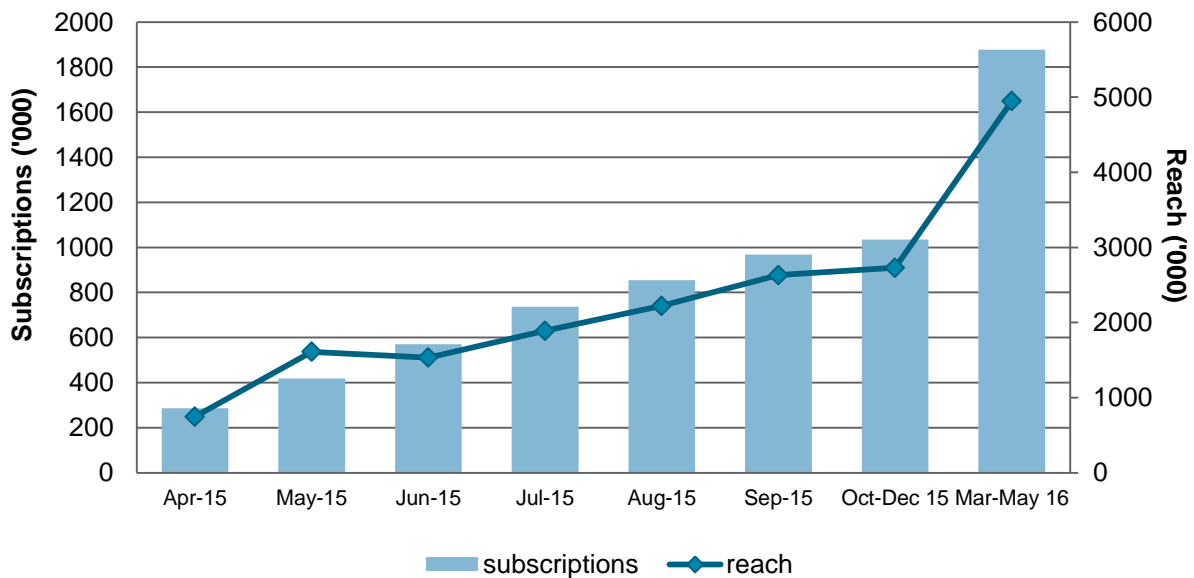
**Figure 4 – Non-voice communication services used by adult Australians**



Source: ACMA Communications Report 2014-15.

4.12. Consumer consumption of traditional entertainment media such as free-to-air (FTA) TV and movie rental services is starting to slowly decline, particularly amongst younger age groups. Roy Morgan Research of the commercial segment of TV broadcast estimates that over one in seven Australians now watch no commercial TV on a normal weekday, more than twice as many as in 2008, with younger age groups less likely to watch commercial TV. Among those who don't watch any commercial TV, 54 per cent stream or download televisual content.<sup>11</sup>

**Figure 5 – Growth in Netflix subscriptions (households) and reach (individuals)**

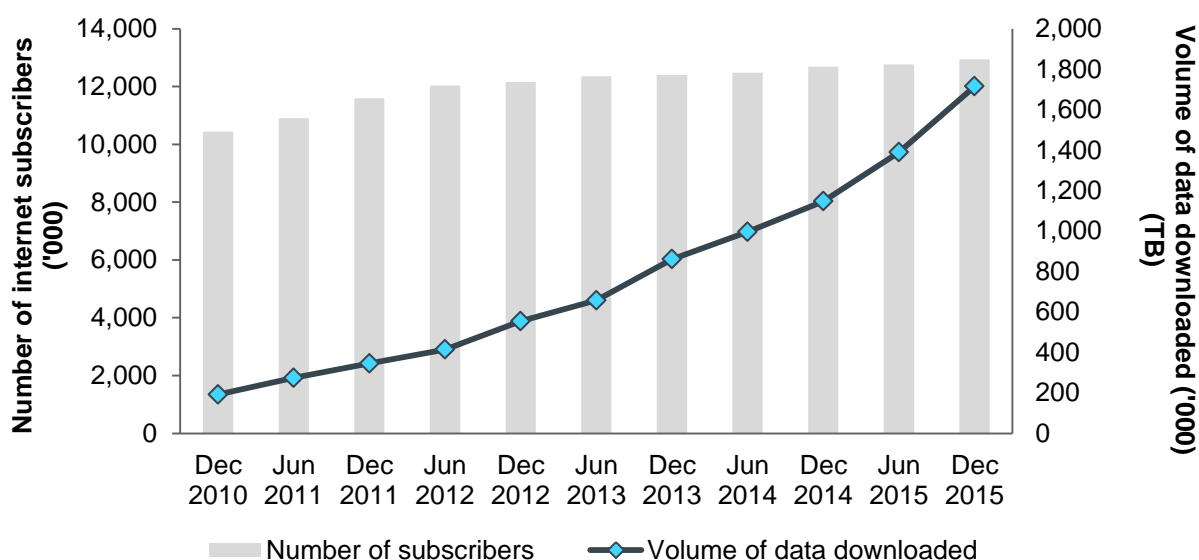


Source: Roy Morgan Research 2015-16.

<sup>11</sup> Roy Morgan Research, 1 February 2016, *1 in 7 Australians now watch no Commercial TV, nearly half of all broadcasting reaches people 50+, and those with SVOD watch 30 minutes less a day*, viewed 28 July 2016, <http://www.roymorgan.com/findings/6646-decline-and-change-commercial-television-viewing-audiences-december-2015-201601290251>

- 4.13. The proliferation of OTT subscription video on demand (SVOD) services, such as Netflix, Stan and Presto, supported by greater availability of high speed internet services and cheaper plans with large data quotas, is bringing more choice and convenience to consumers. Consumers have greater access to a variety of content for a low monthly cost that can be cancelled at any time. Netflix is currently the most popular SVOD provider with almost five million Australians using the service, growing rapidly since it was introduced in Australia in April 2015, as shown in Figure 5.<sup>12</sup>
- 4.14. As consumers increasingly substitute or replace traditional TV viewing with online streaming, demand for data and high-speed internet, particularly during peak evening periods, has continued to grow rapidly. Cisco estimates that, in Australia, total busy hour internet traffic will grow 4.3-fold from 2015 to 2020 (reaching 28 terabytes (TB) per second) compared to an increase of 2.7 fold for average internet traffic (reaching five TB per second) for the same period. Internet video traffic is expected to account for 82 per cent of all internet traffic in 2020, up from 69 per cent in 2015.<sup>13</sup>
- 4.15. The number of Australians using the internet appears to be reaching saturation levels, while the volume of downloaded data on all broadband services (fixed-line, wireless and mobile) continues to grow, as shown in Figure 6. Consumer preference for data intensive applications that have become more affordable and accessible following technological developments and improvements to devices and network services is contributing to the increasing data downloads. The majority of data continues to be downloaded on fixed-line broadband, accounting for 92.4 per cent of total data downloaded in the quarter to June 2015, compared to only 4.9 per cent on mobile handsets and 2.6 per cent on wireless broadband.<sup>14</sup> New and emerging applications including ultra HD video (4K and 8K), 360 video, and augmented/virtual reality games are expected to drive further growth in demand for data.

**Figure 6 – Number of internet subscribers and volume of data downloaded (fixed-line, mobile and wireless)**



Source: ABS, Internet Activity, Australia, December 2015.

<sup>12</sup> Roy Morgan Research, 15 June 2016, *Five million Australians now have Netflix; Stan and Presto still well behind, but growing*, viewed 28 July 2016, <http://www.roymorgan.com/findings/6839-netflix-stan-presto-subscription-video-on-demand-may-2016-201606141025>

<sup>13</sup> Cisco, *Visual Networking Index Fact Sheet 2020 Forecast Highlights*, June 2016, pp. 1-3.

<sup>14</sup> ACMA, *Communications report 2014-15*, p. 48.

## Meeting consumer needs

- 4.16. While competition in the supply of fixed-line and mobile services has been relatively strong, with prices falling and choice increasing, competition in regional and rural areas continues to be subdued.<sup>15</sup> Many consumers in these areas experience issues with service coverage and limited choice of RSPs.<sup>16</sup>
- 4.17. The NBN will improve fixed-line broadband capability in regional Australia and ongoing investment in mobile network infrastructure should result in improved mobile coverage. However, the communications sector will need to continue to respond to changing consumer preferences by developing new product and service offerings that are widely available, reliable and affordable.
- 4.18. For example, many service providers are now offering customisable mobile plans with consumers having options to roll over or share data between devices and/or choose their own mix of call minutes, text messages and data. Many fixed-line plans now offer unlimited data to consumers, reflecting the popularity of data intensive SVOD services.
- 4.19. We anticipate that competition will increasingly focus on service performance and quality. This means that keeping up with ever-increasing consumer demand for data will likely create ongoing challenges for network operators and service providers. In 2014-15 alone, demand for data on fixed-line networks grew from 0.96 million TB to 1.3 million TB.<sup>17</sup>
- 4.20. To meet consumer expectations for fast and reliable network services and manage demand in peak usage periods, network operators will need to invest in network infrastructure and develop efficient traffic management strategies to mitigate capacity constraints. The deployment of dynamic network architecture technologies and the adoption of advanced data and video compression techniques are likely to facilitate more efficient and cost-effective use of bandwidth, to the benefit of consumers. The challenges for industry are discussed further in section 5.

## Information available to consumers

- 4.21. Consumers need transparent and accurate information to make the right purchasing and switching decisions to suit their communication needs. Empowered consumers foster competition and efficient markets, which in turn promote positive consumer outcomes.
- 4.22. The Australian Consumer Law and relevant industry codes play an important role in ensuring consumers are able to make informed purchasing decisions by requiring industry to provide accurate information about communications products and services.
- 4.23. However, consumers continue to experience problems selecting telecommunications products and services. The Australian Consumer Survey 2016 found that consumer problems were more likely to arise in relation to telecommunication products or services and internet service providers, with 26 per cent and 25 per cent, respectively, of consumers who made a purchase experiencing a problem. The main

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<sup>15</sup> ACCC, *ACCC telecommunications reports 2014-15*, p. 4.

<sup>16</sup> ACCC, *ACCC telecommunications reports 2014-15*, p. 4.

<sup>17</sup> Australian Bureau of Statistics, 6 April 2016, *8153.0 - Internet Activity, Australia, December 2015*, viewed 20 May 2016, <http://www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0>

causes of these problems were poor customer service, incorrect or misleading information, cost and faulty/unsafe products.<sup>18</sup>

- 4.24. As Australian communications markets continue to evolve and fixed-line services transition to next generation networks, it is important that consumers are able to navigate new product offerings to find the ones that best suit their needs.
- 4.25. While technological improvements and a new market structure has the potential to support more competitive product offerings for consumers, RSPs will need to clearly describe their product offerings to ensure that consumers are able to easily understand what is being offered in order to compare competing products.
- 4.26. Consumers already appear to be facing search costs when selecting a broadband service, largely due to the lack of transparency about service performance and speeds they can expect to achieve, particularly during peak usage periods.
- 4.27. While RSPs have typically differentiated fixed-line plans on price and download quotas, we are seeing ambiguous statements advertising speed and performance as 'quick' or 'fast', with little information about what this means. Consumers need unambiguous information about broadband speed and performance so that they can understand if what they are being offered will actually meet their needs.
- 4.28. In the absence of comparable information, consumers are unable to make informed purchasing decisions, which can lead to poor consumer outcomes and inefficient markets. We consider that improved consumer information will minimise the potential for consumers to be misled and reduce search costs. Greater transparency will also encourage RSPs to compete on service performance as well as on price and non-price inclusions.
- 4.29. We recently issued a discussion paper on broadband speed claims and are currently seeking feedback from interested parties.<sup>19</sup> We are seeking to understand whether the market will resolve this issue for consumers over time, or whether specific initiatives may be needed to better support consumers and strengthen incentives for RSPs to improve the quality of their services, particularly during the transition period to next generation networks.
- 4.30. Consumer information about mobile services has generally improved in recent years. Following a period of complaints about 'bill shock' and high charges for excess data usage, many RSPs now provide clearer information to consumers about data charges and regular usage updates (although some have a 48 hour lag time).
- 4.31. Notwithstanding these improvements, mobile phone plans can still cause confusion for some consumers. In particular, additional charges for some services (international calls and text, premium messages), limited offers (additional data quotas for a limited time) and varying handset charges (often discounted on higher value plans), can make it difficult to compare plans and long-term costs.
- 4.32. Comparator websites can be useful tools for consumers to compare complex telecommunications plans as they can reduce switching costs (lower search costs) and increase the likelihood of retail competition.
- 4.33. However, as Australia does not currently have an accredited price comparison scheme (like that administered by Ofcom in the UK), there is still potential for

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<sup>18</sup> The Treasury and EY Sweeney, *Australian Consumer Survey 2016*, Canberra, 2016, pp. 52-53. Accessible [here](#).

