Communications Sector Market Study

Final report

April 2018

ACCC communications sector market study final report

Consumers are getting better value, but there is considerable concentration in key service markets.

MOBILE PHONE

3.1% ▼
real decline in prices in 2016-17

49% ▲
in data quotas in 2016-17

89%
of services supplied by **three providers** in 2017

NBN

4.5% ▼
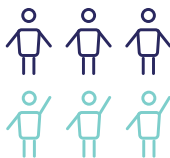real decline in prices in 2016-17

24% ▲
in data quotas in 2016-17

94%
of services supplied by **four providers** in 2017

The NBN is more than half way through its rollout however for some consumer segments wireless may increasingly be a viable substitute.

AVAILABLITY

NBN available to **6.3 million** premises with **3.6 million** activations by March 2018

Regional Australians have been among the first to benefit from the NBN with **56% of activations in regional Australia**

POTENTIAL SUBSTITUTES

100GB+
Download quotas on some wireless plans have reached over 100GB

30%
of fixed broadband subscribers would consider switching to a wireless service

Some immediate NBN issues are being tackled.

NBN 50Mbps and CVC capacity price promotion

ACCC inquiry into **NBN wholesale service standards**

ACMA imposing rules to **improve NBN consumer experience**

37% increase in CVC between September and December 2017

There is rapid growth and development of emerging services and also some potential issues to monitor.
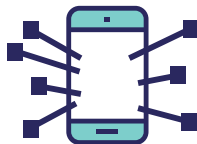
80% of businesses used cloud computing in 2016

Over **$1b** Australian data centre market in 2017

Industry predicts content delivery networks will carry approximately **70% of all traffic** by 2021

Industry predicts the Internet of Things will provide significant uplift to GDP by 2025

OTT services continuing to transform use of communications networks and disrupt markets

While e-SIMs may increase competition between mobile service providers there may be barriers for smaller providers in offering e-SIM devices

Fixed and wireless networks will continue to evolve, influenced by technology, new services, consumer preferences and government policy.

NBN

Potential for NBN to be split into competing networks

INCREASING CONVERGENCE

Wireless

Fixed

WIRELESS

5G

Contents

Glossary

3G	3rd generation mobile communications technology
4G	4th generation mobile communications technology
5G	5th generation mobile communications technology
ACCAN	Australian Communications Consumer Action Network
ACCC	Australian Competition and Consumer Commission
Access seekers	Telecommunications companies that seek access to declared services (that is, the right to use the declared service)
ACL	Australian Consumer Law
ACMA	Australian Communications and Media Authority
ADSL	Asymmetric digital subscriber line
ARPU	Average revenue per user
AVC	Access Virtual Circuit
AVOD	Advertisement funded video on demand
B2B	Business to business
BPMR	Broadband performance monitoring and reporting program
CCA	*Competition and Consumer Act 2010* (Cth)
CDN	Content delivery network
CIS	Critical Information Summary
CLI	Caller Line Identification
CSG	Customer Service Guarantee
CVC	Connectivity Virtual Circuit
Dark fibre	Uncontended, unlit point-to-point fibre optic cable that requires connecting equipment and management system to supply a transmission service
Data centre co-location service	Data centre where a business can rent space for servers and other hardware and connect them to network service providers
DBDR	Dimension Based Discount for service providers
DSLAM	Digital Subscriber Line Access Multiplexer
DTCS	Domestic transmission capacity service
ESAs	Exchange Service Areas
FAB	Fibre Access Broadband
FTA	Free-to-air
FTTB	Fibre to the building
FTTC	Fibre to the curb
FTTN	Fibre to the node
FTTP	Fibre to the premise
FTTx	Fibre to the x, where 'x' refers to any or all of the above
Gbps	Gigabits per second
GHz	Gigahertz
HFC	Hybrid Fibre Coaxial
HHI	Herfindahl-Hirschman Index
IaaS	Infrastructure as a Service

IoT	Internet of Things
IoTAA	IoT Alliance Australia
IP	Internet Protocol
IPTV	Internet Protocol television
ISP	Internet service provider
IXPs	Internet exchange points
Layer 2	The data link layer of the open systems interconnection model. The data link layer provides a connection between two fixed end points in a network to facilitate the transmission of data traffic.
Layer 3	The network layer of the open systems interconnection model. The network layer provides a switching function that enables the routing of traffic to its destination address.
LPWA	Low-power wide-area, a wireless telecommunications technology that allows a low bit rate signal to be transmitted over a large area
LSS	Line Sharing Service
LTIE	Long-term interests of end users
M2M	Machine to machine
Mbps	Megabits per second
MNO	Mobile network operator
MVNO	Mobile virtual network operator
NBN	National Broadband Network
NBN Co	NBN Co Limited
NNI	Network to Network Interface
OECD	Organisation for Economic Cooperation and Development
Ofcom	Office of Communications, UK communications regulator
OTT	Over-the-top content/services
PaaS	Platform as a Service
POI	Point of Interconnection
POP	Point of Presence
RBS	Regional Broadband Scheme
RKR	Record keeping rule—under s. 151BU of the CCA, the ACCC has the power to make an RKR and require that carriers and carriage service providers comply with it. The rules may specify what records are kept, how reports are prepared and when these reports are provided to the ACCC.
SaaS	Software as a Service
SAU	Special Access Undertaking
SBAS	Superfast Broadband Access Service
SMS	Short Message Service
STV	Subscription TV
SVOD	Subscription video on demand
TC1	NBN Traffic Class 1—highest priority, dedicated capacity traffic class, suitable for voice
TC2	NBN Traffic Class 2—business grade traffic class used for delivering high-speed symmetrical internet (supports video conferencing, IPTV, gaming)

TC3	NBN Traffic Class 3—designed to give priority to transactional data such as business applications running on WAN
TC4	NBN Traffic Class 4—standard, best efforts traffic class used for delivering residential and small business broadband services
TCP Code	Telecommunications Consumer Protections Code
TCPSS Act	*Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth)
Tier 1 service provider	Large service providers who are vertically integrated and supply wholesale and retail NBN services
Tier 2 service provider	Service providers that intend to directly connect to the NBN and are using NBN wholesale aggregation services prior to reaching the scale at which this is commercially viable
Tier 3 service provider	Service providers that do not intend to directly connect to the NBN and will use NBN wholesale aggregation services on an ongoing basis
TIO	Telecommunications Industry Ombudsman
TTOV	Telstra, TPG, Optus, Verizon
TVOD	Transactional video on demand
ULLS	Unconditioned Local Loop Service
UNI-V	User Network Interface—Voice, connects the user voice interface to the voice network over the NBN
USO	Telecommunications Universal Service Obligation
VoIP	Voice over Internet Protocol
WAN	Wide Area Network
WBA	Wholesale Broadband Agreement
WiMAX	Worldwide interoperability for Microwave Access
WLR	Wholesale Line Rental

1.   Executive summary

1.1   Communications sector market study

We have undertaken this market study at a time of significant change in the Australian communications sector. We noted at the start of the inquiry that the sector is subject to rapid changes in technology, product innovation and consumer preferences as well as major structural change as we transition to the NBN (National Broadband Network). We set out to assess the implications of these trends for the state of competition in the supply of communications services, to examine any identified competition or consumer concerns and to identify actions needed to ensure regulation is responsive to the requirements of the changing communications landscape. 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.

Evidence of this rapid pace of change is the extent of developments we have witnessed since we released our Draft Report in October 2017. At that time, the NBN rollout was approaching its mid-point and a lot of attention was being directed at consumers' experience during the migration from legacy services and with the services supplied to them over the NBN. We are encouraged that since that time, there have been a number of actions taken by Government, regulators and industry to address some of the immediate issues of concern about services provided over the NBN identified in our Draft Report.

It is important that the problems that have emerged during the current state of transition of the Australian communications sector are quickly resolved. This is because communications services are the key foundation for the digital transformation of the economy and the productivity, innovation and efficiency gains that it will bring. In addition, they are essential for all Australians to undertake daily activities, including maintaining contact with family and friends, and accessing commercial, government, medical and education services.

The Australian Competition and Consumer Commission (ACCC) uses market studies as a tool to improve our understanding of specific sectors and to help promote effective competition in markets. We undertook this market study to provide a wide-ranging stocktake of how Australian communications markets are evolving in the face of recent and prospective changes.

We have considered the state of competition in the supply of retail communications services to individual, residential and small business consumers and also in the markets for intermediate inputs and other wholesale services. Figure 1.1 depicts a generalised communications supply chain and illustrates the coverage of the market study.

Figure 1.1: The communications supply chain—how voice and broadband services are delivered to consumers over next generation networks
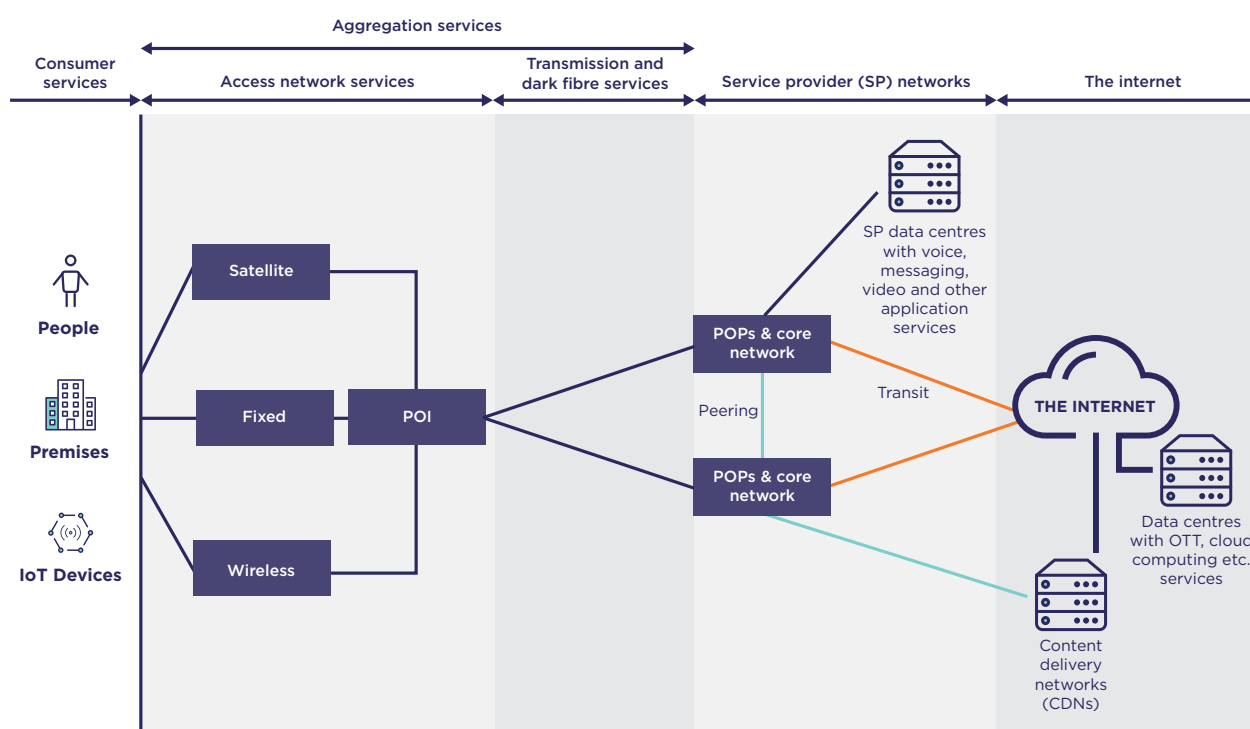
Significant change is affecting how this communications supply chain functions, including the nature and extent of competition in retail and wholesale markets. This change includes both structural reform, as a result of policy initiatives (at the centre of which is the rollout of the NBN) and the rapid pace of technological advancement and product innovation that is occurring globally.