<sup>19</sup> Australian Competition and Consumer Commission, *Broadband Speed Claims - Discussion Paper*, July 2016. Accessible [here](#).

consumers to be misled, particularly if website operators omit or incorrectly display relevant information and are not transparent about commercial relationships.<sup>20</sup>

- 4.34. Technological innovation is providing consumers with more choices and ways to meet their communications needs. The evolution of the internet of things and OTT services, increasing availability and interconnectivity of smart devices, growing prevalence of video technology and cloud services and widespread mobile and Wi-Fi connectivity, offer a myriad of opportunities for consumers. However, to ensure that consumers are able to make informed decisions and achieve the best outcomes, clear and comprehensible information about these new products and services must be made available and accessible.

## Bundling of services

- 4.35. Bundling refers to an offering of two or more products or services as a single, usually discounted, package to consumers. Bundling can generate positive consumer outcomes by increasing choice, offering convenience (e.g. a single bill) and reducing prices where efficiencies from bundling are passed on. However, bundling may also raise competition issues, for example, if an RSP offers bundles that its rivals cannot technically replicate.
- 4.36. In 2003 we previously considered bundling and its impact on competition in its *Emerging market structures in the communications industry* report.<sup>21</sup> At the time, Telstra was introducing bundles that included pay TV (Foxtel) and competing RSPs raised anti-competitive conduct concerns as they were unable to offer comparable bundles.
- 4.37. Bundling is now commonplace in Australian and international communications market. Most RSPs offer some form of bundling, most commonly voice and broadband services, but increasingly triple (voice, broadband and entertainment) and quadruple-play bundles (triple plus mobile).<sup>22</sup>
- 4.38. The advent of OTT and other entertainment services has facilitated opportunities for more RSPs to offer competitive bundles. RSPs are further diversifying bundle offerings by including Wi-Fi hotspot connectivity (e.g. Telstra Air), cloud storage and online gaming services.
- 4.39. As the range of bundled offers and inclusions grows, it becomes increasingly difficult for consumers to compare offers and determine what best suits their needs. While some consumers may benefit from the ease of a single bill for all their communication services, others particularly those who do not want all the included services, may incur costs to purchase a service or product they do not want.
- 4.40. Price comparison is complex for consumers if different services are included in bundles or if packages contain limited offers. This may mean that price comparisons are not be made clear at the time of purchase but also over the longer term once a service is purchased.
- 4.41. Barriers to switching providers can dampen competition and increase costs for consumers. Bundling is usually offered as a part of a two year contract, which means consumers face being locked into one contract for all their communication services. They may be limited in their ability to change providers given the complexity of

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<sup>20</sup> Ofcom, 6 November 2013, Ofcom Price Comparison Accreditation, viewed 29 August 2016, <http://stakeholders.ofcom.org.uk/consultations/ocp/statement/pricescheme/consumerfaq/>

<sup>21</sup> ACCC, *Emerging market structures in the communications sector*, 2003.

<sup>22</sup> Organisation for Economic Co-operation and Development, *Triple and Quadruple Play Bundles of Communications Services*, OECD Science, Technology and Industry Policy Papers, No. 23, OECD Publishing, Paris, 2015, p. 2.

switching multiple services to new providers and the high fees charged for early contract termination.

### **Questions**

1. How are consumer preferences changing and how is this impacting the communications sector?
2. Does the convergence of fixed-line and mobile markets raise any concerns for consumer outcomes? If so, what are these concerns?
3. Do you consider that the communications sector will be able to respond to consumer needs in the transition to next generation networks? If so, what market factors will influence this?
4. What information is or would be beneficial for consumers to help them make informed decisions about which communication services and products would best suit their needs?
5. Are consumers currently able to accurately compare bundle offers? Please provide information about how this comparison currently occurs, and any changes you consider are needed.
6. Are there any other emerging issues or trends in the communications sector that could affect consumers? Are there any consumer information needs that are likely to arise?



## 5. Emerging services

- 5.1. As discussed in section 4, Australian consumers and businesses are readily adopting new ways of communicating and utilising new online platforms and content services offered by OTT providers. These emerging and developing trends have implications for network operators and traditional communications service providers.
- 5.2. Innovative disruption from emerging services is affecting traditional communications business models in a number of ways. Streaming OTT services, such as video on demand and YouTube, are driving very significant growth in network traffic and putting pressure on network capacity. For example, Cisco expects IP video traffic in Australia to grow 3-fold from 2015 to 2020.<sup>23</sup> Meanwhile, other services, such as messaging apps, are eroding the revenues of traditional telecommunications service providers.
- 5.3. We are seeking to understand how network operators and service providers are responding to the challenges and opportunities arising from these developments and what this means for competition and efficiency in the communications sector, including incentives for investment. This section seeks views on the implications of these emerging trends from the perspective of the network operators and service providers.

### Over the top services

- 5.4. OTT services are those services delivered over a communications network that are not offered by that network operator. These services ride on top of the infrastructure service and are provided independently of the network operator.<sup>24</sup> As discussed in section 4, OTT services include social media platforms, messaging platforms, and content and audio services.
- 5.5. OTT services are often provided to consumers via an application developed for devices and operating systems preferred by consumers including smartphones, tablets and internet connected TVs. While OTT services are provided independently of the network operator, they utilise the MNO or RSP's networks to deliver the service to end-users. Importantly, the manner in which network operators manage their networks can affect the ease with which end-users access OTT services and the quality of the service they experience.
- 5.6. Some content and communication OTT providers operate as two-sided platforms. For example, an OTT provider may buy content for distribution to users and sell advertising. The more content they buy, the more valuable their service becomes and the more users subscribe to it. The more users are subscribed to the OTT service, the greater the demand by advertisers to connect with the platform. This allows the OTT provider to offer their service to users at no charge, or at a significantly discounted charge, and monetise their service through advertising revenue.
- 5.7. The growth of OTT services has had mixed implications for the network operators whose networks they utilise. On one hand, the emergence of a multitude of OTT providers and their growing popularity among consumers has increased the demand for, and value of, access to retail broadband services. On the other hand, OTT services are increasingly displacing traditional communication services offered by network operators (such as voice and SMS services) and directly competing with some content services provided by network operators.

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<sup>23</sup> Cisco, VNI Complete Forecast Highlights Tool, viewed 26 July 2016, [http://www.cisco.com/c/m/en\\_us/solutions/service-provider/vni-forecast-highlights.html#](http://www.cisco.com/c/m/en_us/solutions/service-provider/vni-forecast-highlights.html#).

<sup>24</sup> ACMA, *Communications report 2014-15*, p. 131.

- 5.8. OTT service providers have some advantages over traditional voice and SMS service providers. They are often able to offer their services to users at no fee, which provides a pricing advantage over the traditional voice and SMS services that typically seek to recover all network costs from the users of those services. OTT services are also network agnostic, simply requiring broadband access, which may allow them to be more agile and innovative than traditional communications services in meeting the needs of end-users.
- 5.9. However, OTT services also currently face some significant constraints, which limit the extent to which they can substitute traditional voice and SMS services. In particular, OTT services currently do not provide access to emergency services and, given that OTT providers have no control over the networks that carry their services, they are not able to guarantee the same quality or reliability of service as traditional services. In addition, given current lack of data portability and platform interoperability, users can only communicate with their desired recipient if they are both using the same application.
- 5.10. Despite the disruptive nature of OTT services, the complementarity of network and OTT services means that some network operators are using the strong demand for OTT services as an opportunity to boost their subscription base. For example, a number of network operators have integrated OTT services into their network by providing access for their subscribers via a proprietary set top box, while others have taken a step further by ‘zero rating’ or ‘unmetering’ certain OTT content so that it is not deducted from end-users’ download quotas. In addition, some network operators have also taken steps to manage the impact that data intensive OTT services have on their network by allowing OTT providers to embed their content delivery network servers within their networks.<sup>25</sup>
- 5.11. As noted in section 4, the on-demand nature of OTT content services is also impacting on the traditional linear TV model provided by traditional TV broadcasters. An increasing number of consumers are streaming or downloading content on demand from services such as Netflix rather than watching commercial TV broadcasts.
- 5.12. As the implications of OTT services are varied and not yet fully known, we are seeking to understand how the emergence of OTT services is impacting on infrastructure as well as the provision of communications and content services. In particular, we would like to understand whether there are incentives for network operators to hinder the delivery of competing OTT services by ‘throttling’ or blocking services. We would also like to understand what the emergence of OTT services means for the current economic regulatory framework for the communications sector.

## Content services and bundling

- 5.13. Premium and compelling content (such as sporting events, movies and premium drama series) has a proven record of attracting large audiences. As a result, there is often strong competitive tension for the rights to premium content and this tension has been further increased by the emergence of new platforms over which content can be distributed such as mobile and internet protocol television (IPTV). At the same time, traditional broadcasters and content aggregators have faced increased competition from the entry of communications service providers (including MNOs and RSPs) and OTT players in the provision of content to consumers.

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<sup>25</sup> Content delivery networks allow the OTT provider to serve their content to end-users from a data centre located closer to end-user’s location, thereby improving the quality of the service and reducing demand on the ISPs’ network.

- 5.14. There is a growing trend for communications service providers to offer access to exclusive premium content such as major sporting competitions (including AFL, EPL, NRL and cricket) bundled with broadband access and other communications services. Service providers can do this by offering the premium content solely to their subscribers or by offering discounts or other enhanced features when bundled with a broadband subscription. Service providers pursue bundling strategies to drive subscriptions or reduce churn to other providers.
- 5.15. As discussed in section 4, bundling of content with communications services can be a pro-competitive strategy and provide benefits to consumers in terms of cost savings and new methods to access content. However, bundling arrangements also have the potential to distort competition. This can occur if either the communications service provider or the content provider has market power in their respective market. In these circumstances, bundling can entrench and/or leverage market power from one market to another. Rivals that are unable to replicate the bundle may find it difficult to compete with the bundled service with detrimental effects on competition, higher prices and reduced innovation. Telstra's bundling of the Foxtel subscription TV (STV) service was a concern of this nature as it brought together the dominant broadband and STV providers to provide a bundle of services that competing ISPs could not replicate.
- 5.16. The time critical nature and large audiences drawn to major sporting events have made them enduring premium and compelling content sought by content providers to attract audiences, subscribers and advertisers. In the sports content acquisition market, a key feature impacting on how rights are acquired by different content providers in Australia is the anti-siphoning regime.<sup>26</sup> This is a licence condition imposed on STV providers prohibiting them from acquiring the rights to listed events (largely popular sporting events) before these rights have been offered to FTA broadcasters. The anti-siphoning regime works to maintain a significant proportion of key sports events on FTA TV for public viewing for free. As a result, this may have limited the quantity of exclusive sports content available for STV providers, in conjunction with ISPs, to bundle.
- 5.17. While bundling of content is a key strategy of some communications service providers, the emergence of new services and the unbundling of content from STV packages for a wider distribution are providing new ways to access content, particularly movies and drama. For example, independent OTT content services, such as Netflix, Stan and Presto, are rapidly growing in popularity and are not tied to any broadband networks. In addition, Fetch TV, a STV service similar to Foxtel was originally bundled by partner ISPs with a broadband service but is now available at electronics retailers for use on any broadband service. Foxtel also offers lower cost IPTV streaming services for consumers to access without subscribing to the full package.<sup>27</sup> The availability of these OTT content services over a growing number of devices is allowing consumers to construct their own content bundles to suit their budgets and preferences. It is also providing smaller communications service providers the opportunity to align themselves with content services through unmetering or promotional deals.
- 5.18. We are seeking to understand how the control and distribution of content is currently impacting on broader competition in the communications sector and how this may be affected by continuing trends in content distribution and consumption.

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<sup>26</sup> The anti-siphoning regime is made under subsection 115(1) of the *Broadcasting Services Act 1992*. The current list of events is made under the *Broadcasting Services (Events) Notice (No. 1) 2010*. Accessible [here](#).

<sup>27</sup> This service is called Foxtel Play, see [here](#).

## Questions

7. Are there currently any barriers to entry for OTT service providers in reaching end-users, for example, in accessing devices, operating systems or network elements? Is this expected to change in the next five years? If so, how?
8. Are network operators honouring quality of service for IP voice traffic across their networks from OTT service providers? Is there evidence of ISPs seeking to undermine the provision of OTT services? If so, please describe.
9. Does increased collaboration between ISPs and OTT service providers create any concerns for competition and consumer choice? If so, please describe.
10. Does the lack of interoperability and portability of data among different OTT services create competition issues? If so, how? Is this likely to change in the next five years?
11. What does the emergence of OTT services mean for the current economic regulatory framework for the communications sector?
12. Does the bundling of content with broadband access and other communications services currently create competition concerns? Is it likely to create competition concerns in the next five years? If so, how?

## Data traffic management

- 5.19. SVOD services are data intensive and their take-up has generated significant growth in data traffic volumes transmitted across fixed-line and mobile broadband networks. From December 2014 to December 2015, a period which coincided with the launch of new SVOD services such as Netflix, the volume of data downloaded on Australian fixed networks increased by 50.4 per cent.<sup>28</sup> This trend is expected to continue. For example, Cisco forecasts that traffic per capita per month in Australia will grow from 29.7 GB in 2015 to 73.2 GB in 2020.<sup>29</sup>
- 5.20. Continued data traffic growth may exacerbate congestion issues, particularly at peak times, if sufficient investments to increase network capacity are not made in a timely manner or peak time pricing signals are not prevalent or effective. As noted in section 4, Cisco forecasts that busy hour internet traffic is expected to rise faster than average internet traffic, growing at 4.3-fold and 2.7-fold respectively between 2015 and 2020.<sup>30</sup> Alongside the growth in magnitude of internet traffic experienced during peak times, the duration of this peak period also appears to be extending to cover a longer duration during evenings.
- 5.21. Investment in additional network capacity is one means by which network operators can respond to increasing busy hour traffic and maintain the performance of the network, although this may result in upward pressure on prices. Network owners may also use data traffic management procedures or price signals to alleviate congestion issues resulting from the growing demand for data.<sup>31</sup>
- 5.22. Our long standing view is that network operators should be clear and transparent in their advertising and representations to consumers about any traffic management procedures they introduce and that they do not unfairly preference their own traffic over that of competitors.<sup>32</sup> We are seeking to understand how networks may use data

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<sup>28</sup> ABS, *Internet Activity, Australia, December 2015*, <http://www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0>.

<sup>29</sup> Cisco, VNI Complete Forecast Highlights Tool, viewed 26 July 2016, [http://www.cisco.com/c/m/en\\_us/solutions/service-provider/vni-forecast-highlights.html#](http://www.cisco.com/c/m/en_us/solutions/service-provider/vni-forecast-highlights.html#)

<sup>30</sup> *ibid.*

<sup>31</sup> ACCC, *ACCC telecommunications reports 2014-15*, p. 1.

<sup>32</sup> ACCC, *ACCC telecommunications reports 2014-15*, p. 1.

traffic management procedures and other strategies such as price signals to manage the continued growth in network traffic in the short, medium and long terms.<sup>33</sup>

## Questions

13. How prevalent is the use of data traffic management procedures by Australian network operators?
14. How do network owners monitor and manage their network in response to rapidly fluctuating traffic volumes? How is this likely to change as network traffic growth accelerates? What does this mean for network investment?
15. Are there any barriers to the use of pricing signals to manage network demand? If so, please describe.
16. Do current data traffic management procedures impact on services, service quality and competition? If so, how can they benefit consumers? Can some applications be deprioritised with no perceptible impact for consumers?
17. What traffic management procedures have the biggest impact on end-users and why?
18. Are there any other strategies that could be used to deal with congestion issues, particularly if network congestion worsens in the future? If so, please describe.

## Internet of things and machine to machine communication

- 5.23. The use of communication technology is rapidly changing with end-users increasingly seeking to connect a myriad of devices to the internet to be able to access and utilise data generated by those devices at any time. Different terms have been used to describe this development, including the Internet of Things (IoT) and Machine to Machine communication (M2M).
- 5.24. The term IoT is mainly associated with passive communication devices that transmit data intermittently when they are connected to the internet.<sup>34</sup> These devices are typically fitted with sensors to provide an interface between the physical world and the device (for example, Fitbit). The term M2M describes active communication devices that are constantly connected to the internet, using a variety of fixed-line and wireless networks, and communicate with each other and the wider world. These devices transmit information as either a timed, threshold or constant stream. Examples include security alarms, traffic control devices and smart meters for electricity, gas and water.
- 5.25. IoT and M2M technologies are extending the reach of the internet to directly control the physical world, including machines, factories and infrastructure. Cisco estimates that there will be 237 million networked devices in Australia by 2020, with 59 per cent being M2M devices.<sup>35</sup>
- 5.26. These technological developments are likely to bring unprecedented opportunities to a wide range of end-users. For example, IoT and M2M technologies will improve the ability to make automated decisions and take actions in real time, which are often critical in manufacturing, energy, transportation, agriculture and healthcare.

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<sup>33</sup> The ACCC is currently consulting on how RSPs can provide consumers with better information about broadband speeds, including any network management tools they employ. More information is available on the ACCC's Consultation Hub [here](#).

<sup>34</sup> The IoT ecosystem can also include local area networks and wide area networks that do not use the wider internet for communication between devices.

<sup>35</sup> Cisco, *Visual Networking Index Fact Sheet 2020 Forecast Highlights*, June 2016, p. 5.

5.27. However, the deployment of IoT and M2M devices is currently in its early stages and many important questions remain, including how these developments will impact existing industries, supply chains and business models. We would like to understand any potential future impacts, and in particular, how they are likely to affect competition and incentives to invest in the provision of communication services.

For example, given the likely use of IoT and M2M devices for health, transport, consumer electronics, energy use, and many other sectors, a very large amount of machine and personal data could be generated. This data is likely to be processed and delivered across multiple devices and networks. We would like to understand whether collection, storage and distribution practices for such data could raise competition issues in the communications sector.

### **Questions**

19. Are there any trends emerging from the adoption of IoT and M2M technologies that could materially impact the communications sector in Australia?
20. Is the emergence of IoT and/or M2M changing the nature of competition in the provision of communication equipment and/or services? If so, how? Are these developments likely to have significant implications for market structures, supply chains and business models? If so, how?
21. Is the manner of collection, storage and distribution of IoT and M2M data likely to impact on competition in the provision of communication services? If so, how?

## 6. Fixed-line voice and broadband services

- 6.1. The provision of, and demand for, fixed-line voice and broadband services is evolving as these services transition to next generation networks, including the NBN.
- 6.2. The following section identifies potential issues that could have implications for competition and the efficient operation of the fixed-line voice and broadband markets, both during the transition to next generation networks and over the longer term once the transition has been completed. We are interested in the views of interested parties in relation to these and any additional issues.
- 6.3. As there is significant dependency in the provision of fixed-line voice and broadband services on the core and aggregation networks, the issues raised in section 9 are also relevant, along with the issues in section 5 about emerging services which utilise fixed-line access networks. Further, the interaction between fixed-line and mobile services, and the extent to which these services are complements or substitutes, has implications for competition in the supply of voice and broadband services. These issues are outlined in section 8.

### Transitioning to supply of fixed-line voice and broadband services over next generation networks

- 6.4. Telstra currently remains the dominant provider of fixed-line access services, with around 8.7 million active connections to its legacy access network as at 30 March 2016.<sup>36</sup> Reflecting the transition of services to next generation networks, the NBN had passed 2.9 million premises as at 30 June 2016, of which customers had activated 1.1 million services.<sup>37</sup> The NBN is forecast to be complete in 2020 with a target of eight million premises activated.<sup>38</sup> There are also a variety of other next generation network providers which supply a smaller number of customers, generally in specific geographic areas. These networks are continuing to be rolled out, particularly in new housing estates and multi-dwelling buildings.
- 6.5. The four largest RSPs (Telstra, Optus, TPG and Vocus) supply 96 per cent of the retail fixed-line voice services over Telstra's legacy access network and 91 per cent of the retail fixed-line broadband services.<sup>39</sup> Over the NBN these four RSPs acquire 94 per cent of wholesale access services.<sup>40</sup> This reflects the market consolidation which has occurred over recent years. There are a number of other smaller RSPs supplying voice and broadband services on Telstra's legacy access network, the NBN and other next generation networks. This includes RSPs which have a national presence, others which are located in specific geographic areas and some which are focusing on supplying customers wireless and satellite services on the NBN.
- 6.6. As the sector further transitions towards the supply of fixed-line voice and broadband services over the next generation networks, including the NBN, the composition of investment appears to be changing. While Telstra continues to invest in its digital subscriber line (DSL) network to provide broadband services, there is slowing

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<sup>36</sup> Australian Competition and Consumer Commission, *Snapshot of Telstra's customer access network*, March 2016. Accessible [here](#). The NBN Co multi-technology mix approach will utilise some of this legacy network to provide fibre to the node services, i.e. it will use some of the copper access network.

<sup>37</sup> NBN Co, *National Broadband Network – Rollout Information*, 21 July 2016, p. 3. Accessible [here](#).

<sup>38</sup> NBN Co, *Corporate Plan 2016*, p.10. Accessible [here](#).

<sup>39</sup> ACCC, *ACCC telecommunications reports 2014-15*, pp. 23 -24. This was as at 30 June 2015 and includes supply via the following wholesale access services: wholesale line rental, local carriage service, fixed network originating and terminating access services, unconditioned local loop, line sharing service and the wholesale ADSL service.

<sup>40</sup> ACCC, *NBN wholesale market indicators report (table 4)*, June 2016. Accessible [here](#).

investment by other RSPs in DSL services<sup>41</sup> and an increase in the take-up of Telstra's wholesale asymmetrical digital subscriber line (ADSL) service.<sup>42</sup> In addition, the recent market consolidation has changed the competitive dynamic, leaving the four largest RSPs competing in the supply of fixed-line voice and broadband services with a large number of smaller, second tier, RSPs.

- 6.7. During the transition period Telstra's Structural Separation Undertaking (SSU) and Migration Plan implement structural separation of Telstra through the migration of end-users to the NBN. The SSU includes a commitment by Telstra to progressively cease supply of voice and broadband services over its legacy and hybrid fibre coaxial (HFC) access networks and commence supplying these services over the NBN as the network is rolled out.<sup>43</sup> In order to promote competition during the interim period, the SSU also includes a broad range of equivalence and transparency measures for access to key wholesale services up until the day existing customers are all transitioned onto the NBN. The Migration Plan governs the manner in which Telstra will cease supplying voice and broadband services on its legacy and HFC networks and ultimately achieve structural separation.
- 6.8. This framework is important in providing the opportunity for competitive supply in the provision of fixed-line voice and broadband service particularly during the transition period.
- 6.9. In this context, we are interested to understand the current state of fixed-line competition and how this will evolve. For example, what are the factors that might influence consumers to switch RSPs as they take up services on next generation networks, or transition with the RSP who currently provides their services on Telstra's legacy access network? Further, how vigorous competition will likely be between the four largest RSPs and what the role will be of the smaller, second tier, RSPs during the transition period, particularly given the economies of scale enjoyed by the larger four RSPs and their ownership of backhaul infrastructure? In addition, what form competition will take and whether it will likely occur via price and/or non-price differentiation? Current experience may inform views around how competition will evolve.
- 6.10. In this regard, we are also interested to understand whether there are any particular barriers to competition evolving during this transition period, for example:
  - The likely structure of retail and wholesale markets for the provision of fixed-line broadband and voice services over next generation networks, including the number of suppliers and concentration at each layer.
  - The costs to consumers of switching RSPs, or transitioning to next generation networks including search costs.
  - The 'stickiness' of some consumers and tendency not to change RSPs.
  - The presence or otherwise of industry codes, processes and systems which facilitate consumers changing their RSP on next generation networks.

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<sup>41</sup> Australian Competition and Consumer Commission, *Wholesale ADSL service declaration inquiry – Discussion Paper*, ACCC, Canberra, July 2016, p. 21. Accessible [here](#). There was annual growth in the unconditioned local loop services in operation, which is necessary for RSPs to utilise DSL services, of 10.8 per cent between 2012 and 2014, before plateauing over 2015.

<sup>42</sup> *ibid.*, p. 23. Since December 2012 the take-up by RSPs of the wholesale ADSL service increased at an average rate of 3.8 per cent.

<sup>43</sup> Australian Competition and Consumer Commission, *Assessment of Telstra's Structural Separation Undertaking and draft Migration Plan Final Decision*, ACCC, Canberra, February 2012, p. 14. Accessible [here](#).



- The wholesale products and pricing of those products (see the following section for a more detailed discussion on these issues).
- 6.11. With voice services increasingly being provided over next generation networks, efficient IP voice interconnection arrangements are of increasing importance. This includes next generation networks interconnecting with each other and during the transition period with the legacy access network. We understand that IP voice interconnection currently occurs using either the CCSS7 or session initiation protocol (SIP) packet based signalling protocols.<sup>44</sup> The CCSS7 signalling protocol has been used historically to interconnect calls originating and terminating on the legacy access network.
- 6.12. It appears that IP voice interconnection is currently occurring effectively using these signalling protocols. However, we are interested to understand how IP voice interconnection is likely to evolve, both technically and commercially, and what this might mean for competition. For example, whether it is likely to occur on a centralised or decentralised basis and the implications of the location of the IP interconnection points for competition, including in the related aggregation and backhaul markets. Further, we are interested in how commercial terms for IP voice interconnection might be established and the likely basis for these arrangements. For example, the price terms and conditions, including the price of origination and termination, and any relationship to cost and whether IP voice interconnection could be a barrier to entry for RSPs.

## Questions

22. Is there competition in the supply of retail fixed-line voice and broadband services supplied over both Telstra's legacy access network and next generation networks, including the NBN? If so, how would you describe the state of competition, what form is it taking (price and non-price differentiation) and how is it likely to evolve? What are the key factors shaping the competitive state? Please provide details and examples.
23. What impediments are there to RSPs winning new customers during the transition to supply of fixed-line services over next generation networks, including the NBN? Please provide details and examples including with reference to those possible impediments noted above.
24. Are Telstra's SSU and Migration Plan impacting competition for fixed-line services and if so how?
25. Does IP voice interconnection create any barriers to the competitive supply of retail fixed-line voice services? If so, please provide details.
26. How is IP voice interconnection likely to evolve and what, if any, competition issues may arise during the transition to next generation networks? Please provide details and examples, including with reference to the issues noted above.
27. Are there any cost advantages associated with IP voice interconnection relative to the legacy PSTN network? Does this have any implications for the pricing of IP voice interconnection? Please provide details.