We have taken a five year horizon for considering likely competition and efficiency developments in communications markets. This time period covers the completion of the NBN rollout, the expected initial deployment of 5G wireless technology and settling of the future market structure for the wholesale provision of fixed broadband services as part of NBN Co Limited (NBN Co)'s eventual privatisation.

Reflecting the dynamic nature of communications markets, the period of the study has allowed us to observe developments that have occurred in parallel including those prompted by some of the findings and proposed recommendations in our Draft Report. We recognise that this report captures a snapshot of the communications sector at this point in time and that the markets we have assessed will continue to evolve, sometimes in ways that may not be foreseen. However, we consider that the regulatory tools we have equip us to respond to changing market circumstances, address any market failure, promote competition, and benefit consumers.

1.2 Key points

1.2.1 Competition and the regulatory framework

Notwithstanding considerable concentration in both fixed and mobile retail markets, there is evidence of competition between the major service providers of broadband and voice services. Smaller providers and new entrants have the potential to provide additional competitive tension by exercising some constraint on the larger providers.

We have not found any major deficiencies in the current communications regulatory arrangements that we administer and consider that these have remained largely fit for purpose. In our view, the economic regulatory framework for the communications sector has proven to be capable of accommodating major changes to the sector, including allowing for appropriate responses during the transition to the NBN. In particular, we consider that Part XIC of the *Competition and Consumer Act 2010* (CCA)

provides the necessary tools for access regulation of monopoly and bottleneck communications infrastructure, including that being built by NBN Co, and we do not find that there is currently a need for significant changes to this regulatory regime.

We consider that it is important that regulatory conditions do not stifle innovation and flexibility in emerging and developing markets. We consider there is far less need for up-front regulation of newer communications services. Looking further ahead, if competition concerns arise in relation to the provision of these services, we would address these concerns in the first instance through use of the general competition law provisions in the CCA.

1.2.2   Progress on NBN issues

The rollout of the NBN is a major investment in communications infrastructure and is having a significant impact on the Australian communications sector. The changes within the supply chain and consequential impacts on retail service providers and consumers have inevitably been a key focus of the market study.

The NBN rollout is now well advanced with over three and a half million premises activated and NBN Co progressing at a rapid pace to complete its build by 2020.

However, a number of competition and consumer issues related to the NBN transition have emerged and require immediate measures to resolve on the part of both retail service providers and NBN Co. Some of these measures are already underway with significant progress achieved since the publication of our Draft Report in October 2017.

We are taking actions to promote improved consumer and competition outcomes by ensuring availability of reliable and useful information to support consumer choice. These measures include enforcement of the Australian Consumer Law (ACL) including obtaining court-enforceable undertakings and compensation from Telstra, Optus, TPG, iiNet, Internode, M2 Commander, Dodo and Primus Communications (iPrimus) for likely misleading consumers about maximum speeds they could achieve on certain NBN services. In response to our concerns, these service providers have undertaken that, where they advertise or otherwise represent to potential customers that they will receive a particular speed, they will check each customer's attainable speed within four weeks of connecting a new service. If it is below the advertised speed, they will notify the customer and offer remedies.

We have also undertaken measures to promote improved broadband speed information available to consumers for the NBN plans that service providers offer, including:

- our broadband speed claims guidance for service providers released in August 2017, which has led a number of service providers to improve their marketing information and give consumers comparable information about typical busy period broadband speeds,[1] and

- the introduction of our broadband performance monitoring and reporting program (Measuring Broadband Australia), which released its first report in March 2018.

In addition, we have commenced an inquiry into NBN Co's Wholesale Service Standards, in line with our proposed Action 6 of the Draft Report. This inquiry is looking at aspects of the NBN Co wholesale arrangements most likely to influence consumer experience and whether the service levels currently in place are appropriate and effective. As part of the inquiry, we will examine whether there are appropriate incentives for NBN Co to remedy service failures and consider the adequacy of compensation available to service providers to enable them to provide appropriate consumer redress.

Since the release of our Draft Report, the Government has also announced a range of new protections to ensure broadband customers get the level of service they expect from their retail service provider as they transition to the NBN. These include the Australian Communications and Media Authority (ACMA) implementing new rules that will:

- specify the minimum information that service providers must provide about their network services before they sign consumers up

- specify minimum standards for service providers' complaints-handling processes and a requirement for them to report their complaint numbers to the ACMA so that changes can be monitored

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1   We note, however, that some service providers accounting for approximately 16 per cent of the market are yet to provide typical busy period speeds information in their advertising.

- require service providers to undertake a series of tests after a consumer has activated their NBN service to ensure that the service works and that faults are identified early

- require carriers and carriage service providers to provide continuity of voice and/or internet services if consumers experience issues when migrating to the NBN.

NBN Co itself has undertaken a number of initiatives that address some of the issues identified in our Draft Report. Notable among these are its new temporary prices to promote the 50 Mbps access virtual circuit (AVC) tier and to increase the amount of connectivity virtual circuit (CVC) capacity provisioned per customer.[2]

Many service providers have responded positively to the various ACCC and NBN Co initiatives, and adjusted their wholesale acquisitions and retail products, resulting in significant increases in CVC capacity contracted. Evidence of this is a 37 per cent increase in CVC capacity acquired per customer between the end of September and December 2017.[3] This has already led to a dramatic reduction in congestion on the network and should result in fewer speed complaints.

NBN Co's temporary prices mean that service providers and their customers are effectively getting increased data speeds at no (or limited) extra charge. Consumer willingness to pay additional charges for increased data speeds remains uncertain, and we are concerned that NBN Co's longer-term targets may continue to create excessive uncertainty for access seekers. Further, achievement of efficient pricing outcomes will be constrained if demand for NBN services does not increase at the rate currently expected by NBN Co in the next few years.

1.2.3   Wireless and 5G

5G deployment could create significant opportunities for industry and consumers. However, at this early stage, there is still uncertainty about the nature and timing of the deployment but it is anticipated that 5G has the potential to accelerate the extent of fixed to wireless broadband substitution given its ability to provide comparable speeds to fixed broadband services. In doing so, existing business models may be disrupted, with the degree of substitution in part depending on the price and service performance of NBN services.

Future substitution will also depend on the nature of wireless service offerings from providers, which are not yet evident. Although the amount of data included for wireless offerings has been growing, in general, it is still typically less than 200 GB per month, while recent trends mean that most fixed line services now include unlimited data. If this divergence between data quotas continues in the future, it may limit the substitutability of wireless for fixed line broadband for most consumers.

1.2.4   Changes to proposed actions and recommendations

Our Draft Report put forward a number of proposed recommendations and actions. Feedback from submissions to the Draft Report has assisted us to confirm which areas of the sector require regulatory attention, and which do not.

Following consideration of submissions to the Draft Report, we have made a number of changes to our findings, actions and recommendations:

- On NBN pricing issues and cost recovery obligations our Final Report takes into account NBN Co's recent pricing initiatives, which have demonstrated NBN Co's ability to respond flexibly to stakeholder concerns.

- We have pointed to the importance of examining the potential for disaggregation of NBN Co prior to its privatisation as a means of facilitating greater infrastructure-based competition.

- In response to concerns about the potential for deterring investment at this nascent stage of deployment, we have decided to keep a watching brief on the deployment of dense small cell infrastructure to identify any potential barriers impeding access to critical infrastructure.

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2   Service providers acquire AVCs at a specified speed tier for each customer premises they supply over the NBN. They must also buy CVC capacity from NBN Co to carry aggregated customer traffic to the points that their networks interconnect with the NBN.

3   Australian Competition and Consumer Commission (ACCC), *NBN retailers acquired 37% more CVC*, ACCC, 8 February 2018, viewed 19 March 2018.

- In relation to e-SIMs, we will explore broader concerns that competition between mobile service providers in the offering and use of e-SIM devices could potentially be impeded by the need to enter commercial agreements with device manufacturers.
- We propose to await the findings of the ACMA's research on email portability before deciding whether to undertake any further review of email retention offerings.

1.3 State of competition in the supply of broadband and voice services

Broadband and voice services are the essential communications services on which individuals and businesses rely. The retail provision of these services displays considerable concentration, with the four largest providers accounting for 96 per cent of services to residential premises. Telstra's fixed line dominance has not been significantly eroded so far in the transition to the NBN despite some losses in regional areas where its dominance has been greatest. Competition for mobile services is concentrated in the hands of the three mobile network operators (MNOs) that account for 91 per cent of mobile services.

However, we anticipate that the competitive dynamic in the supply of fixed line and mobile voice and broadband services will increase following the recent entry of Vodafone into the provision of fixed line services and TPG's deployment of its own wireless network. This will result in four major carriers providing both fixed and mobile services, and potentially five major fixed line providers.

Notwithstanding the high level of market concentration, there is evidence of competition in the markets for voice and broadband services, over both fixed and mobile access technologies. This is particularly evident in the price competition between suppliers of both fixed and mobile services. However, the extent of non-price competition is greater in mobile, compared to fixed services as evidenced by significant product differentiation in mobile services. While there has been less differentiation in fixed services we note that competition in relation to quality of service dimensions, such as broadband speed is beginning to emerge, including as a result of our recent guidance on speed claims.

While there are signs of retail price competition occurring for fixed services, as noted above we initially heard from many service providers that the NBN wholesale pricing construct and level was constraining their ability to provision greater capacity given consumers' current willingness to pay. More recently, NBN Co has begun to respond to stakeholder feedback by introducing temporary pricing initiatives and is consulting with industry on longer-term pricing changes. The temporary pricing has already benefited consumers through enabling better quality broadband with less congestion during peak evening periods. However, it will be important that the long-term pricing changes also successfully address these issues.

1.4 Transitioning consumers to the NBN

The challenges faced by NBN Co include providing services that meet consumer expectations and deliver an efficient use of the infrastructure being deployed while simultaneously completing the build. While the NBN experience of the majority of consumers is generally positive, there is a significant number of consumers for whom this is not the case who have reported unsatisfactory experience with the NBN both during and after migration from the legacy networks. Two principal concerns arise in this regard: issues faced by consumers during the migration of their services from legacy networks to the NBN, and the performance of services provided over the NBN not meeting consumer expectations.

As noted above, we have commenced an inquiry into NBN wholesale service standards. This inquiry is examining concerns about connection and activation problems at the time of migration as well as fault rectification after connection, missed appointments and unsatisfactory complaint resolution processes. We will determine whether existing wholesale service standards are appropriate and consider whether regulation is necessary to improve customer experience. Concurrently, the ACMA is undertaking complementary work to implement a range of new rules requiring service providers to improve the customer experience in moving to the NBN, which are expected to come into place in mid-2018.

In relation to the second concern, the adoption of our speed claims guidance by service providers is an important positive step towards addressing consumer dissatisfaction with the speed of NBN services. The positive response by a number of service providers is resulting in the provision of improved retail plan information on speeds that supports consumers in making their purchase decisions, and through retailers ensuring their retail NBN services typically operate in the manner advertised.

Recent pricing and product development initiatives by NBN Co are encouraging the uptake and promotion of higher speed services by service providers. We expect this to result in higher service quality and improved consumer experience.

1.5　Medium term NBN issues

While the above measures are likely to lead to significant progress on improving consumer experience, it will take more time for the full effects to be evident. We acknowledge that these and proposed future measures may not resolve all of the poor outcomes that are being delivered by retail markets.

We welcome recent initiatives by NBN Co to work with stakeholders on these issues, for example, the flexibility shown by NBN Co in its new prices to promote the 50 Mbps wholesale tier and to increase the amount of CVC provisioned per service. These pricing initiatives implemented in December 2017 are temporary measures and we also note that NBN Co is to introduce longer-term pricing changes.

However, notwithstanding these developments, the willingness to pay additional charges for increased throughput remains uncertain, and we are concerned that NBN Co may continue to have difficulty meeting its financial targets. If demand for NBN services does not increase at the rate currently expected by NBN Co, this may continue to create uncertainty for access seekers and has the potential to constrain the delivery of efficient pricing of the NBN infrastructure.

While there remain longer-term pricing issues to resolve, we provided additional flexibility to the parties in negotiating pricing outcomes, through deferring our decision on the Special Access Undertaking (SAU) variation that NBN Co has submitted. NBN Co's proposed SAU variation incorporates fibre to the node (FTTN), fibre to the building (FTTB) and hybrid fibre coaxial (HFC) access technologies into the SAU, to reflect the current NBN model. If approved, the SAU variation would extend the current SAU pricing arrangements to these access technologies. We anticipate resuming our assessment of the SAU variation when NBN Co has determined its longer-term pricing changes.

The multiple and complex objectives that NBN Co has been tasked with achieving make full cost recovery a potentially difficult proposition. In the medium term, it remains to be seen how the broadband speed claims and monitoring measures and NBN Co's longer-term pricing initiatives will help to improve NBN Co's commercial viability. While recognising that NBN Co does have a degree of flexibility to lower its prices, there may ultimately be a need for pricing relief measures to be taken by the Government, such as debt payment concessions or direct budget funding of non-commercial services, to better promote the efficient use of the network and the long-term interests of end users (LTIE).

1.6　Key intermediate inputs

Smaller service providers have the potential to add to the competitiveness of communications markets by constraining the behaviour of the larger providers and increasing competitive tension. However, smaller providers frequently rely on wholesale inputs, either of resale services (as in the case of mobile virtual network operators (MVNOs)) or of intermediate inputs such as transmission between NBN points of interconnection (POIs) and their own point of presence (POP), as well as internet interconnection services to reach the customers and the content hosted by the larger providers. To connect to the NBN, an alternative to transmission is to purchase NBN wholesale aggregation services from providers that have directly connected to the NBN.

The market study has looked at whether these wholesale markets upstream of retail markets are operating competitively to supply key intermediate inputs to smaller service providers. We have observed some potential limitations with the NBN wholesale aggregation services being supplied, which may be impeding the ability of smaller service providers from entering markets or offering differentiated products over the NBN. Notwithstanding this, we have observed significant growth in

direct connections to the NBN by service providers outside the top four as measured by the number of POIs to which they are connected.

There are a number of potential means of addressing concerns that the wholesale aggregation market is not functioning efficiently or competitively. These include NBN Co's proposed NNI (Network-to-Network Interface) Link product, which is designed to enable downstream service providers to acquire access services from NBN Co directly and to control CVC provisioning; or NBN Co providing transitional aggregation products or pricing measures during the rollout period to facilitate the entry of smaller or niche service providers.

Our 2018 inquiry into the declaration of the domestic transmission capacity service (DTCS) is explicitly considering the supply of transmission services to NBN POIs including the choice of active suppliers and investments in capacity. It will also examine the potential role of NBN Co's proposed NNI Link product and the supply of aggregation services in providing access to NBN POIs by smaller service providers.

In addition, in response to concerns regarding the slow development of the wholesale markets for NBN aggregation services and dark fibre availability, including to NBN POIs, we will consult with industry on a new record keeping rule (RKR). The RKR will provide useful transparency on the performance of the wholesale aggregation and dark fibre markets and the information necessary to determine whether any regulatory intervention is required.

We have also identified concerns in the internet interconnection market where Telstra, Optus and TPG appear to hold some market power in relation to access to their networks. We are continuing to assess whether access to these services is available at prices, and on terms, that support competition in downstream markets. We will report on our findings and any required action later this year.

1.7   Network competition and convergence

The above issues need to be considered in the wider context in which the NBN is being rolled out. This context encompasses the increasing substitutability between, and convergence in the use of, alternative last mile access networks. Substitution of fixed line services with mobile services has been occurring in some consumer segments for a number of years and is likely to continue as mobile data inclusions increase. This substitutability may also be encouraged by the upcoming deployment of 5G. At this early stage, the nature of this deployment and degree of future infrastructure-based competition remain uncertain given the numerous variables involved, such as the allocation of finite spectrum. However, with two MNOs announcing plans to commence deployment as early as next year, there are encouraging signs of infrastructure-based competition in the roll out of 5G. Further, the extent to which greater substitution is realised will also be influenced in part by the relative cost and service experience of the NBN compared to wireless alternatives.

The NBN already faces some competition from non-NBN fixed line networks, particularly in large occupancy buildings and new estates. These networks are typically in low cost to supply areas. Under its Regional Broadband Scheme (RBS), the Government is intending to impose a charge on fixed line networks that provide high-speed services in competition with the NBN to help fund the NBN's non-commercial fixed wireless and satellite services supplied in regional and remote areas. We do not consider this charge should be extended to other substitute networks in the future such as wireless services and our view is that all non-commercial services should be funded directly from the Commonwealth budget.

1.8   Emerging services and issues

Beyond the large number of issues relating to the provision of voice and broadband services, the market study has considered the growth and development of services delivered over or using the internet, including Internet of Things (IoT), and changes in supply chain structures and related services such as the use of content delivery networks (CDNs) and data centres. We have also considered the emergence of cloud-based services which are transforming the way services traditionally provided locally to the user are consumed.

We consider that these markets are highly dynamic and seem to be operating competitively. These areas are diverse, subject to rapid innovation and change and, for the main part, do not give rise to immediate concerns regarding the competitive functioning of their associated markets.

However, there are instances where incumbents in the communications sector may be able to exercise market power or where market power concerns could emerge due to strong network effects to the detriment of competition in these markets. Our intention is to keep abreast of developments in these markets and take action in relation to any competition concerns that may emerge through use of our general competition law powers.

1.9   Policy implications and priorities

We consider that the current communications regulatory and competition arrangements that we administer have remained fit for purpose as communications markets have continued to evolve. They therefore appear to be well suited to deal with the immediate and longer-term issues we have identified in the market study.

The policy priorities we have identified largely relate to reviews that are currently being conducted or have recently been completed. These policy issues have interdependencies with competition in and the efficient operation of communications markets and include spectrum management; data availability and use; the proposed RBS; and the Government's Mobile Black Spot Program. As a general principle, we support measures that promote infrastructure-based competition and use of explicit, transparent subsidies to fund non-commercial services for policy objectives.

Over the medium to long-term, we recognise the Government's intention for the privatisation of NBN Co. This will provide a unique opportunity to put in place a market structure to facilitate greater infrastructure-based competition through the disaggregation of the NBN. We also consider that it is imperative that measures are taken at an early stage to help enable this future disaggregation. We strongly support that the form of any disaggregation of the NBN should be part of the terms of reference for the Productivity Commission's future inquiry into regulatory, budgetary consumer and competition matters relating to the NBN in the lead up to privatisation.

2. Recommendations and ACCC actions

2.1   Recommendations

Recommendation 1

NBN Co should continue to review and adjust its prices to ensure the economically efficient use of the network and the long-term interests of end users, assisted by Government pricing relief measures if required.