<sup>44</sup> The ACCC understands there is no formal international SIP protocol, as there is for the CCS7 signalling protocol, but rather an agreed approach within Australia for using this to interconnect.

## Supply of fixed-line voice and broadband services over next generation networks

- 6.13. An important factor facilitating future competition in the retail markets for fixed-line voice and broadband services supplied over next generation networks will be the wholesale products offered and the pricing of these products. The way in which these products are wholesaled will also be important. These issues are discussed below.

### NBN products and pricing

- 6.14. NBN Co's wholesale products and pricing are set out in NBN Co's SAU, which we accepted in December 2013.<sup>45</sup> The SAU specifies a maximum regulated price for each product that was in place at the time the SAU was accepted. Subject to some limited exceptions, the SAU limits price increases for each individual product to CPI minus 1.5 per cent in any given year.<sup>46</sup> These price controls operate until June 2040, which is the duration of the SAU.
- 6.15. We assessed the SAU against the statutory criteria set out in Part XIC of the CCA. As part of this assessment, we had regard to a range of factors, including promotion of competition, incentives for efficient use and investment in infrastructure, the direct costs of providing services and the legitimate business interests of NBN Co.<sup>47</sup> In accepting the SAU, we considered that the significant scale of the NBN rollout, uncertainty about future costs, demand and uptake of higher value services, initial under-recovery of costs and the long-term price controls would combine to provide strong incentives for NBN Co to incur only efficient costs and to price reasonably so as to encourage take-up of services.<sup>48</sup> In particular, because the SAU limits NBN Co's ability to increase prices, it must rely on increasing demand for its existing services, or introducing new services, in order to increase its revenue and recover costs.<sup>49</sup> Under the SAU, and the long-term revenue constraint methodology, we annually identify any revenue shortfall which is included in the initial cost recovery account.
- 6.16. As set out below, within the bounds of the SAU, we are interested in industry views about the impact of NBN product development and pricing initiatives on competition and efficiency over the next five years.
- 6.17. NBN Co currently offers a range of products under the SAU. These products are available across a range of symmetric and asymmetric capacities (download and upload data rates) and quality of service levels (including best efforts services and services delivered at committed information rates). These appear to enable RSPs to offer retail products that are broadly comparable to those that have been offered over the legacy access network.<sup>50</sup> NBN Co also consults with customers through its product development forum on new products and prices. This includes consideration of new product ideas proposed by industry.
- 6.18. We have received some views from RSPs that it is more difficult to develop NBN products for medium-sized and large businesses. This is because NBN Co has

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<sup>45</sup> Australian Competition and Consumer Commission, *NBN Co Special Access Undertaking Final Decision*, ACCC, Canberra, December 2013. Accessible [here](#).

<sup>46</sup> *ibid.*, p. 11. Under the SAU, the maximum prices for a number of basic products are fixed until 30 June 2017. These basic products include Connectivity Virtual Circuit charges for the general broadband and voice traffic classes (TC4 and TC1), the asymmetric Access Virtual Circuits analogous to legacy copper services (12/1 and 25/5) and a number of ancillary services.

<sup>47</sup> *Competition and Consumer Act 2010*, section 152CBD.

<sup>48</sup> ACCC, *NBN Co Special Access Undertaking Final Decision*, pp. 11-13.

<sup>49</sup> ACCC, *ibid.*, p.89.

<sup>50</sup> In particular, the 12/1 Mbps and 25/5 Mbps AVCs appear broadly comparable with those provided over the ADSL and HFC networks respectively.

released residential, mass market, products ahead of developing products to support business services with higher specifications, including committed information rates for business voice lines. In the absence of these products, RSPs have to use best effort products on the NBN or other networks (direct fibre or wireless products) to serve these customers. However, NBN Co has now commenced the commercial release of additional product functionality to enable RSPs to supply equivalent substitute services for business grade services (such as ISDN and data transmission) as part of its White Paper process.<sup>51</sup> NBN Co's Integrated Product Roadmap sets out targeted timeframes for releasing further product functionality.<sup>52</sup>

- 6.19. We are interested to understand whether the products offered by NBN Co, and the processes which support the development of those products, will provide RSPs with the flexibility to innovate and respond to changing consumer (both residential and business) demands. Further, how important are NBN Co's product offerings for RSPs in competing for ongoing market share of services supplied over the NBN.
- 6.20. Following the announcement in April 2014 of the multi-technology mix approach, NBN wholesale access products are now offered over a variety of technologies within the NBN fixed-line footprint. We are currently assessing a proposed variation to NBN Co's SAU, which is primarily intended to incorporate the new technologies under the multi-technology mix into the SAU. We have sought comment from stakeholders on the SAU variation, including on NBN Co's proposed changes to the SAU service description and in relation to the competitive impacts of the information available about the NBN rollout.
- 6.21. Pricing of the NBN products is also an important issue. The key access charges (noting there are different charges for different data rates and traffic classes) are:
- the User Network Interface (UNI) charge – the physical connection of a consumer to the NBN
  - the Access Virtual Circuit (AVC) charge – a virtual connection between a consumer and an NBN point of interconnection (POI)<sup>53</sup>
  - the Connectivity Virtual Circuit (CVC) charge – the virtual capacity for an access seeker to aggregate the traffic of multiple end-users within a service area at an NBN POI
  - the Network to Network Interface charge – the physical connection between the NBN and an RSPs transmission backhaul at a POI.
- 6.22. Concerns regarding CVC pricing have been raised by a number of RSPs and industry stakeholders, particularly given the recent growth in data use. Concerns raised are in relation to the pricing construct in general and the risk that CVC pricing may restrict demand and disadvantage smaller RSPs by hindering entry or expansion.
- 6.23. NBN Co has always signalled that CVC prices, which can be considered a proxy for usage, would decline as total data usage increases over time, noting this in its first Corporate Plan.<sup>54</sup> This started with NBN Co reducing the price of CVC in early 2015 and introducing the dimension based discounting trial in June 2016.<sup>55</sup> Under the

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<sup>51</sup> Telstra, *Migration Plan*, 23 August 2011, p. 53. Accessible [here](#).

<sup>52</sup> NBN Co, *Integrated Product Roadmap*, July 2016. Accessible [here](#).

<sup>53</sup> The first UNI is normally bundled into the costs of an AVC.

<sup>54</sup> NBN Co, *Corporate Plan 2011-2013*, NBN Co, 2010, p. 103. Accessible [here](#).

<sup>55</sup> Dimensioning refers to the capacity provisioned/acquired to provide voice and broadband services. This depends on the capacity of infrastructure installed on a network and in the case of RSPs providing services on the NBN the amount of CVC acquired to service customers. Dimensioning decisions require a RSP to balance the cost of acquiring bandwidth with the need to provide a quality of service that satisfies customers.

dimension based discounting trial, the price of CVC is calculated based on the average CVC capacity the industry dimensions per end-user. As the amount of the dimensioned CVC increases across the industry, the price of CVC will fall.<sup>56</sup> NBN Co has indicated its intention to explore the possibility of applying the discount directly to each RSP rather than on an industry level.<sup>57</sup> We are interested to understand the impact on competition of a discount which is based on average industry use and how this compares to a discount based on individual RSP use. Further, and more generally, we are interested in the anticipated impact of discounts on competition and the importance of their size and timing.

6.24. As noted above, CVC pricing needs to be considered in the context of the economies of scale associated with the NBN, as well as the legitimate commercial interests of NBN Co to recover its costs. These considerations include price structures and levels, as well as non-price terms and conditions. These factors will determine the extent to which product differentiation across RSPs occurs. These factors will also determine whether demand growth for NBN services is encouraged and hence network costs are recovered. We are interested to understand industry views about what refinements to CVC pricing might be possible given this context and also taking into account:

- NBN Co's current dimension based discounts to the CVC charge and possible refinements to this mechanism
- our ability to initiate in certain circumstances price reviews under NBN Co's SAU to rebalance charges subject to revenue neutrality (i.e. if the capacity charge was to decrease, this would likely mean the connection charges would increase).

6.25. We are also interested to understand the nature and magnitude of the costs that may be associated with meeting increased demands and the implications of this for pricing, including capacity prices.

### **Wholesale supply of NBN services**

6.26. In addition to the wholesale products being supplied directly by NBN Co, resale also occurs through the wholesale supply of an aggregation service, which at its simplest combines an NBN access service with a transmission service (from the NBN POIs to an RSP's point of presence).

6.27. NBN wholesale aggregation services are supplied by providers with access to backhaul/transmission networks and/or capacity from the NBN POIs. They provide the smaller RSPs with an end-to-end resale service meaning they do not need to separately acquire transmission from each of the NBN POIs. This reduces the administrative complexity and cost for the smaller RSPs of supplying services over the NBN given the number of NBN POIs.

6.28. We understand that smaller RSPs may provide NBN retail services (to both residential and business consumers) through a mix of direct and indirect connections to the NBN. Smaller RSPs may prefer to connect directly to the NBN in POI locations where transmission costs are relatively low and they have a reasonable size customer base. However, they may also choose to acquire an aggregation service in other areas where transmission costs are relatively higher and where they have fewer retail customers.

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<sup>56</sup> NBN Co, *Discount Notice - CVC Dimension Based Discount*, 5 May 2016. Accessible [here](#).

<sup>57</sup> NBN Co, *New discount-based pricing to encourage enhanced broadband experience, media release, NBN Co, 5 April 2016*. Accessible [here](#).

- 6.29. While still in its formative stages, a wholesale aggregation market is developing on the NBN, which has the potential to encourage new entrants to supply NBN retail services. As at August 2016, NBN Co's website listed eight providers who offer wholesale aggregation services including the four RSPs who currently acquire around 94 per cent of the wholesale access services over the NBN (Telstra, Optus, TPG and Vocus (via M2)).<sup>58</sup>
- 6.30. Given the fixed costs associated with connecting at a large number of NBN POIs, we are interested to understand how the wholesale market for NBN services is likely to develop and the implications of this for retail competition. In particular, what the incentives are for the larger vertically integrated RSPs also supplying wholesale aggregation services, and whether competition in the supply of wholesale aggregation services will evolve sufficiently to enable smaller RSPs to better compete against those larger vertically integrated RSPs. Further, we would like to know whether there are alternative models for the supply of wholesale aggregation services which could improve the ability of smaller RSPs to compete.
- 6.31. In addition, we are interested to understand whether the nature of the wholesale market is likely to lead to smaller RSPs competing in specific geographic areas and how effective this will be in promoting retail fixed-line competition more generally.

### **Other fixed-line next generation networks**

- 6.32. While most consumers will be connected to the NBN, some will be connected to non-NBN next generation networks. For example, in new housing developments where next generation networks are constructed by alternative providers, or in high density areas such as the central business districts of capital cities where TPG has deployed a fibre to the basement network. We declared the superfast broadband access service and the local bitstream access service provided over these networks in order to promote the long-term interests of end-users, including promoting competition.<sup>59</sup> We considered that declaration would promote the long-term interests of end-users particularly where network operators are vertically integrated and retail only supply was occurring or wholesale supply occurred but with limited retail competition.
- 6.33. The degree of overlap between the non-NBN next generation networks and the NBN appears to be limited to date. Given this and that non-NBN next generation networks are now regulated, we are interested in whether there are any implications for the competitive outcomes for consumers.
- 6.34. There is also an emergence of new providers rolling out next generation networks to targeted geographic areas. These appear to be trying to take advantage of their small size (both in terms of their business and initial geographic coverage) and ability to install infrastructure and provide services relatively quickly to be first to market. We are interested in views about whether this could affect the likelihood of future overlap with the NBN and if there are any implications for competitive supply in the future.

### **Other issues**

- 6.35. Fixed-line voice and broadband revenues have been declining over recent years, although within this aggregate, broadband revenues have been increasing. This

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<sup>58</sup> NBN Co, Wholesale providers, viewed August 2016, <http://www.nbnco.com.au/sell-nbn-services/wholesale-providers.html>. Note that given industry consolidation, there are now only eight providers who supply both wholesale NBN and backhaul/transmission services (as AAPT and PIPE Networks are owned by TPG and Amcom and M2 are owned by Vocus).

<sup>59</sup> Australian Competition and Consumer Commission, *Superfast Broadband Access Service declaration inquiry Final Decision*, ACCC, July 2016. Accessible [here](#). And Australian Competition and Consumer Commission, *Layer 2 bitstream service declaration Final Report*, ACCC, February 2012. Accessible [here](#).

appears to be largely driven by the increasing use of mobile services for voice calls, along with the increasing use of broadband services, particularly by residential consumers for streaming of content (see section 4). The interaction between fixed-line and mobile services, including how substitutable they are, and may be in the future, is examined in section 8.