Recommendation 2

Telstra, TPG, Optus and Verizon (TTOV) should maintain on their website a comprehensive set of criteria and any other relevant policies to which they have regard when assessing peering requests from other networks. This would provide prospective peering parties some guidance on the criteria they are required to meet with each of the TTOV networks.

Recommendation 3

Telecommunications industry members must, as a priority, collaborate with regulators and government agencies to develop and implement technical solutions, at the network level, to protect consumers from the significant harm that flows from spoofing and related scams.

Recommendation 4

Regulation should not constrain competition with the NBN. Instead, NBN Co will require both greater pricing flexibility and continued technology flexibility to respond to market developments.

Recommendation 5

The Government should continue planning for the future disaggregation of the NBN and ensure that measures are in place to enable the NBN to be split into competing networks, to provide a market structure that will facilitate greater infrastructure-based competition. The form of any disaggregation and privatisation should also be part of the terms of reference for the Productivity Commission's future inquiry into regulatory, budgetary, consumer and competition matters relating to the NBN.

Recommendation 6

We recommend that the Radiocommunications Bill explicitly recognise the promotion of competition in its objects and require the ACMA to consult the ACCC on potential competition issues in relevant markets.

Recommendation 7

The Government's implementation of the Consumer Data Right should be extended to the telecommunications sector, as planned. This will allow consumers to have access to relevant data about themselves, and to provide this data to nominated third parties, enabling them to make better purchasing decisions as well as encourage service providers to make more tailored offerings to consumers.

Recommendation 8

The Regional Broadband Scheme (RBS) should not be extended to wireless services. The extent to which wireless services constrain fixed line broadband services is evolving and should not be inhibited by policy or regulatory changes to assist NBN Co. Greater substitution across technologies would also bring into question the suitability of the RBS charge as a mechanism to fund non-commercial NBN services. We propose direct budget funding as it would be the least distortionary alternative and not serve as a means of protecting the NBN from network competition.

2.2   ACCC actions

Action 1

We will have regard to the views from stakeholder submissions in our review of our competition and price monitoring activities and undertake further consultation with interested parties as needed.

Action 2

We will examine the messaging services market to determine the need for ongoing regulation of SMS termination services in our next regulatory review of the mobile terminating access service.

Action 3

We will carefully consider the effectiveness of NBN Co's longer-term price changes under its Pricing Evolution initiative in promoting the efficient use of the network and the long-term interests of end users. We will take these matters into account in our consideration of NBN Co's proposed variation to the Special Access Undertaking.

Action 4

We will continue our Inquiry into NBN Wholesale Service Standards to determine whether current wholesale standards are appropriate, and to consider whether regulation is necessary to improve consumer experiences.

As part of the Inquiry, we will examine whether there are appropriate incentives for NBN Co to remedy service failures and consider the adequacy of compensation available to service providers to enable them to provide appropriate consumer redress.

Action 5

We will consult with industry on a proposed record keeping rule to monitor the supply of wholesale aggregation services directed at determining whether subsequent regulatory intervention is required. To the extent the market does not evolve, and the information we collect points to a lack of competition, we will consider (following further consultation) the publication of competitive benchmarking information.

Action 6

We will obtain further views from market participants on NBN Co's NNI Link product and consider wider product developments by NBN aggregators as part of our 2018 inquiry into the declaration of the domestic transmission capacity service prior to deciding whether any other potential measures are needed to aid access to the NBN by service providers that lack scale to provide a further competitive dynamic in the supply of retail broadband services.

Action 7

We are examining the supply of transmission services to NBN Points of Interconnection as part of the domestic transmission capacity service declaration.

Action 8

We will consult with industry on a proposed record keeping rule to monitor the supply of dark fibre services to determine whether any regulatory intervention is required.

Action 9

We will continue to assess and report on whether access to internet interconnection services is available on competitive terms to support effective competition in downstream markets, with a particular focus on the market for the supply of services to corporate customers.

Action 10

We will review the scope, transparency, and ease of use of comparator websites for communications services and consider the need for further intervention in addition to our existing guidance for comparator websites. We will collaborate with the ACMA in this regard to draw on their experience with comparator websites. We will consult with ACCAN, industry and Government to develop an appropriate course of action if intervention is needed.

Action 11

We will monitor consumer complaints about unfair terms in communications contracts and closely examine 36-month plans. We will also work with industry and government stakeholders to ensure consumers are informed about the potential benefits of short-term or no 'lock in' contract options when migrating to the NBN. As part of the TCP Code review, we will submit that the TCP Code should be amended to reflect the requirement that early termination fees must not be more than the reasonable costs to the service provider. In addition we will submit that service providers be obliged to more clearly identify the contract end date to consumers.

Action 12

We will await the ACMA's full report, including findings, on its NBN consumer experience residential and small and medium-sized business surveys, and take into account any further evidence identified through that research before deciding whether to undertake any further review of email retention offerings.

Action 13

We will monitor consumer complaints about bundling and take enforcement action where necessary. We will also consider issuing guidance to consumers regarding bundled telecommunications products.

Action 14

We will work with the ACMA to achieve the objectives outlined in the Minister's December 2017 announcement regarding protections for consumers of communications services provided over the NBN.

We will also work with ACCAN, the Telecommunications Industry Ombudsman, and other government agencies to improve information provision to consumers, particularly complaints data.

Action 15

We will address concerns about the performance of broadband services on the NBN through our Measuring Broadband Australia program, the broadband speed claims guidance, and enforcement action in response to practices that contravene the Australian Consumer Law. We propose to review the broadband speed claims guidance in August 2018 to determine whether it has been effective in addressing consumer concerns about fixed line broadband speed claims.

Action 16

We will observe the deployment of dense small cell infrastructure and keep a watching brief to identify any potential barriers impeding access to critical infrastructure.

Action 17

We will observe the take-up of different broadband technologies and continue to assess relevant market definitions in the communications sector as we undertake our regulatory functions.

Action 18

We will follow developments in the markets for Content Delivery Networks, cloud computing and data centre services to ensure that competition is not undermined over time and take appropriate action if necessary through use of our general competition law powers.

Action 19

We will explicitly examine competitive constraints posed by over-the-top (OTT) services on traditional communication services as part of future access regulation inquiries. In addition, we will pay close attention to:

- any traffic and price discrimination of OTT services by broadband service providers (through blocking, throttling, prioritising and un-metering)
- the impact of traffic management practices by broadband service providers (in response to increasing traffic volumes), whether this is performed in a competitively neutral manner, and the adequacy of disclosure to their consumers. Should broadband service providers fail to fully disclose to new and existing customers how their traffic management policies may impact their services, we will consider the need to develop appropriate principles and industry guidance as well as consider enforcement action where appropriate
- the development of key OTT service markets, which we propose to report on as part of our annual telecommunications report
- potential harm arising from the ability of OTT platforms to amass market power (which we have excluded from this market study). We note that the ACCC (pursuant to a Government direction) is currently undertaking an inquiry into the impact of digital platforms (including search engines and social media platforms) on competition in media and advertising services markets.

Action 20

We will:

- continue our involvement in relevant external processes in relation to Internet of Things (IoT) spectrum, NBN and consumer/data issues run by the ACMA, the Internet of Things Alliance Australia (IoTAA) and other government departments
- continue to work with IoTAA in its various work streams
- explore concerns regarding restrictions associated with e-SIMs (and Apple SIM) adopted by device manufacturers which may restrict competition between service providers in the offering and use of e-SIM devices and how this issue develops as e-SIM based devices become more prevalent
- more generally, periodically examine the development of competition in key IoT sectors for signs of concentration or conduct of concern. This will involve monitoring features of the market including the number of market participants and their market shares; the degree of interoperability at the network and service layers; and availability of suitable wholesale access products. We will consider the value of incorporating this monitoring activity as part of our annual telecommunications report.

3. Introduction

3.1 The market study

3.1.1 Purpose of the study

The Australian communications sector is going through a period of significant change. Global technological and business trends are changing how communications networks are designed and used to supply services to consumers, while domestically, there are significant developments specific to the Australian communications sector.

The purpose of the market study is to take stock of these developments and their implications for competition and the LTIE. The findings and recommendations of the study are intended to inform the policy and regulatory framework within which the communications sector operates.

In contrast to other ACCC studies and inquiries into specific sectors, this market study looks forward over a five year period to both examine immediate issues of concern and to form a view about the directions that policy and regulation should take. This is to reflect the impact that new and emerging technologies and product innovations (such as IoT and 5G) will have on significant segments of the communications sector.

Where there are emerging impediments to competition, there may be a need for a regulatory response. Conversely, where market developments are leading to greater competition there may be an opportunity to reduce or remove existing regulation.

3.1.2 Context and environment for the study

In line with global trends, the communications market in Australia continues to evolve rapidly with technical and product innovations driving new connections to networks, growth in the demand for data and the prospect of greater convergence between fixed and mobile networks, and an increasing number of IoT applications for personal, household and business use.

The local developments of significance for the study relate to the deployment of the NBN, which is intended to provide all Australian households and businesses with access to high-speed broadband services. The NBN has recently passed the mid-point of its rollout.

Necessarily, this has meant much attention has been focussed on how industry is adjusting and responding to the changing communications landscape as NBN Co, the government-owned business charged with the deployment, rolls out the infrastructure that is replacing the legacy networks.

A significant aspect of the NBN policy framework is the vertical separation between the network operator and the service providers accessing the network to supply broadband and voice services to consumers. This is intended to promote retail competition by providing wholesale broadband products on equal terms to all service providers.

Many of the challenges currently facing industry relate to the relationship between NBN Co and its wholesale customers and how that relationship is working to ensure outcomes that are in the LTIE. Some of the major concerns we have identified in the market study are the migration experiences of many customers when moving to the NBN, the wholesale costs that service providers incur to acquire NBN services, and the quality of services that service providers are delivering over the NBN.

There are a number of initiatives and processes currently underway, by both industry and regulators, that are intended to address the issues identified as being of concern. In particular, NBN Co has recently introduced changes to its pricing structure and we have commenced an Inquiry into NBN Wholesale Service Standards.

The ACMA has been focused on improving the consumer experience before, during and after the migration to the NBN, and has introduced a number of new rules to improve the consumer experience. These are discussed in more detail in section 5.4.

We are also active in addressing consumer concerns related to services supplied over the NBN. This includes our broadband speed claims guidance,[4] our Measuring Broadband Australia (MBA) program, which released its first report in March 2018, and enforcement action where warranted in relation to breaches of the ACL.

In addition to consumer related concerns, we have identified issues in relation to the availability and costs of wholesale inputs for the supply of fixed broadband services. These include concerns about the effective operation of the markets for fixed network aggregation services,[5] transmission and internet interconnection, all of which will be subject to varying levels of action by the ACCC.

3.1.3   Scope of the study

In assessing the state of competition in the various communication markets, we have taken a service based approach by focusing on retail and wholesale services. This has enabled us to identify key interdependencies between services and inputs in the supply chain and to facilitate a holistic approach to consideration of the sector. We explain our framework for analysis further in section 3.2.5.

We have focused on competition in the supply of services to residential and small business consumers who purchase 'off-the-shelf' communications services. This includes availability and competition in the supply of the intermediate inputs necessary to service these consumers with broadband and voice services.

The supply of communications services on a customised basis to larger enterprises or corporate businesses has not been specifically assessed in the study. However, any impediments to smaller service providers' ability to acquire critical inputs for the supply of services to their customers, including in the corporate market, are captured as part of a wider consideration of this issue.

We have also considered whether there are any potential competition issues in relation to newer communications services such as OTT and IoT services.

We have also taken into account, but not specifically examined, particular communications issues that are the subject of other inquires. These include our domestic mobile roaming declaration inquiry, the Productivity Commission's inquiries into the future direction of the Universal Service Obligation (USO) and Data Availability and Use,[6] and the Government's consideration of the Spectrum Review Report.[7]

Similarly, we have not examined regulation of the media sector, which has been the subject of reform discussions in Government, or the role of global communications platform operators (such as Google, Amazon and Facebook) in Australian markets, as this is the subject of a separate ACCC inquiry.

3.1.4   Consultation and information gathering

In conducting the market study, we have consulted extensively with industry, consumer and other stakeholders. Major consultations have included:

- release of an Issues Paper in September 2016, to which we received 64 submissions, as well as over 1000 responses to a consumer questionnaire
- a two-day stakeholder forum in Sydney in July 2017
- release of a Draft Report in October 2017, to which we received 20 submissions.

The availability of reliable information is critical to the market study reaching evidence based findings and recommendations. As the market study is not constituted under provisions of the CCA, we were unable to use our enforceable information gathering powers. Rather, we have utilised data relating to the communications sector received through our RKRs as well as data from other government agencies, including the Australian Bureau of Statistics and the ACMA.

We obtained data about the retail communications market, which is outside the scope of our RKRs, from Roy Morgan Research to fill this important gap in our evidence base and inform our analysis and findings in the market study.

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4   Australian Competition and Consumer Commission (ACCC), Broadband speed claims: industry guidance, ACCC, 21 August 2017.
5   Aggregation services are explained and discussed in section 4.3 of this report.
6   Productivity Commission, Telecommunications universal service obligation public inquiry, Productivity Commission, 19 June 2017.
7   Department of Communications and the Arts (DoCA), Spectrum review, DoCA, 26 May 2015.

We have also co-funded a consumer survey with Venture Consulting to obtain information about use of fixed and mobile broadband services by consumers.

In addition, we have obtained information through discussions with individual stakeholders, issuance of voluntary information requests, a survey of MVNOs and a survey of wholesale customers acquiring aggregation services and related inputs from other service providers.

3.2   The communications sector

3.2.1   Communications sector overview

Since the early 1990s, the communications sector has evolved from a single vertically integrated fixed line voice service provider (Telstra), to now comprising of a variety of service providers offering voice and broadband services (fixed line and mobile), with several operating at the wholesale and retail level.

The core and aggregation networks are critical to providing services using the fixed line and mobile access networks as they enable routing and interconnection between networks and, therefore, consumers. This supply chain is depicted in figure 3.1.

Figure 3.1:   The communications supply chain—how voice and broadband services are delivered to consumers over next generation networks
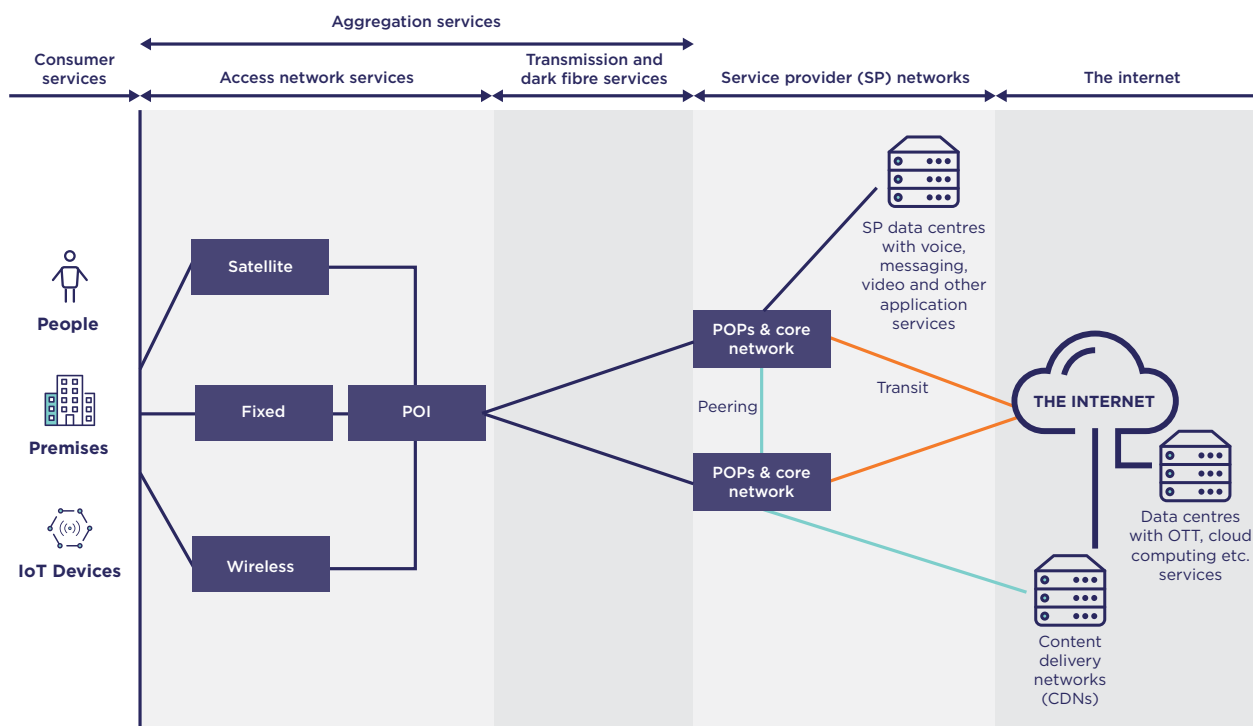
A significant competitive development in the sector has been the emergence and proliferation of OTT services. These services run over-the-top of access, core and aggregation network services to provide a variety of applications and increasingly data intensive content services. Other major developments include the rise of cloud computing and the growth in the importance of data centres.

Some service providers currently operating in the communications sector are vertically integrated and have their own infrastructure, while others operate only at the retail level, purchasing wholesale inputs from infrastructure and network owners.

Many service providers supplying fixed line services purchase the relevant wholesale access inputs from either Telstra or next generation fixed line access network operators, such as NBN Co.[8] As the NBN rollout is completed, Telstra's fixed line access services will be phased out in areas within the NBN Co fixed line footprint and NBN Co will become the predominant provider of wholesale fixed line access services.

In relation to mobile services, there are soon to be four MNOs (the existing networks of Telstra, Optus and Vodafone and new entrant TPG) and a number of MVNOs that purchase wholesale end-to-end mobile services (including transmission) from the MNOs to provide retail services.

Some service providers have their own transmission networks, and others purchase wholesale services from these providers. Most service providers have their own core network.

OTT services such as communication apps, video on demand services and social media platforms use these networks, with OTT service providers interacting directly with residential and business consumers and in some circumstances forming relationships with communications service providers. While consumers will generally form a relationship with one service provider (or possibly one service provider for a fixed line service and another for a mobile service) they will often use multiple OTT service providers.

Beyond the supply chain in figure 3.1, 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.
- the communication network electronics layer comprising the electronics, switches, routers, etc. that provide the 'smarts' to enable transmission of communication and data storage services
- the application layer which supports the provision of voice, email, web browsing, and video streaming services as well as those provided over other applications. In some cases these applications will support access to content.

Devices such as fixed line and mobile phones and tablets operate across these layers and enable end-to-end communication.

3.2.2   Regulatory framework overview

The overarching framework for the regulation of communications in Australia largely dates back to 1997, when a number of legislative changes took effect with the objective of opening telecommunications markets progressively to full competition and privatising Telstra. Most economic regulation of telecommunications became the responsibility of the ACCC and technical regulation, spectrum management and administration of the USO became the responsibility of the Australian Communications Authority (now the ACMA).

The 1997 changes included the introduction of a third-party telecommunications specific access regime under Part XIC of the former *Trade Practices Act 1974* (now the *Competition and Consumer Act 2010*). This is designed to ensure that service providers have access to monopoly and other bottleneck infrastructure to supply competitive communications services to customers, where there are limited incentives for, or significant barriers to the development of, infrastructure-based competition.

Under the Part XIC access regime, telecommunications services can be declared for third-party access by the ACCC where it is in the LTIE to do so. Service declaration typically occurs following an inquiry by the ACCC. We have tended to declare services when a single or small number of vertically integrated networks serve as a bottleneck to downstream competition. Once a service is declared, we can determine regulated terms and conditions of upstream access in an access determination or binding rule of conduct that applies if parties are unable to agree commercially.

The telecommunications services that are currently declared for third party access and the current expiry dates of these declarations are listed in table 3.1.

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8   Next generation networks enable communication downloads at speeds of 25 Mbps or more, and include the NBN and other next generation fixed line access networks. They provide service providers with the declared Local Bitstream Access Service (LBAS) or Superfast Broadband Access Service (SBAS). Examples include the FTTB networks and HFC networks operated by TPG and the fibre to the premise (FTTP) networks operated by OPENetworks and OptiComm in new developments.