- 6.36. In addition, as outlined earlier in section 5, OTT services are being provided using the broadband services supplied by RSPs to consumers. In many cases the RSP will not have a relationship with the OTT service providers, but the OTT services may be competing with traditional voice and texting services or generating significant additional use of retail broadband services. This potentially raises issues regarding the price signals for efficient use of fixed-line next generation networks and potentially for future investment in those networks. We are interested to understand how RSPs are responding to these developments. For example, whether new business models are being developed which would enable the RSP to earn revenues, and recover costs, from OTT service providers or their advertisers, facilitating efficient use of and investment in fixed-line next generation networks.
- 6.37. A further potential issue in the supply of fixed-line voice and broadband services is the customer premises equipment (CPE) that is required for the next generation networks to be connected. We are interested to understand whether there are any issues associated with CPE developing in a way which is proprietary to particular RSPs and which may act as a barrier to entry.

## Questions

28. Do NBN Co product offerings, and the NBN Co product development processes, provide RSPs with the flexibility to innovate and respond to changing customer demands, including residential and business consumers? Please explain how this is impacted by changing consumer preferences and provide examples.
29. What refinements to NBN pricing could improve RSPs ability to compete on the NBN and to develop products to meet business and consumer needs? Please provide details and ensure your response takes account of the requirements of the SAU, the economies of scale associated with the network and the legitimate commercial interests of NBN Co to recover its costs.
30. Does NBN Co's current dimension-based discount for CVC improve the opportunity for competition in the provision of fixed-line voice and broadband services? Please provide details. What would be the impact of a dimension-based discount which reflected RSP use, rather than industry specific use? More specifically, will the size and timing of any discounts impact competition?
31. What are the cost and price implications for NBN Co of meeting increasing demands for traffic volumes on the NBN and what might this mean for competition? Please provide details.
32. How is the market for wholesale aggregation services evolving and is it facilitating competitive outcomes in the supply of retail fixed-line voice and broadband services? If possible, please provide examples. Are there any impediments to this market evolving or alternative models which would promote competition further?
33. Are there any barriers to entry for RSPs supplying fixed-line voice and broadband services on the NBN and other next generation networks? Or any other factors affecting the competitive supply of these services? Are there any particular issues which impact smaller RSPs?
34. Are there any implications for competition, and outcomes for consumers, as a result of the presence and ongoing operation of regulated non-NBN next generation networks?

35. How are network operators and RSPs responding to the growth in OTT activity? Are there any alternative business models developing between network operators, RSPs and OTT service providers, or their advertisers? If so, what is the nature of new business models and how do they address the impact of OTT on traditional business models?

36. Are there any CPE arrangements that may act as a barrier to entry now or in the future?

### **Other issues**

6.38. We welcome submissions on any other issues that may be impacting competition or consumers in relation to the supply of fixed-line voice and broadband services.

## 7. Mobile voice and broadband services

- 7.1. Competition for mobile services currently appears to be relatively strong. There are competing mobile networks across a large portion of Australia, and retail prices have fallen significantly over the last decade. We would like to understand how competition for mobile services is likely to develop in the future and whether there are any areas which may raise concerns.
- 7.2. Mobile markets are also rapidly evolving, with the development of new network technologies and changing consumer preferences. These developments are driving an increased focus on data services, which will likely create both challenges and opportunities for mobile service providers.
- 7.3. This section looks at the current state of competition for mobile services, as well as examining key developments in the sector.

### Competition in the mobile sector

#### Structure and state of competition in the supply of retail mobile services

- 7.4. The supply of retail mobile services is dominated by the three mobile network operators (MNOs), Telstra, Optus and VHA, which had a combined market share of 90 per cent as at June 2015.<sup>60</sup> The three MNOs all operate a national 3G mobile network, and have each rolled out 4G networks over the past five years and are still extending these services to regional areas.<sup>61</sup> It is likely that each MNO will continue to upgrade its network, and begin to rollout 5G services by around 2020.<sup>62</sup>
- 7.5. The remaining 10 per cent of the retail mobile market is held by mobile virtual network operators (MVNOs).<sup>63</sup> MVNOs do not operate their own mobile network, but purchase wholesale end to end services from MNOs which they resell to consumers. There are currently over 30 MVNOs providing services in Australia.
- 7.6. The three MNOs (Telstra, Optus, and VHA) each operate a national mobile network and all three offer services to at least 97 per cent of the population.<sup>64</sup> Such competition has driven decreases in retail prices, which have fallen by 26 per cent in real terms over the last decade, and contributed to MNOs making significant investments in their mobile networks.<sup>65</sup>
- 7.7. While mobile infrastructure based competition is strong for populated areas of Australia, there are many areas of regional Australia where Telstra is the only MNO with coverage. Telstra's mobile network covers 99.3 per cent of the population; Optus' covers 98.5 per cent of the population and VHA's reaches 97 per cent of the population.<sup>66</sup> This difference in population coverage equates to a large geographic

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<sup>60</sup> ACCC, *ACCC telecommunications reports 2014-15*, p. 29. Note that this figure applies to the mobile handset market, and exclude shares of non-handset mobile broadband services (such as those provided over wireless modems, dongles and tablet SIMS). This figure is made up of 45 per cent to Telstra, 27 per cent to Optus and 18 per cent to VHA. Further, Optus' market share figure includes Virgin Mobile subscribers as Virgin Mobile is a wholly owned subsidiary of Optus.

<sup>61</sup> Optus and VHA also still operate 2G mobile networks.

<sup>62</sup> 5G networks will offer faster data rates and greater capacity than 4G networks. They will also likely use higher frequency spectrum and smaller cell sites. These are discussed further in Section 8.

<sup>63</sup> ACCC, *ACCC telecommunications reports 2014-15*, p. 29.

<sup>64</sup> Vodafone, 5 April 2016, Vodafone announces Mobile Black Spot rollout schedule, viewed 14 August 2016, <http://www.vodafone.com.au/media/black-spot-rollout-schedule/>. This is based on VHA coverage (which is the smallest of the three MNOs).

<sup>65</sup> ACCC, *ACCC telecommunications reports 2014-15*, p. 87.

<sup>66</sup> Telstra, Business performance network, viewed 24 August 2016, <https://www.telstra.com.au/small-business/bundles/business-performance-network>; Optus, About the Optus Network, viewed 24 August 2016,



area, with Telstra's coverage being over 1 million km<sup>2</sup> larger than Optus' (which is the second biggest network).<sup>67</sup>

- 7.8. It is possible that the cost of expanding into regional Australia, coupled with low demand in these areas, has contributed to more limited infrastructure competition in regional Australia. The large areas and distances that must be covered, and the low population density in these regions, mean that for many areas the costs of deploying or extending a mobile network will be high relative to the potential revenue.
- 7.9. We are currently considering stakeholder views and evidence around competition and incentives to invest in regional areas in our inquiry into whether to declare a domestic mobile roaming service. However, we are still interested to explore other related regional issues in the market study.

### Non-handset mobile broadband services

- 7.10. Non-handset mobile broadband services are broadband services provided over a mobile network, which use a USB modems, dongles, data cards or tablet SIM cards to access the service. These services exclude handset mobile broadband services which use a mobile handset (e.g. a smartphone) to connect to a mobile network and access the broadband service. Both handset and non-handset services connect to the same mobile network but use different devices to access those broadband services. All MNOs and a number of MVNOs currently offer non-handset mobile broadband services.
- 7.11. The demand for non-handset mobile broadband services is smaller than for mobile handsets services, and non-handset services have also exhibited less growth. As at June 2015 there were around six million non-handset mobile broadband subscribers, compared to over 25 million mobile handset subscribers.<sup>68</sup> Further, while the volume of data downloaded using mobile handsets grew seven fold, from about 10 000 TB in the June 2012 quarter to 72 000 TB in the June 2015 quarter, mobile wireless data downloads only increased by a factor of 1.5 from 25 000 TB to 38 000 TB over the same period.<sup>69</sup>
- 7.12. While growth in demand for non-handset mobile broadband services has been much slower than for handset wireless services, there has been a significant change in the share of the market held by the MNOs. In June 2015 Telstra had a 64 per cent share of non-handset mobile broadband services, Optus had a share of 14 per cent, VHA seven per cent, and MVNOs a combined share of 15 per cent.<sup>70</sup> Telstra's share of these services has increased significantly since June 2011, when it had a share of 47 per cent, followed by VHA with 22 per cent and Optus with 20 per cent.<sup>71</sup> It is also much greater than Telstra's share of the mobile handset market, which was 45 per cent in June 2015.<sup>72</sup>
- 7.13. We are interested to understand the factors that affect competition for the supply of non-handset mobile broadband services, and consumers' use of non-hand set and handset mobile broadband services.

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<http://www.optus.com.au/shop/mobile/network/about>; Vodafone, 5 April 2016, Vodafone announces Mobile Black Spot rollout schedule, viewed 14 August 2016, <http://www.vodafone.com.au/media/black-spot-rollout-schedule/>.

<sup>67</sup> Telstra's network currently covers 2.4 million km<sup>2</sup>, as at February 2016 the Optus network covered approximately 1 million km<sup>2</sup>. Telstra, Our Network, viewed 24 August 2016, <https://www.telstra.com.au/coverage-networks/our-network>; and *Telstra Corporation Ltd v Singtel Optus Pty Ltd* [2014] VSC 35.

<sup>69</sup> ACCC, *ACCC telecommunications reports 2014-15*, p. 18.

<sup>70</sup> *ibid.*, p 30.

<sup>71</sup> *ibid.*

<sup>71</sup> ACCC, *ACCC telecommunications reports 2014-15*, p. 29.

<sup>72</sup> ACCC, *ACCC telecommunications reports 2014-15*, p. 29.

## Questions

37. How would you describe the current state of competition, and what are the key factors affecting competition and consumer choice, for mobile services nationally and for the provision of non-handset mobile broadband services?
38. How do consumers use hand-set and non-handset mobile broadband services?
39. Are there obstacles to MVNOs providing competitive mobile services and non-handset mobile broadband services? What benefits do MVNOs provide to consumers in supplying these services?
40. Are there other competitive issues in the mobile services market?

## Mobile network infrastructure sharing

- 7.14. Mobile network infrastructure sharing arrangements are agreements between MNOs under which they share aspects of their mobile networks. These agreements can include sharing of passive infrastructure, such as tower sites, masts, power supplies, but also active infrastructure such as, aspects of the radio access network including spectrum and base station electronics. The extent of network sharing can impact network operators' ability to distinguish their services from each other. In particular, network sharing arrangements that involve sharing of active infrastructure can lead to sharing parties providing services of an identical quality.
- 7.15. Similarly, MNOs may also look to lease access to infrastructure from mobile network infrastructure providers who usually provide access to tower infrastructure, but do not themselves operate a mobile network.
- 7.16. Mobile network infrastructure sharing can provide MNOs with cost saving opportunities, and they can be particularly attractive in regional or sparsely populated areas, where network deployment costs are high but potential returns are low. However, while there are benefits from such arrangements, they can also limit network operators' ability to differentiate their services, and thereby impact competition.
- 7.17. Mobile network sharing has become more prominent in international jurisdictions in recent years, with network sharing arrangements being encouraged in many countries, including Sweden, Denmark and the UK. In Australia, Optus and VHA currently engage in some infrastructure sharing, but network sharing arrangements do not appear to be used as extensively as overseas. The present of NBN infrastructure may also provide future infrastructure sharing opportunities.
- 7.18. We are interested to understand the level of mobile network infrastructure sharing currently used in Australia, whether there are any impediments to network sharing in Australia either generally or in particular areas, and how such arrangements may impact competition in mobile markets.

## Questions

41. What are the benefits and risks associated with mobile network infrastructure sharing?
42. What is the current level of mobile network infrastructure sharing and use of independent mobile infrastructure provider services in Australia and are there any impediments to the use of these arrangements and services? Are regulatory arrangements aimed at facilitating infrastructure sharing working effectively? Why is infrastructure sharing used less widely in Australia than internationally?

43. Is there the potential for mobile infrastructure sharing to be used more extensively in Australia in the future? In particular, would infrastructure sharing help MNOs expand their mobile networks?

## Data growth and mobile network capacity

- 7.19. As discussed in section 4, consumer demand for data has grown significantly in recent years, and this growth is forecast to continue. Analysys Mason has forecast that in the five years from 2016 to 2021, mobile data traffic will nearly triple. However, it acknowledges that there is a considerable margin for error forecasting traffic growth.<sup>73</sup> The growth in data usage has been facilitated by the rollout of 4G networks and the future deployment of 5G networks will likely see data usage grow further.
- 7.20. This increase in demand for mobile data will create challenges for MNOs in how to deal with the increased traffic over their networks. There will likely be a number of options for MNOs to manage the increase in data traffic. Such options could include upgrading their network technology, increasing the density of base stations, utilising Wi-Fi network handoff, increasing backhaul capacity, reviewing tariff structures and using data traffic management procedures. It will also be important for MNOs to have sufficient spectrum holdings to meet any increase in demand.
- 7.21. We are seeking views on the challenges that data growth will pose for MNOs, how operators may deal with the growth in traffic on their networks and how these options may impact consumers.

### Questions

44. What are the key factors that determine the capacity of a mobile network? How important are spectrum holdings in determining the capacity of a mobile network?
45. What strategies may MNOs utilise to manage increased data traffic on their mobile networks? For example, will MNOs use Wi-Fi handoff to manage data, and how effective will this be? What issues may such strategies raise for competition and consumers?
46. Will new mobile plan features, such as data sharing, change the way consumers use broadband services on their mobile devices?