Table 3.1:   Currently declared telecommunications services[9]

Services	Expiry date
Domestic transmission capacity service	31 March 2019
Mobile terminating access service	30 June 2019
Unbundled local loop service	31 July 2019
Line sharing service	31 July 2019
Wholesale line rental (WLR)	31 July 2019
Local carriage service	31 July 2019
Fixed originating access service	31 July 2019
Fixed terminating access service	31 July 2019
Superfast broadband access service (SBAS)	28 July 2021
Local bitstream access service	Legislated not to expire
Wholesale asymmetric digital subscriber line (ADSL) service	13 February 2022
NBN access service, ancillary services and facilities access service	30 June 2040

Under the 1997 legislative reforms, telecommunications providers are also subject to specific anti-competitive conduct provisions under Part XIB of the CCA.[10] In addition, Part XIB provides the ACCC with record keeping, information disclosure and monitoring powers in relation to the telecommunications sector. The Part XIB provisions operate in addition to the general anti-competitive conduct regime set out in Part IV of the CCA.

Some other aspects of competition in the communications sector and some of our related functions are governed by the *Telecommunications Act 1997*. These include provisions governing access to particular telecommunications facilities, number portability and designated interconnection services. More recently they have included Telstra's Structural Separation Undertaking and Migration Plan that provide a framework for safeguarding competition as services transition from Telstra's access networks to the NBN.

A number of additional communications-specific consumer safeguards are provided via the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (the TCPSS Act) and associated instruments. These include the customer service guarantee (CSG) that provides for minimum performance standards in the supply of telephone services and the payment of compensation if these standards are not met. The TCPSS Act also establishes an industry-funded independent Telecommunications Industry Ombudsman (TIO) Scheme to provide a dispute resolution service for residential and small business consumers of telephone and internet services.

The communications sector is also subject to the ACL. Consumer protection in the sector is currently a priority in our Compliance and Enforcement Policy.[11]

Under the *Radiocommunications Act 1992,* the issuance of a spectrum licence is treated as an acquisition for the purposes of s. 50 of the CCA, which prohibits acquisitions that would result in a substantial lessening of competition. When requested, we provide advice to the Minister on setting competition limits in new spectrum allocations.

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9   Australian Competition and Consumer Commission (ACCC), Current declarations, ACCC, viewed 19 March 2018.

10   Section 151AJ of the *Competition and Consumer Act 2010* (Cth) (the CCA) sets out the circumstances in which a carrier or carriage service provider is said to engage in anticompetitive conduct for the purposes of Part XIB. Section 151AK of the CCA is the competition rule, which prohibits anti-competitive conduct.

11   The ACCC's approach to enforcement and compliance activities is guided by the ACCC's Compliance and Enforcement Policy. A copy of the ACCC Compliance and Enforcement Policy is available at https://www.accc.gov.au/publications/compliance-and-enforcement-policy.

3.2.3 Relevant NBN regulatory and policy settings

A key feature of the communications policy landscape is the delivery of the NBN. The NBN is being built by NBN Co, which was established in 2009 as a government business enterprise. NBN Co has a mandate to supply wholesale-only high-speed broadband access services to reach all Australians using a mix of access technologies and based on uniform national prices.[12]

A key objective of the establishment of NBN Co as a wholesale-only entity was to address the long-standing competition concerns associated with Telstra's vertical integration and its ability and incentive to discriminate against competitors seeking access to its network.

We regulate NBN Co's wholesale broadband services under a SAU, which includes price and non-price terms for access by service providers. The SAU establishes a framework for the economic regulation of NBN Co, under which it is provided with the opportunity to recover its prudent and efficient costs subject to a long-term revenue constraint methodology.

The price terms included in the SAU set out initial prices for NBN access services that apply uniformly across Australia. This means that wholesale non-commercial fixed wireless and satellite services supplied to regional and remote areas of Australia are sold at prices below the high cost of supply. Consequently, there are cross subsidies between the low and high cost services and the prices of NBN high-speed broadband services in metropolitan areas may be higher than expected if they were supplied on a purely commercial basis.[13]

To help maintain the NBN's cross-subsidy arrangements, the Government has introduced a number of 'level playing field' measures that are intended to reduce the incentives for the provision of alternative broadband infrastructure in lower cost to supply areas. These include requiring particular competing fixed line networks capable of supplying high-speed broadband services to operate on a wholesale-only open-access basis.

More recently, the Government has proposed allowing functional separation as an alternative to structural separation for networks competing with the NBN.[14] In addition, the Government has moved to impose a levy, known as the RBS charge, on other fixed line suppliers of high-speed broadband services as a contribution to help fund the NBN's non-commercial fixed wireless and satellite services.[15]

3.2.4 Legislative reform

A number of legislative amendments are proposed or have been passed recently. In addition to the NBN related measures noted above, these include:

- the *Competition and Consumer Amendment (Misuse of Market Power) Act 2017*
- a legislative reform package to implement the Government's program of red tape reduction
- an exposure draft of the new Radiocommunications Bill 2016, which is intended to implement significant reform to spectrum management following the spectrum review by the ACMA.

In addition to this program, the Department of Communications and the Arts is currently developing a framework for a consumer safeguards review in response to the 2015 Regional Telecommunications Review.[16]

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12 Uniform national prices are no longer a Government objective of the NBN, however they were incorporated into the regulated prices of the NBN via the accepted SAU.

13 We note that this is tempered somewhat by NBN Co setting its entry level prices (for 12/1 and 25/5 Mbps services) to enable service providers to match legacy retail broadband offers. See NBN Co, Supporting Submission NBN Co Special Access Undertaking, 28 September 2012, pp. 8, 10, 113–114.

14 Telecommunications Legislation Amendment (Competition and Consumer) Bill 2017 (Cth), Explanatory memorandum.

15 Telecommunications (Regional Broadband Scheme) Charge Bill 2017 (Cth), Explanatory memorandum.

16 Regional Telecommunications Independent Review Committee, Regional telecommunications review 2015, Regional Telecommunications Review, 22 October 2015.

3.2.5   Framework for analysis

For the market study, we have taken a services-based approach to examining competition and related issues in the supply of communications services. Under this approach, we look at competition in the supply of retail voice and broadband services, irrespective of the technology and networks used to deliver them.

This approach enables us to draw out interdependencies and to assess competition within an holistic framework for the sector. In undertaking this assessment, we gave consideration to how competition is developing, where impediments exist or might emerge, and where competitive constraints that might limit market power are emerging.

We recognise the fundamental role of competition within communications markets in delivering outcomes in the best interests of consumers. However, effective competition (in the sense of markets having a number of actual or potential competitors, whose price and product offerings are constrained by each other and their customers) does not always result from allowing markets to operate without regulation. Regulatory intervention can be necessary to deliver competitive outcomes by addressing market power, through use of the powers provided by Parts XIB and XIC of the CCA.

Using the services-based and competition frameworks outlined above, we have adopted the following approach to examine issues in the market study:

Step 1: Identify significant services and overarching trends

Identification of key services in the supply chain and how the demand for and supply of these services may be changing. As context, broader trends across services have also been examined in relation to technological and product developments, changes in consumer preferences and major structural changes.

Step 2: Examine the state of competition in the provision of these services

This includes examining the available substitutes and complements (taking into account underlying technologies, service functionality and relevant customer segments) to establish the boundaries within which competition is examined, as well as other sources of competitive constraints and identification of any market failures. Static measures are considered (e.g. number of suppliers and market shares) as well as more dynamic 'process of competition' measures (e.g. changes in prices over time, barriers to entry such as switching costs for consumers and network economies of scale and scope for providers) and any regulatory and policy considerations that may be acting as constraints. The significance of other sources of market failure (such as, for example, issues associated with network externalities) are also considered if relevant.

Step 3: Identify the issues for further examination and focus

This serves to prioritise those issues with significant and material concerns identified in the state of competition analysis (i.e. in step 2). These are characterised as immediate, medium or longer-term issues, depending on the timeframes over which the issues are expected to emerge, using the services-based focus.

We also include discussion and conclusions in relation to those issues we do not consider require further consideration, either due to the issues being progressed in other contexts (e.g. the Spectrum Review) or as a result of them not raising significant competition issues (e.g. retail competition on non-NBN networks).

Step 4: Examine what opportunities exist to help promote competition and efficiency in the immediate, medium and longer-terms

This involves analysis of the issues that require addressing in the immediate (as well as medium) and longer-term in greater detail and proposing solutions for addressing the identified concerns, including the entities best placed to respond to those issues. Consideration is given to regulatory options, and also potentially broader options including the policy framework. We have also identified proactive steps and processes to guard against unfavourable conditions arising for efficiency and competition in emerging services.

4. Current state of competition in communications services

The following sections examine the current state of competition for different communications services. It provides a baseline assessment to help identify potential competition, efficiency and consumer issues that will be examined further in section 5 (immediate issues) and section 6 (medium to long-term issues).

We start by examining the current state of competition for retail communications services such as broadband, voice and messaging services.

We then examine competition across the wholesale elements of the supply chain that enable delivery of these services, including access networks, aggregation, transmission and dark fibre services.

Finally, we examine competition in relation to internet interconnection, OTT content services, IoT, CDNs, cloud computing, and data centres.

We discuss a number of metrics such as market structure and market shares for different services, the Herfindahl-Hirschman Index (HHI) (a comparative measure of market concentration), price and non-price competition, and any competitive constraints, in our assessment of the state of competition for each service.

4.1 Broadband, voice and messaging services

There is significant structural and technological change occurring in the communications sector which has substantial implications for broadband, voice and messaging services used by residential consumers. In particular, the move from Telstra's copper network to the NBN and other next-generation fibre networks will see fixed broadband services reach new, higher speeds and fixed voice services delivered using internet protocol (VoIP) rather than the public switched telephone network (PSTN). This shift also has implications for the structure of the industry and infrastructure competition more broadly, and is discussed in more detail in section 4.2.

Broadband services are now considered an essential rather than a discretionary service with consumers heavily reliant on the internet to carry out every day activities and access basic services. Broadband services also support a range of other services such as OTT communications and content services, the IoT, cloud services and more, which are discussed in sections 4.6 to 4.10.