## The development of Wi-Fi services

### Wi-Fi networks

- 7.22. Wi-Fi networks are networks that use wireless local access network (WLAN) technology to provide broadband services. Carrier Wi-Fi networks are WLAN networks that are deployed by network operators to supply broadband services to the public and are larger in scale than residential Wi-Fi networks. This section concentrates on carrier Wi-Fi.
- 7.23. A number of providers are currently offering broadband services over carrier Wi-Fi networks in Australia, and the availability of such services seems likely to increase. In 2015 Telstra launched its Telstra Air network, a Wi-Fi network of over 300 000 hot spots across Australia. iiNet also provides public Wi-Fi services in a range of areas in Australia, and Optus has entered into partnerships to offer free Wi-Fi services at Westfield shopping centres.

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<sup>73</sup> Analysys Mason, *Updated final Report for the ACMA: Mobile Network Infrastructure Forecasts*, June 2015, p. 33, 37 (Figure 4.26). Detailed model and report accessible [here](#).

7.24. The growth of carrier Wi-Fi networks will likely provide both opportunities and challenges for mobile service providers. Wi-Fi networks can benefit mobile operators by moving traffic from the mobile network to the Wi-Fi network (Wi-Fi handoff or offloading).<sup>74</sup> In addition, the growth of Wi-Fi networks may also increase competition for wireless data services. For example, if fixed-line operators begin to rollout carrier Wi-Fi networks, there is the potential for fixed-line operators to place competitive pressure on mobile service providers.

### **Wi-Fi calling**

7.25. Wi-Fi calling applications allow customers to make and receive calls on their mobile phones, using their mobile phone number, over a Wi-Fi network instead of over a mobile network. They enable operators to provide voice services to their customers in areas where they may not have strong network coverage and may also help to alleviate traffic on the mobile network. Wi-Fi calling applications are developing internationally, and are being offered in Australia, with Optus launching a Wi-Fi Talk application in late 2015.

7.26. We are interested to understand how Wi-Fi calling services are developing in Australia, the benefits and challenges these services pose for operators and how they may impact the regulation of mobile termination services.

### **Questions**

47. How are fixed and mobile network operators developing and using carrier Wi-Fi networks, and how do they plan to use them in the future? Are MNOs currently using active Wi-Fi handoff?

48. How may carrier Wi-Fi network services impact competition for mobile and fixed-line services?

49. Are there any factors which limit the ability of Wi-Fi networks to offer wireless data service of a similar quality to those offered over mobile networks?

50. What are MNOs' plans to offer Wi-Fi calling services? What are the benefits of offering such services, and how will MNOs charge consumers for such services?

51. Does the use of Wi-Fi calling applications impact interconnection agreements? For example, if a call terminates on a phone using a Wi-Fi application will MNOs still charge for termination of the call?

### **Other issues**

7.27. We welcome submissions on any other issues that may be impacting competition or consumers in mobile markets.

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<sup>74</sup> We note that there are two kinds of Wi-Fi handoff, passive and active handoff. Passive handoff occurs when the user of a mobile device elects to use their device over a Wi-Fi network instead of a mobile network. Active handoff occurs where a MNO controls the handoff of traffic from their mobile network to a Wi-Fi network.

## 8. Interaction between fixed-line and mobile services

- 8.1. As noted in section 6, we understand fixed-line voice revenues have been declining over recent years, which appears to be largely driven by the increasing use of mobile services to make voice calls. The uptake of mobile services, and the rapid improvement of mobile network technology, has seen consumers' use of mobile and fixed-line services evolve. This section looks at the current state of substitution between fixed-line and mobile voice and broadband services, how this may change in the future, and possible implications.

### The current extent of fixed-line to mobile substitution

#### Voice services

- 8.2. As discussed in section 4, there appears to be an increasing degree of substitution between fixed-line and mobile voice services. For example, since 2007-08 the number of fixed-line voice services in operation has fallen, while the number of mobile voice services has grown.<sup>75</sup> Further, as at June 2015 the number of mobile voice services in operation was nearly three times the number of fixed voice services in operation.<sup>76</sup> Although we note that this will reflect the individual nature of mobile services, while fixed-line services will generally be acquired for a household or premise.
- 8.3. Mobiles also appear to be the preferred device for making voice calls. Between 2011 and 2015, mobile voice call minutes grew by around 38 per cent (around 14 billion minutes), while fixed-line voice minutes fell by around 45 per cent (around 16 billion minutes).<sup>77</sup> Further, the total volume of mobile originating voice call minutes is over twice the volume of fixed-line voice originating minutes.<sup>78</sup> There are also an increasing number of consumers who have a mobile and not a fixed-line voice service. As at June 2015 29 per cent of Australians had a mobile phone but no fixed-line phone connection.<sup>79</sup>
- 8.4. Some consumers may also see other communication services, such as SMS, OTT messaging services, and social media as a substitute for voice calls. ACMA reports that the use of both OTT instant messaging and social media have increased in recent years. As at May 2015 65 per cent of adults used social networking communications services and 42 per cent had used OTT instant messaging services.<sup>80</sup>
- 8.5. Despite the growing preference for mobile voice services, there are still groups of consumers who value fixed-line connections. In particular, it appears that older Australians continue to use fixed-line voice services, with the proportion of mobile-only voice users decreasing with age. While 56 per cent of 25-34 year olds are mobile voice only, only 20 per cent of 45 to 54 year olds and 9 per cent of over 65 year olds are.<sup>81</sup>
- 8.6. We also consider there are likely to be a range of factors that mean some consumers have, and will retain, a fixed-line phone connection. For example, some consumers,

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<sup>75</sup> ACCC, *ACCC telecommunications reports 2014-15*, p. 14.

<sup>76</sup> *ibid.*

<sup>77</sup> *ibid.*, p. 15.

<sup>78</sup> *ibid.*

<sup>79</sup> ACMA, *Communications report 2014-15*, p. 14.

<sup>80</sup> *ibid.*, p. 50.

<sup>81</sup> *ibid.*, p. 52.

including businesses, may have a preference for fixed-line voice services because they are priced and offered in an attractive way, including for international calls, or offer greater reliability. In other instances, RSPs may require consumers to purchase an underlying fixed-line voice service in order to acquire fixed-line broadband.

## Broadband services

- 8.7. While it appears that there is an increasing degree of substitution between mobile and fixed-line voice services, this is less clear for mobile and fixed-line broadband services. At June 2015 around 21 per cent of Australians used a mobile device for internet access and did not have a fixed-line internet connection.<sup>82</sup> However, the volume of data downloaded over mobile networks was much smaller than data downloaded over fixed-line connections. Data downloaded over fixed-line connections accounted for 97 per cent of total download volume in the three months to June 2015.<sup>83</sup> This illustrates that consumers prefer fixed-line broadband for data intensive activities, such as downloading or streaming content, and that the extent of substitutability between mobile and fixed-line broadband services may differ between consumers depending on their use of data intensive activities.
- 8.8. A key reason for this is likely to be the price of mobile broadband services, which is substantially more expensive than fixed-line broadband services, and mobile data allowances are significantly smaller than fixed-line allowances. For example, our analysis of current retail prices suggests that for approximately \$50 per month a consumer can acquire between 50 and 100 gigabyte (GB) data allowance on a fixed-line network, while they can only acquire around 3 to 10 GB on a mobile handset plan. This means that while mobile and fixed-line speeds may be similar, with 4G services being able to offer comparable speeds to next generation networks, including the NBN, it is not attractive for consumers to use their mobile services for data intensive activities.<sup>84</sup> We note that the actual data rates of mobile services may be affected by the location and usage on the network at a point in time, and that this could impact the extent of substitution.
- 8.9. We are interested to understand whether, and the extent to which, the following may impact on the extent of substitution between fixed-line and mobile broadband services:
- The coverage and reliability of mobile broadband services.
  - The development of new mobile plans by RSPs which allow the sharing of data between a group of users or different devices.
  - The increasing availability of mobile specific applications.

## Technological developments that may increase substitution

- 8.10. There have been significant developments in mobile network technology in recent years, with the rapid deployment and take-up of 4G mobile services. Further, it seems likely that mobile technology will continue to improve with the development of 5G networks. These developments will likely improve the quality of data services available on mobile networks, and may further increase substitution between fixed-line and mobile services.

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<sup>82</sup> ACMA, 9 June 2015, Australians get mobile, viewed 31 July 2016, <http://www.acma.gov.au/theACMA/engage-blogs/engage-blogs/Research-snapshots/Australians-get-mobile>.

<sup>83</sup> ABS, *Internet Activity, Australia, December 2015*, <http://www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0>.

<sup>84</sup> Currently 4G networks can potentially offer maximum data rates of 100 Mbps, however there are many factors that affect mobile network performance including network coverage in the area, the amount of network traffic at any given time, weather conditions, and whether the communications device is static or on the move.

## 4G Networks

8.11. As discussed in section 7, all three MNOs currently operate 3G and 4G mobile networks. 4G networks are capable of speeds of 100 megabits per second (Mbps), whereas 3G networks can offer a maximum speed of about 40 Mbps.<sup>85</sup> All three MNOs now cover extensive areas of Australia with their 4G networks. Telstra's 4G network covers 96 per cent of the population, Optus' 90 per cent, and VHA's covers around 91 per cent of the population.<sup>86</sup> We understand the performance of 4G networks will likely improve further as newer 4G technologies, such as LTE-Advanced, are adopted.<sup>87</sup>

## 5G Networks

8.12. We understand that operators are also beginning to consider the next generation of mobile technology, 5G networks. In Australia, and internationally, commercial deployment of such networks is expected to commence by 2020.<sup>88</sup> However, there is the potential for these networks to be rolled out more rapidly with developments in the US suggesting that commercial trials of the service could begin as early as 2017.<sup>89</sup>

8.13. While 5G standards are still being defined, it is expected that 5G services will have the following characteristics:

- Data rates of between one to 10 gigabits per second (Gbps).
- Lower latency, greater bandwidth and the ability to support more connections, than 4G networks.
- Reduced energy usage and greater battery life for 5G devices.<sup>90</sup>

8.14. It is also expected that these networks will have a different architecture to 4G networks with smaller cells and higher frequency spectrum being used. The use of smaller cells will lead to denser mobile networks, which will likely require the deployment of additional fibre backhaul links. This could see competition in transmission markets having a greater impact on the provision of mobile services.

8.15. The evolution to 5G technologies will likely present a number of opportunities for consumers and mobile service providers. For example, international developments suggest that 5G technologies could be used to provide fixed wireless broadband services in the future.<sup>91</sup> Further, it is expected that 5G technology will improve capacity of mobile networks, which will assist operators deal with increased data traffic and offer higher speed data services.<sup>92</sup>

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<sup>85</sup> Telstra, Our Network, viewed 25 July 2016, <https://www.telstra.com.au/coverage-networks/our-network>. We note that faster speeds may sometimes be available.

<sup>86</sup> Telstra, Our Network, viewed 25 July 2016, <https://www.telstra.com.au/coverage-networks/our-network>, Optus, *Optus to Boost Regional Mobile Coverage with 1800 MHz Spectrum*, media release, 8 February 2016. Vodafone, Our Network, viewed 25 July 2016, <http://www.vodafone.com.au/network>.

<sup>87</sup> Mobile Network Guide, Mobile data speeds in Australia, viewed 26 July 2016, [http://www.mobilenetworkguide.com.au/mobile\\_data\\_speeds.html](http://www.mobilenetworkguide.com.au/mobile_data_speeds.html). Note LTE-Advanced networks, which aggregate spectrum in two bands, are capable of high data rates in the range of 300 Mbps.

<sup>88</sup> Australian Communications and Media Authority, *5G and mobile network developments – Emerging issues Occasional Paper*, ACMA, February 2016, p. 1. Accessible [here](#).

<sup>89</sup> Verizon, *Verizon 5G trials driving ecosystems towards rapid commercialization*, viewed 25 August 2016, <https://www.verizon.com/about/news/verizon-5g-trials-driving-ecosystem-towards-rapid-commercialization/>

<sup>90</sup> ACMA, *5G and mobile network developments – Emerging issues Occasional Paper*, p. 7.

<sup>91</sup> Thompson Reuters, *VZ – Q1 2016 Verizon Communications Inc Earnings Call*, 21 April 2016, p. 3.

<sup>92</sup> ACMA, *5G and mobile network developments – Emerging Issues: Occasional Paper*, p. 7.

## Questions

52. What factors influence consumers' choice of communications platform, and how are these changing? Please provide details and examples.
53. What is the current level of substitution between fixed-line and mobile voice and broadband services?
54. Are there factors currently limiting further substitution between mobile and fixed-line voice and broadband services? If so, what are these factors?
55. How will substitution between fixed-line and mobile voice and broadband services develop in the future? How will the development of 5G mobile networks and the growth of Wi-Fi services impact substitution between the two services?
56. Why are mobile broadband services currently more expensive than fixed-line data services? Is this likely to be different with the development of 5G mobile networks and will mobile broadband services likely become cheaper?
57. How is substitution between fixed-line and mobile services developing internationally, and how will developments in Australia compare to those overseas?

## Implications of fixed-line to mobile substitution

- 8.16. If the substitution between fixed-line and mobile services increases, mobile service providers will place competitive pressure on fixed-line service providers. This includes the services provided over Telstra's legacy access network during the transition period, as well as those provided over the NBN.
- 8.17. As outlined in section 6, as this transition occurs, there are several potential issues which could impact how competition evolves in the supply of fixed-line voice and broadband services. We are interested to understand the extent to which fixed-line to mobile substitution could further impact on competition both during this transitional period and when next generation networks, including the NBN are fully rolled out. For example, what the following may mean for competition:
  - Consumer preferences and use of fixed-line and mobile services, including in response to changed product offerings and pricing of fixed-line and mobile services.
  - The structure of the market, including whether service providers are able to offer fixed-line and mobile bundles, or mobile only, and what that might mean for how the market structure may evolve.
  - The incentives for service providers to develop competing mobile products and pricing.
  - Any decisions regarding fixed-line and mobile network investment and use and what the nature of those impacts might be.

## Questions

58. What are the possible implications for competition in the fixed-line voice and broadband markets if further substitution occurs between fixed-line and mobile services? Please provide details.
59. Could further industry consolidation occur as a result of additional fixed-line to mobile substitution? If so, please outline how this may occur and provide examples if possible. What would be the impacts of any such consolidation?



60. How could investment and use decisions be impacted if fixed-line to mobile substitution continues to occur? What might be the different implications for the fixed-line NBN and non-NBN networks and mobile networks?
61. What would be the impact on the pricing approaches for fixed-line voice and broadband services if further fixed to mobile substitution occurs and demand for fixed-line services is reduced? In particular, what might be the implications for the current pricing?
62. Are there any current regulatory arrangements that may need to be adjusted to deal with increased fixed to mobile substitution? In particular, will the ACCC's regulation of fixed-line services need to change?
63. Will existing or new regulatory arrangements be required to effectively deal with fixed to mobile substitution issues? For example, will the regulation of NBN and other superfast networks need to be adapted if there is increased competition from mobile services?

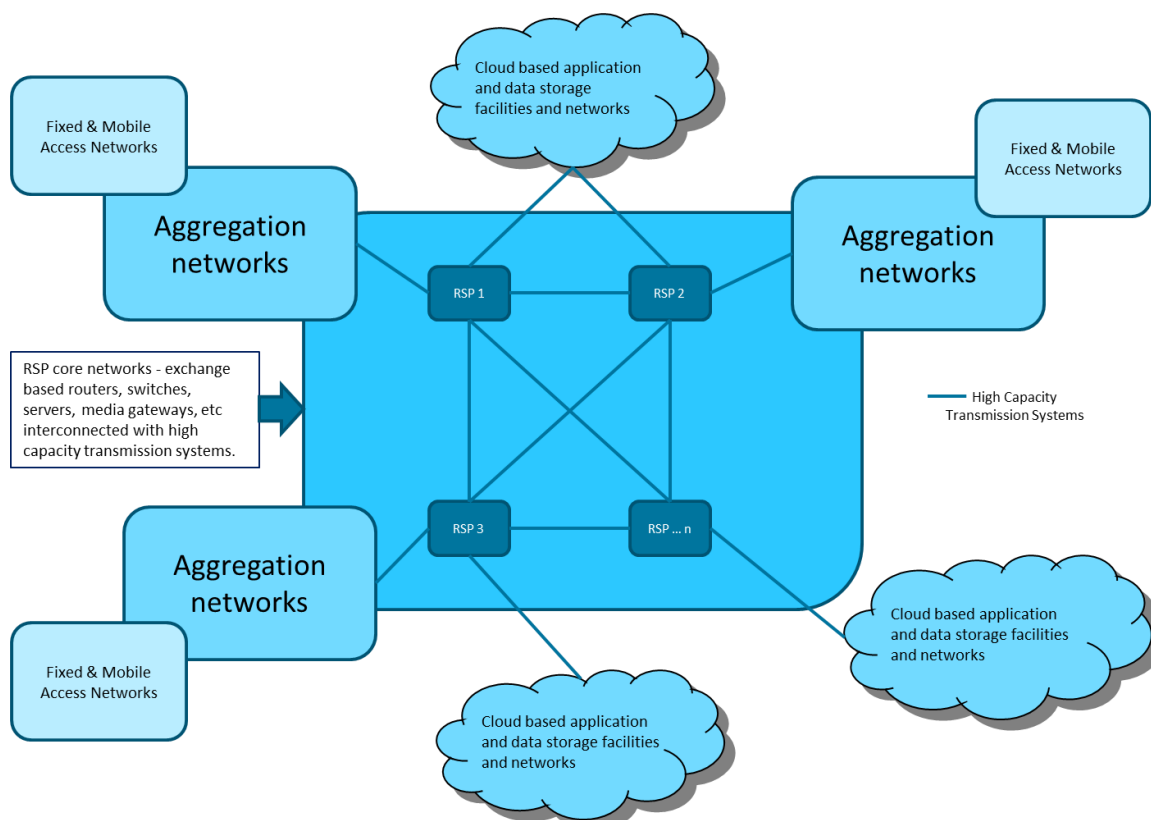
## Other issues

- 8.18. We welcome submissions on any other issues that are limiting or facilitating substitution between services and the implications of increasing substitution of mobiles for fixed-line services.

## 9. Core and transmission networks and services

- 9.1. Core networks refer to the components of a network where traffic from end-users connected via an access network is aggregated and transmitted to central servers for routing and/or interconnection with other networks and services. These network components comprise high capacity transmission links, switches and routers. The core and aggregation elements of communications networks are usually common to all access network technologies whether fixed-line or mobile.
- 9.2. Being central to the operation of networks, effective competition and/or effective regulation of the provision of core and aggregation network services is important to encourage efficient use and investment in facilities and to ensure that competitive outcomes are promoted in downstream services. Historically, the domestic transmission capacity service (DTCS) has been a focus of regulation due to its natural monopoly characteristics in some geographic areas. However, as the communications sector is undergoing significant changes, we are seeking to understand the implications of these changes on the operation and development of all elements of transmission, core and aggregation networks.
- 9.3. Figure 7 below depicts the relationships between the access and core elements of the communications service provider's network and (leased or owned) transmission and interconnection links from the core to other networks including other RSPs, cloud computing services and data centres.

**Figure 7 – IP networks and services**



## Internet interconnection

- 9.4. Internet services depend on the exchange of traffic between service providers both domestically and internationally to ensure any-to-any connectivity and that Australians have access to content and services connected to different networks. Without this interconnection, end-users of one network would not be able to access content or communicate with the end-users of another network without also joining that network.
- 9.5. As a key input into downstream internet services, it is important that all service providers can obtain interconnection on competitive terms so as to not deter entry or expansion in the supply of downstream services. However, the suppliers of domestic interconnection services will typically be other service providers with which the service provider competes in downstream markets.
- 9.6. We understand that settlement-free arrangements to exchange traffic (known as 'peering') exist between Telstra, Optus, TPG and Verizon. The aim of peering arrangements is to avoid transaction costs when traffic volumes exchanged between the networks are roughly balanced, and/or where the net costs of supplying the service are minimal.
- 9.7. Smaller service providers do not have access to these peering arrangements with larger carriers but rather acquire a wholesale service to exchange traffic with them (known as 'transit') in order to provide their customers with access to these networks. This arrangement reflects international practice for internet interconnection but may give Telstra, Optus, TPG and Verizon a cost advantage over smaller service providers. It may also allow these larger networks to set price and non-price terms to their advantage including controlling the locations where traffic will be exchanged or to act opportunistically in directing traffic over these tolled links.
- 9.8. We understand that smaller service providers may seek a range of interconnection services to exchange traffic with other network operators such as:
  - direct interconnection with another network that allows the exchange of two networks' traffic only, which is typically only offered by other ISPs of a similar size
  - a hybrid transit product that can provide a service provider with comprehensive domestic and international connectivity but does not provide the ISP with a high degree of control over how it's traffic is routed
  - domestic and/or international transit services that provide higher assurance to the service provider as to whether its traffic will transit via domestic links or international links.
- 9.9. Smaller service providers can meet some of their connectivity needs (traffic outside of the networks of Telstra, Optus, TPG and Verizon) by exchanging traffic with other service providers and content providers at public exchanges. These public exchanges generally provide a low cost way for small service providers to exchange traffic as they involve a fixed cost for locating infrastructure irrespective of traffic volumes.
- 9.10. Concerns regarding peering and transit interconnection arrangements have been raised with us a number of times. In 2003-04 we conducted an inquiry into the declaration of an interconnection service. In January 2005 we decided against declaring such a service largely because it did not have sufficient information regarding costs or whether the current arrangements optimally reflected the relative values and costs of providing interconnection.<sup>93</sup>

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<sup>93</sup> ACCC issues final report on internet interconnection, media release, ACCC, 19 January 2005. Accessible [here](#).

- 9.11. We understand that industry consolidation has increased the proportion of total internet traffic controlled by Telstra, Optus, TPG and Verizon. As a consequence it is likely that there has been a commensurate reduction in traffic exchanged at public exchanges. Further, the volume of traffic passing over interconnection or transit links is likely increasing significantly given the overall trends being observed in data volumes. This may have implications for interconnection costs for smaller service providers.
- 9.12. Given industry consolidation and continued concerns regarding smaller service providers' access to interconnection, we would like to understand how the availability and pricing of interconnection products is impacting on barriers to entry in the provision of downstream services. We are also interested to test whether operational considerations such as where traffic exchange is occurring and the degree of control that smaller service providers have over the routing of their traffic that passes over transit links is raising costs to smaller service providers in accessing interconnection products.

### Questions

64. Have industry developments (such as traffic growth, industry consolidation etc.) resulted in changes to internet interconnection arrangements or changed the impact of the existing interconnection arrangements on downstream competition? If so, how?
65. How would you describe the current state of competition for the provision of domestic interconnection and/or transit? Who competes for the provision of domestic interconnection/transit to service providers? What inclusions do they offer? How are they offering to charge for interconnection/transit?
66. Does the current availability and/or pricing for interconnection/transit present barriers to entry/expansion or impede competition for smaller service providers in downstream markets? If so, how?
67. Are current interconnection arrangements between Telstra, Optus, TPG and Verizon, and smaller service providers inhibiting more efficient practices, technologies, etc.? If so, how are they having an impact?
68. What alternatives do smaller service providers have to exchange traffic or obtain access to the larger networks (such as public peering, wholesale providers or international routes)? To what extent do these alternatives substitute for domestic transit? Do smaller service providers generally acquire domestic interconnection/transit bundled with other services? If so, what are these other services? Do they have a choice whether to buy an unbundled service?
69. Are smaller service providers able to acquire Layer 2 type interconnection products that suit their needs and allow them flexibility if they seek to direct and monitor traffic over the most efficient routes? Are there other products smaller service providers seek which are not available? If so, please describe what they are and why they are needed.
70. With the growth of independent data centres, where is the majority of interconnection now occurring? Are smaller service providers required to incur significant additional costs to interconnect at a location of the sellers' choosing? If so, please explain why.
71. Do Australia's interconnection arrangements differ to those in comparable international jurisdictions? If so, how and why?

### Transmission and dark fibre

- 9.13. Transmission refers to the symmetric and uncontended capacity data links used to carry communications traffic between network locations. Transmission links are constructed to form a communications network from aggregation points to the core

elements of the network. There are various types of transmission services ranging from long distance high capacity routes such as inter-capital, capital/regional-regional links and links to NBN POIs to inter-exchange links between exchange service areas, and tail-end links which are usually shorter, lower capacity links from an exchange or point of interconnect into an end-user's building.<sup>94</sup>

- 9.14. Transmission can be provided over many technologies, however, fibre is the dominant technology due to its superior capacity particularly for long distance and high capacity requirements such as connecting to NBN POIs.<sup>95</sup> For regional mobile networks, fibre appears to be progressively displacing traditional microwave backhaul particularly on aggregated 'trunk' routes as capacity requirements grow to serve mobile data demand.
- 9.15. We regulate access to certain domestic transmission services to ensure that competing service providers can provide services to end-users particularly in areas where natural monopoly characteristics are present. In general, competition is most vigorous in metropolitan areas and on long distance routes between capital cities and large regional centres. Regional transmission routes and tail-end links are most likely to exhibit natural monopoly characteristics.
- 9.16. Where they do not own transmission infrastructure, service providers rely on buying managed transmission services from transmission network owners or wholesalers to provide communications services to end-users. Therefore, access to transmission services is an important element in ensuring connectivity and that Australians receive competitive communications services. International transmission is also an important element of the communications network so that domestic Australian networks can provide international connectivity to end-users. It is therefore important that international capacity is able to respond to growing Australian demand for data.
- 9.17. Wholesale transmission prices are generally determined by the capacity and link distance sought and whether the service is 'protected' (includes a redundant link). Duplication of transmission infrastructure is unlikely to be economic in some geographic areas as the level of contestable demand may not justify the level of investment required. For example, Telstra has a transmission link to Tasmania from the mainland which includes a redundancy link. While a second link has been built by Basslink utilising its existing electricity transmission infrastructure, high cost barriers mean that it lacks geographical redundancy which is an important attribute sought by acquirers of transmission services.
- 9.18. In April 2016 we released a final access determination (FAD) for the regulated DTCS representing significant reductions on the prices set in the previous access determination in 2012. These reductions reflected the downward pressure on prices caused by competition in the commercial unregulated transmission market.<sup>96</sup> We expect that lower DTCS prices will enhance retail competition for communication services, particularly in some areas of regional Australia.
- 9.19. Growing data consumption on both fixed-line and mobile networks across Australia is likely to continue to drive demand for transmission services. This demand may be met by greater use of existing transmission services (whether regulated or unregulated), investment in new transmission links and facilities, and the use of existing dark fibre infrastructure. Dark fibre refers to the use of unused strands of fibre

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<sup>94</sup> ACCC, *Domestic Transmission Capacity Service – Discussion Paper*, ACCC, July 2013, p. 6. Accessible [here](#).