In contrast to the growth in take-up and use of broadband services, there is a decline in use of voice services, particularly on fixed networks. A growing proportion of Australians are replacing their fixed voice services with mobile, with 33 per cent of Australians relying only on a mobile phone for voice services in 2016, compared to 25 per cent in 2013.[17]

Furthermore, the emergence and adoption of OTT voice and messaging services, such as Skype and WhatsApp, have also had a significant impact on this market, replacing traditional voice and messaging services for some consumer segments.

4.1.1 Market structure

There are a large number of service providers supplying broadband, voice and messaging services on fixed and mobile networks. In particular, the transition to the NBN has encouraged the entry of many new service providers.

Despite this, there is currently considerable concentration in the supply of broadband, voice and messaging services on both fixed and mobile networks. This is particularly evident once the retail brands and subsidiaries are accounted for as:

- TPG Group includes iiNet, Internode, Adam Internet, AAPT, Westnet, TransACT, Pipe Networks, Netspace, Agile Communications and Chime Communications

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17 Roy Morgan Single Source (Australia), January to December 2013, n=6568 and January to December 2016, n=15 854, 14+ Australian population.

- Vocus Group includes M2, Dodo, iPrimus, Eftel, Club Telco, NextGen Networks, Amnet, Commander, Engin and Southern Cross Telco
- Optus includes Virgin Mobile and Vividwireless
- Telstra includes Belong.[18]

Telstra and Optus are both vertically and horizontally integrated in the supply of fixed and mobile voice and broadband services in some elements of the supply chain.[19] Since the publication of the Draft Report, Vodafone has begun offering fixed broadband services on the NBN, becoming the third horizontally integrated service provider.

Smaller service providers acquire wholesale services such as transmission and/or wholesale end-to-end services, to enable them to provide fixed and mobile voice services.

Wireless broadband services are provided by MNOs, MVNOs and fixed wireless service providers. These products include mobile phone broadband, mobile broadband on tablets, home wireless broadband with a modem, and fixed wireless broadband.[20]

OTT communications service providers (such as Facebook Messenger, WhatsApp, Skype, Viber, WeChat and Google Hangouts) typically offer both voice and messaging services, supplied over existing fixed and mobile broadband services. Many other OTT social media apps (such as Instagram, SnapChat and LinkedIn) also offer messaging as an ancillary service.

4.1.2   Market shares

According to Roy Morgan Research, in 2016, four large service providers supplied the majority of consumer fixed broadband and voice services, as shown in figure 4.1.

For fixed broadband services, Telstra (including its low cost brand, Belong) has 51 per cent of the market, followed by TPG Group with 22 per cent, Optus with 17 per cent and Vocus with 6 per cent.[21,22]

For fixed voice services, Telstra (including Belong) supplied to 66 per cent of the market, Optus had 15 per cent, TPG Group had 12 per cent and Vocus had 4 per cent of the market in 2016.

Figure 4.1:   Consumer fixed broadband and fixed voice service providers market shares for 2016[23, 24]
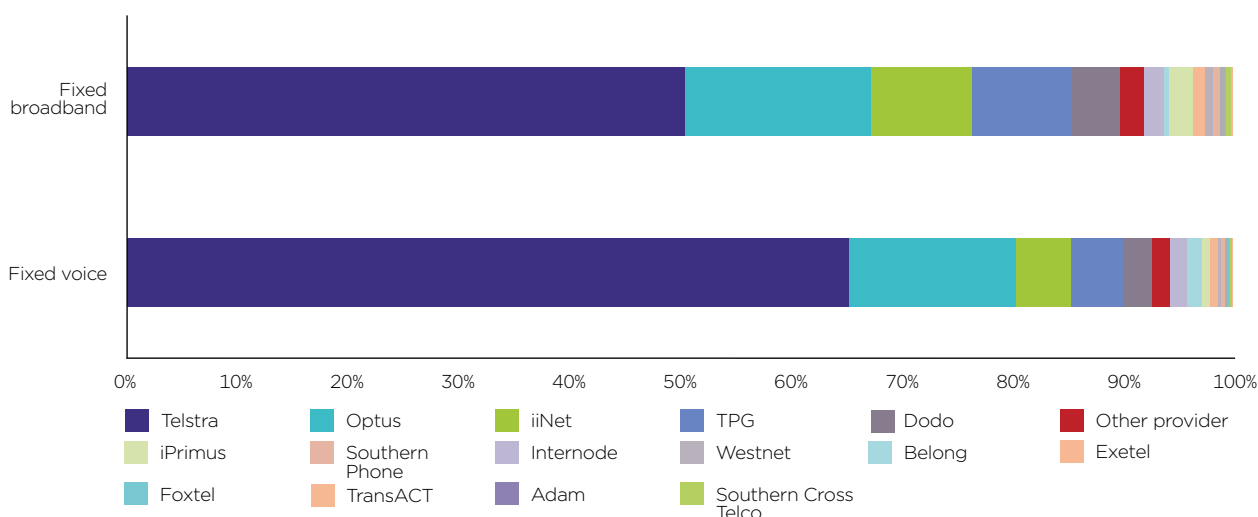
18   Belong is Telstra's budget retail brand which sells fixed line voice and broadband services (from 2013) and mobile phone services (from October 2017).
19   Telstra is fully vertically integrated in the supply of fixed line voices services over the legacy copper network, reflecting its network ownership and control over all elements of the supply chain, from the access networks to retailing, and partly vertically integrated in the supply of fixed voice services over the NBN where it does not have its own access networks but does control all other elements in the supply chain. Optus is vertically integrated in terms of owning and supplying transmission.
20   Fixed wireless typically uses an antenna attached to a premise.
21   Roy Morgan Single Source (Australia), January to December 2016, n=43 317, Australian Households.
22   Roy Morgan Single Source (Australia), January to December 2016, n=31 727, Australian Households.
23   Roy Morgan Single Source (Australia), January to December 2016, n=43 317, Australian Households.
24   Roy Morgan Single Source (Australia), January to December 2016, n=31 727, Australian Households.

Mobile phone services (including broadband and voice services), as shown in figure 4.2, are primarily supplied by the three network operators (Telstra, Optus and Vodafone), who hold 91 per cent of the consumer market.[25]

Telstra (including Belong) holds the largest share with 41 per cent of the market, followed by Optus (including Virgin Mobile) with 29 per cent and Vodafone with 19 per cent of the market. The remainder of the mobile phone services are supplied by MVNOs, with Amaysim and TPG capturing the largest number of subscribers.

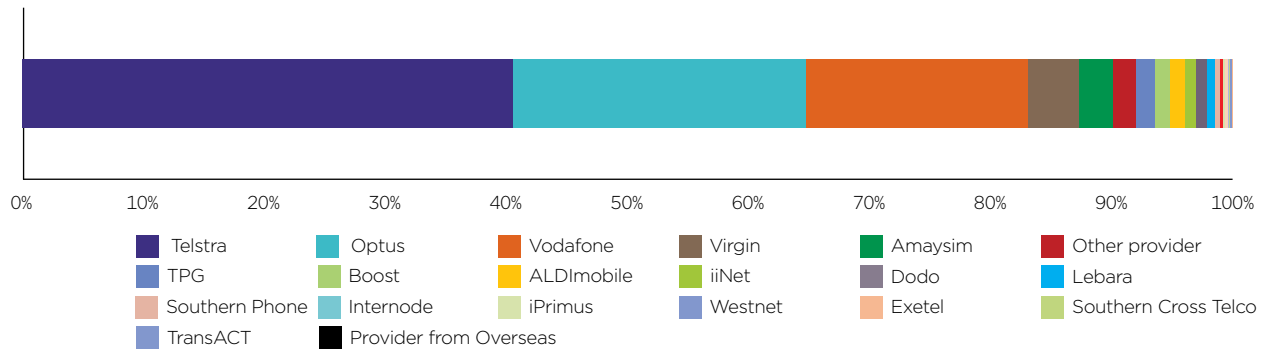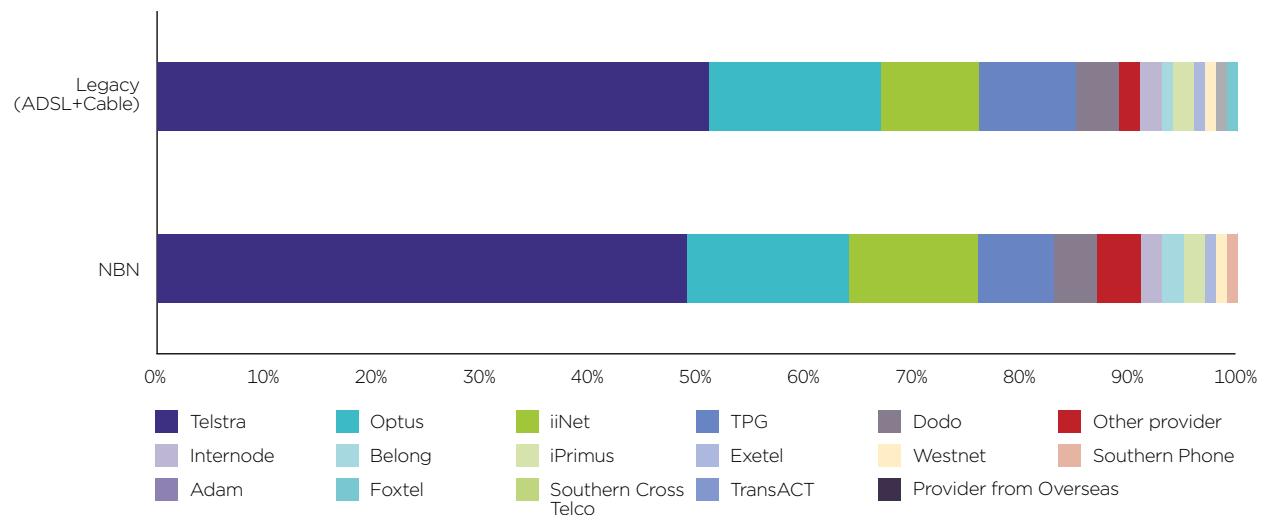**Figure 4.2: Consumer mobile phone service provider market shares for 2016[26]**

Figure 4.3: Market shares for fixed broadband services by network for 2016[27]

For fixed broadband services, the move to the NBN from legacy services (ADSL and cable) has seen a small change in the market shares of service providers, as shown in figure 4.3 and table 4.1.