<sup>95</sup> ACCC, *Domestic Transmission Capacity Service - Final Report*, ACCC, Canberra, March 2014, p. 33. Accessible [here](#).

<sup>96</sup> ACCC, *Public Inquiry to make a Final Access Determination for the Domestic Transmission Capacity Service*, ACCC, Canberra, April 2016, p. 2. Accessible [here](#).

optic cable by an acquirer to activate and form part of their own telecommunications network.

- 9.20. Recent changes in the industry, particularly the consolidation of key players may be impacting on incentives for network owners to offer access to unregulated transmission facilities such as dark fibre. For example, some previously independent wholesalers of dark fibre networks have been acquired by vertically integrated service providers, which now appear to be focusing on supplying their own downstream operations. Continuing this consolidation trend, in July 2016, Vocus Communications Limited, a vertically integrated supplier of retail and wholesale communications services announced its intention to acquire Nextgen Group Pty Ltd, a wholesale provider of transmission.<sup>97</sup>
- 9.21. While we consider that dark fibre is not a direct substitute for the DTCS, non-vertically integrated service providers may increasingly seek access to dark fibre services to provide competitive high-speed broadband services to end-users.<sup>98</sup> As dark fibre services can generally be acquired at a fixed price and a carrier installs its own electronics, it can provision very high capacity links, which may be more cost effective than a managed DTCS service where leased capacity is a significant cost driver. It may therefore be an important wholesale input for RSPs seeking to establish scalable transmission capacity to meet rapid growth in demand for data. Many European jurisdictions such as France and Germany mandate access to dark fibre and the UK regulator has recently ordered incumbent BT to offer dark fibre access by October 2017.<sup>99</sup>
- 9.22. We are seeking to understand how the DTCS FAD, along with other developments in the industry may impact on the availability of the full range of transmission services and the effect on downstream markets.

## Questions

72. What is the likely impact of the reduction of the regulated price of the DTCS service over the next few years?
73. Has the transmission market, including access to regulated routes, been impacted by industry changes (such as growth in traffic, industry consolidation etc.)? If so, how?
74. How feasible are non-fibre transmission technologies in meeting increasing data capacity requirements? If fibre becomes essential for data transmission, what impact will this have on competition?
75. Is transmission investment keeping up with demand? If not, what impact is this having on availability and/or pricing of transmission and on downstream markets?
76. Are there impediments to acquiring cost effective transmission? Please answer by reference to the transmission types noted above. What impacts does this have on competition in respective downstream markets?
77. Is there sufficient capacity and redundancy on international transmission routes to accommodate the growth in traffic over the next few years? If not, how is this likely to impact on competition for the provision of internet services in Australia?
78. How likely is it that issues around redundancy for Bass Strait transmission will be rectified by future infrastructure deployments? What is the potential impact for end-users in Tasmania should these redundancy issues not be addressed?

<sup>97</sup> ACCC, Public registers, Vocus Communications Ltd – proposed acquisition of Nextgen Group Pty Ltd. Accessible [here](#).

<sup>98</sup> ACCC, *Domestic Transmission Capacity Service - Final Report*, p. 29.

<sup>99</sup> Ofcom, *Ofcom demands better business services from BT, media release, 22 March 2016*. Accessible [here](#).

79. Is access to dark fibre becoming more important in light of rapid growth in demand for data? If so, why? Do access seekers encounter issues in accessing dark fibre? How is the availability and pricing of dark fibre likely to change in response to broader market developments?
80. What potential issues could the provision of dark fibre raise for suppliers?

## Access to facilities

- 9.23. Access to telecommunication facilities is an essential input for an access seeker seeking to compete in downstream markets. Broadly, telecommunication facilities are any part of the infrastructure of a telecommunications network including lines, equipment, towers, masts and underground facilities associated with telecommunications networks.<sup>100</sup>
- 9.24. Telecommunication facilities are often located underground (ducts), aboveground (mobile towers) or inside buildings (e.g. in data centres, Telstra's exchanges or high rise buildings).
- 9.25. Access to telecommunication facilities is regulated under the Telco Act and the CCA, both of which contain an obligation on owners or operators of facilities to provide access. Compliance with the facilities access obligation is a standard carrier licence condition under both Acts<sup>101</sup>, the Telstra exchange facilities record keeping rules and the Facilities Access Code also provide a means of regulatory oversight to ensure timely access to facilities.<sup>102</sup>
- 9.26. Changes to the design of telecommunications networks including increased aggregation of services at POIs and new methods of providing services (such as software defined networking) may impact on the way services are traditionally accessed. For example, space for telecommunications equipment to support new technologies is increasingly being sought in specialised data centres. Access to equipment space in data centres in order to interconnect with other telecommunications networks is important for the provision of downstream wholesale and retail services.

## Questions

81. The Telco Act provides access to towers, tower sites and eligible underground facilities and is supported by the ACCC's Facilities Access Code. Have access seekers experienced difficulties in obtaining access? If so, please provide details. Are there any impediments to accessing other telecommunication facilities not covered by the Facilities Access Code that create barriers for the provision of telecommunications services?
82. Is access to telecommunication facilities provided on reasonable terms and conditions?

## Cloud computing and data centres

- 9.27. Cloud computing services allow end-users to store data in an external environment (in central cloud storage/data centres) which they can access when connected to the internet. The benefits to consumers and businesses of these services include the ability to access data remotely from mobile and smartphone devices. Consumer oriented examples of cloud services include web-mail, social media and cloud 'back-

<sup>100</sup> *Telecommunications Act 1997*, section 7, p. 15.

<sup>101</sup> *Competition and Consumer Act 2010*, section 152AZ and *Telecommunications Act 1997*, Schedule 1.

<sup>102</sup> *A Code of Access to Telecommunications Transmission Towers, Sites of Towers and Underground Facilities*, October 1999. Accessible [here](#).

up' storage services. Cloud services are also important in supporting businesses and their employees to work with software and data remotely and collaborate across geographic sites. Many of these services are provided by international platforms and as such the end-users' data can be stored anywhere in the world.

- 9.28. Coupled with the adoption of cloud computing solutions by consumers and businesses has been the increased growth of specialised data centres. Purpose built data centres host cloud infrastructure and platforms and enable interconnection with networks to reach end-users. These data centres may also serve as public interconnection and peering centres, such as Megaport.
- 9.29. The growth of the digital economy and demand for connectivity appears to be supporting strong growth in both cloud computing services and underlying infrastructure such as data centres with both domestic (often network owners and independents) and international players (often cloud computing specialists) investing strongly in these activities. Australian businesses are increasingly embracing the digital economy and cloud software solutions which bring benefits in terms of additional functionality and efficient use of information and communications technology (ICT) services. For example, cloud computing can reduce the need for businesses to maintain expensive computing hardware, dedicated storage space and processing software. It also provides efficiencies in analysing and processing data which can provide further opportunities for businesses.
- 9.30. The cumulative effect of this shift is likely to be a driver of productivity in the Australian economy. We are seeking to understand the potential implications of developments in cloud computing to ensure that these productivity benefits can be realised. For example, we would like to understand to what extent control over data and other inputs could be used to impede entry and competition or impact on investment in the cloud computing or related markets.

## Questions

83. Is the geographic market for cloud computing services a national or international market? To what extent is data held off-shore, and is this a concern?
84. Is the supply of cloud computing services keeping up with demand? Are there currently any impediments or barriers for future entry, expansion or investment into the provision of cloud services and data centres? Does the control of data by cloud service providers give rise to new bottlenecks or data portability issues? If so, what is causing these bottlenecks? Is it significantly more difficult for end-users to change providers if data is held by one provider or on one system?
85. Is vertical integration by local RSPs into cloud computing occurring (for example through bundling with carriage services)? Do international cloud service providers have a competitive edge over local providers? If so, why and what is the impact on competition in Australia?
86. How is the rise of purpose-built data centres impacting on traditional arrangements for networks to interconnect and co-locate?

## Software defined networking

- 9.31. One of the major technological trends in the communications sector is the transition from networks that are operated using dedicated network hardware towards networks that are provisioned and managed using software. Network operators are increasingly adopting network functions virtualisation (NFV) and software-defined networking (SDN) technologies for this purpose.



- 9.32. Traditionally, network operators used function-specific hardware and software to provision and manage their networks. Network operators that adopt NFV employ more generic computer hardware and then use software to tailor this hardware to perform specific network functions. This allows network operators to minimise network cost and to increase the flexibility of their networks.
- 9.33. SDN is a term that refers to different kinds of technologies that increase the separation between a network's control functions and traffic handling functions (i.e. routers and switches), allowing the network to be more easily programmable through software. This gives network operators greater control and flexibility over traffic levels, quality of service and cost.
- 9.34. While the take up of NFV and SDN technologies is still in the early stages, some industry stakeholders are raising concerns that as the use and importance of these technologies evolves over time, the manner in which these technologies are implemented could potentially impact on competition in the provision of communication services.
- 9.35. We would like to understand how the use of these technologies is expected to evolve over time and whether there are likely to be any potential competition or regulatory issues associated with the adoption of these technologies in Australia. In particular, we are interested in whether there are any impediments to SDN and/or NFV products and/or services being offered by RSPs and adopted by end-users.

### **Questions**

87. What trends are emerging in the adoption of SDN and/or NFV technologies that are likely to impact competition in the communications industry in Australia?
88. What SDN and/or NFV products and/or services are currently being offered in Australia? What additional products and/or services are likely to be offered in the next five years?
89. Are there any impediments to the adoption of SDN and/or NFV products and/or services by end-users and/or service providers? If so, provide details.

## 10. Acronyms and Abbreviations

<b>3G</b>	Third generation
<b>4G</b>	Fourth generation
<b>5G</b>	Fifth generation
<b>ACCC</b>	Australian Competition and Consumer Commission
<b>ACMA</b>	Australian Communications and Media Authority
<b>ADSL</b>	Asymmetric Digital Subscriber Line
<b>AER</b>	Australian Energy Regulator
<b>AFL</b>	Australian football league
<b>Apps</b>	Applications
<b>AVC</b>	Access Virtual Circuit
<b>BT (Group)</b>	British Telecommunications (Group)
<b>CCA</b>	<i>Competition and Consumer Act 2010</i>
<b>CCSS7</b>	Common channel signalling system 7
<b>CPE</b>	Customer premises equipment
<b>CPI</b>	Consumer price index
<b>CVC</b>	Connectivity Virtual Circuit
<b>DSL</b>	Digital subscriber line
<b>DTCS</b>	Domestic transmission capacity service
<b>EPL</b>	English Premier League (soccer)
<b>FAD</b>	Final access determination
<b>FTA</b>	Free to air
<b>GB</b>	Gigabyte
<b>Gbps</b>	Gigabits per second
<b>HD</b>	High Definition
<b>HFC</b>	Hybrid Fibre Coaxial
<b>ICT</b>	Information and communications technology
<b>IoT</b>	Internet of things
<b>IP</b>	Internet protocol
<b>IPTV</b>	Internet protocol television
<b>ISDN</b>	Integrated services digital network
<b>ISP</b>	Internet service provider
<b>LTE</b>	Long-term evolution

<b>M2M</b>	Machine-to-machine
<b>Mbps</b>	Megabits per second
<b>MNO</b>	Mobile network operator
<b>MVNO</b>	Mobile virtual network operator
<b>NBN</b>	National Broadband Network
<b>NFV</b>	Network functions virtualisation
<b>NRL</b>	National Rugby League
<b>OTT</b>	Over the top
<b>POI</b>	Point of Interconnection
<b>RSP</b>	Retail service provider
<b>SAU</b>	Special Access Undertaking
<b>SDN</b>	Software defined networking
<b>SIM</b>	Subscriber identity module
<b>SIP</b>	Session initiation protocol
<b>SME</b>	Small and medium enterprises
<b>SSU</b>	Structural Separation Undertaking
<b>STV</b>	Subscription television
<b>SVOD</b>	Subscription video on demand
<b>TB</b>	Terabyte
<b>UK</b>	United Kingdom
<b>US</b>	United States
<b>UNI</b>	User network interface
<b>USB</b>	Universal serial bus
<b>VHA</b>	Vodafone Hutchison Australia
<b>WLAN</b>	Wireless local access network technology