On the NBN, Telstra, TPG Group, Optus and Vocus Group accounted for approximately 94 per cent of the market compared to 97 per cent on legacy networks (ADSL and cable/HFC).[28]

The 'other' service providers accounted for 6 per cent of market share on the NBN, compared to 3 per cent on legacy networks. The other service providers include Exetel, Foxtel, Southern Phone, Active8me, SkyMesh, Aussie Broadband and MyNetFone.[29]

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25   Roy Morgan Single Source (Australia), January to December 2016, n=42 961, 14+ Australian population.
26   Roy Morgan Single Source (Australia), January to December 2016, n=42 961, 14+ Australian population.
27   Roy Morgan Single Source (Australia), January to December 2016, n=30 025, Australian Households.
28   Ibid. We note that the HFC market is predominantly supplied by Telstra and Optus using their own networks.
29   Some of the 'other' service providers listed by respondents to Roy Morgan Research survey for 2016.

Table 4.1:   Consumer fixed broadband market shares by group for 2016[30]

Service provider	Legacy (ADSL+cable)	NBN	Overall
Telstra (inc. Belong)	51%	51%	51%
TPG Group	22%	22%	22%
Optus	17%	15%	17%
Vocus Group	6%	6%	6%
Others	3%	6%	4%

When we look at the market shares for different geographic markets, we observe there is less competition in regional areas compared to metropolitan area. Although there were at least five access seekers (service providers) connected to all 121 POIs by the end of 2017, we are still seeing some POIs, mainly in regional areas, where one service provider is acquiring more than 60 per cent of wholesale services on the NBN.

Roy Morgan Research finds that, overall, Telstra has a larger market share in country areas compared to capital cities, as shown in figure 4.4.

Figure 4.4:   Fixed broadband market shares on the NBN for capital cities and country areas for 2016[31]
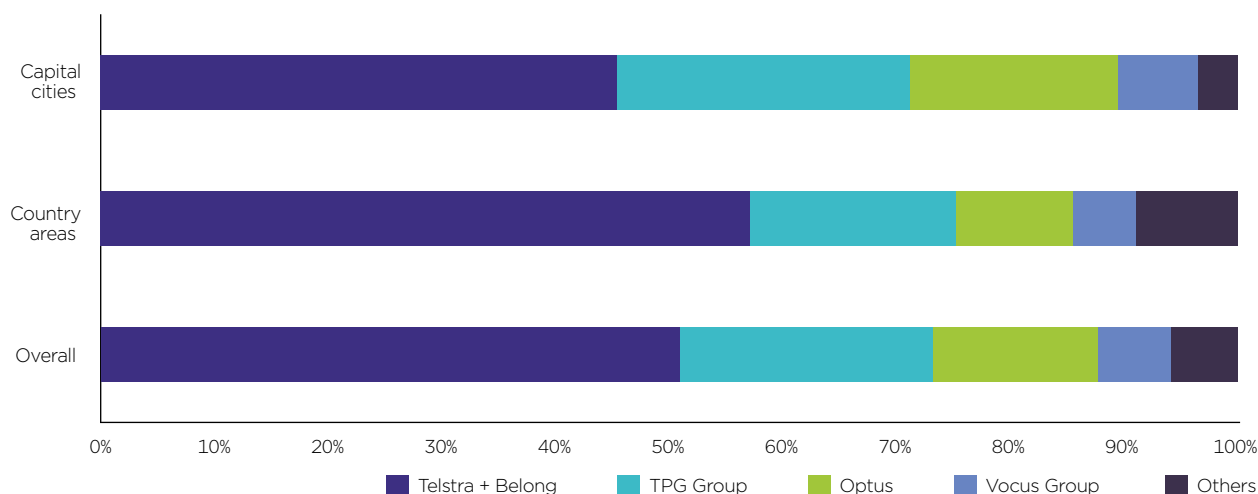
Herfindahl-Hirschman Index (HHI)[32]

The HHI is a commonly accepted measure of market concentration, used to understand the level of competition in a market. A high level of market concentration (shown by a high HHI) may indicate that there is less competition in the market. The HHI can have a value ranging from close to 0 to 10 000, where a HHI of 10 000 would indicate one firm in the market (a monopoly).

Using the market shares provided by Roy Morgan Research we find that for:

- Fixed broadband services, the HHI is around 3500.
- Fixed voice services, the HHI is around 4500.
- Mobile phone services, the HHI is around 3100.

These figures suggest that there is a high degree of concentration in the provision of each of these services.

However, we note that markets for telecommunications services are typically concentrated with three or four major service providers. Furthermore, concentration is only one measure of competitiveness and does not reflect other features of competition such as price and non-price differentiation. This is discussed in subsequent sections.

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30   Roy Morgan Single Source (Australia), January to December 2016, n=30 025, Australian Households.
31   Roy Morgan Single Source (Australia), January to December 2016, n=28 839, Australian Households.
32   The HHI is calculated by squaring the market share of each firm competing in a market and then summing the resulting numbers.

For mobile broadband services (SIM-tablets and modems, and dongles), we estimate that Telstra has a 65 per cent market share as at 2016–17, with Optus supplying 15 per cent of the market, MVNOs with 13 per cent and Vodafone with 7 per cent.[33]

We do not have enough information about the number and scale of non-NBN fixed line broadband and fixed wireless service providers to comment on their market shares.

There are a large number of providers offering OTT communications services and as consumers typically use more than one app and provider, it is difficult to assess market shares. Furthermore, as these providers are typically international companies we do not have reliable information about the individual market shares of these service providers in Australia.

4.1.3   Price competition

There is evidence of strong price competition for broadband, voice and messaging services with prices of all services on fixed line and mobile networks declining in 2016–17.

Fixed broadband services

We have examined the level of price competition for broadband services in terms of the underlying network technology as this is how service providers market services to consumers.

NBN

There is currently strong price competition for broadband services delivered on the NBN with nationally uniform prices offered by service providers. However, this level of price competition may not be sustained in the long-term. The market is still relatively immature with just over half the NBN rollout complete and service providers competing for market share in this key transition phase.

We will continue to monitor and report on price competition on the NBN in our annual telecommunications report to better understand longer-term price trends.

We estimate that, in 2016–17, the real average prices paid for broadband services on the NBN decreased by about 5 per cent.[34]

At present, there are many new entrants seeking to attract customers on the NBN with special offers and discounts. For example, Amaysim, a previously mobile-only service provider, now advertises broadband plans on the NBN with 12 Mbps and unlimited data for $60 per month.[35] We note that at the time of writing the Draft Report, Amaysim offered a discount of $20 per month for the first six months of this plan.

Vodafone has also entered the fixed line broadband market, with plans on the NBN ranging from $60 to $95 per month, including limited time discounts on 24-month contracts.[36]

In the Draft Report, we found that most of the product offerings for NBN services were within the $40 to $80 per month range. Across the different speed tiers (12 Mbps, 25 Mbps, 50 Mbps and 100 Mbps) there are small and unlimited data quota plans offered at similar price points. We also found that the majority of base level NBN plans included 12 or 25 Mbps with higher speeds available for an additional monthly surcharge.

Since the publication of the Draft Report, more service providers have started to actively offer 50 Mbps plans, while others have adjusted their existing plans following changes to NBN Co's wholesale prices. An example of prices and data quotas for different NBN speeds is shown in figure 4.5.

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33   Australian Competition and Consumer Commission (ACCC), ACCC telecommunications report 2016–17, ACCC, February 2018, p. 5.

34   ACCC, ACCC telecommunications report 2016–17, p. 3.

35   Amaysim, NBN plans, viewed March 2018.

36   Vodafone, Vodafone nbn, viewed March 2018.

Figure 4.5:   Comparison of NBN broadband plans by speed tier, data quota and price for various service providers[37]

Figure 4.6:   Changes between the Draft and Final Report for various service provider NBN retail broadband plans[38]
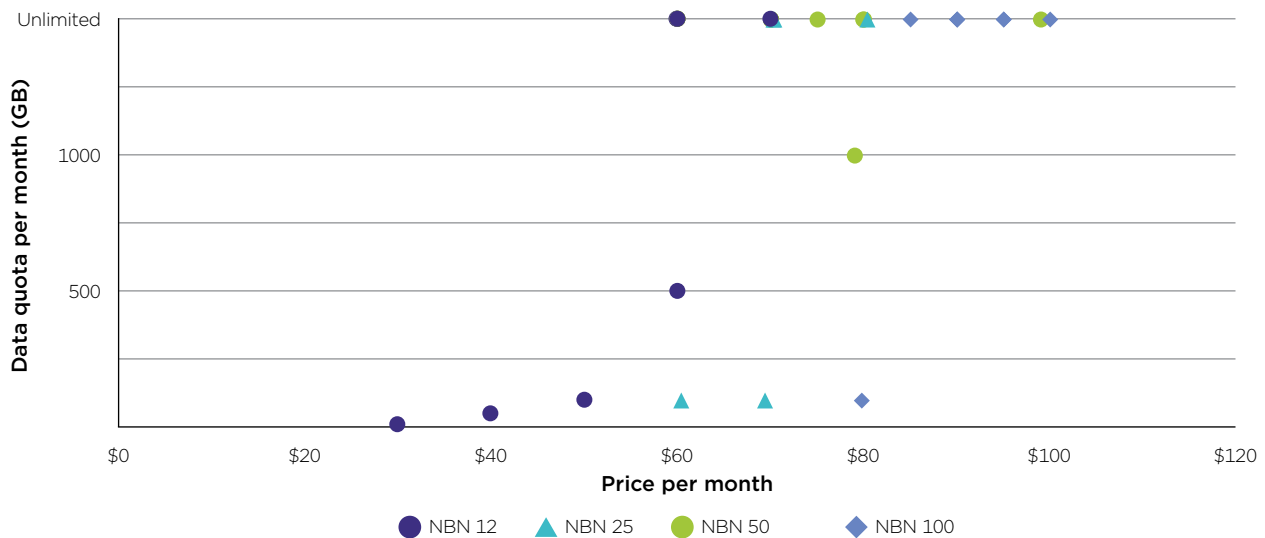
We have also compared the plans offered by select service providers at the time of the Draft Report and the Final Report, as shown in figure 4.6. While most of the plans have stayed the same, there are a few changes, with some service providers increasing their data and/or speed for the same price, and others adjusting prices.

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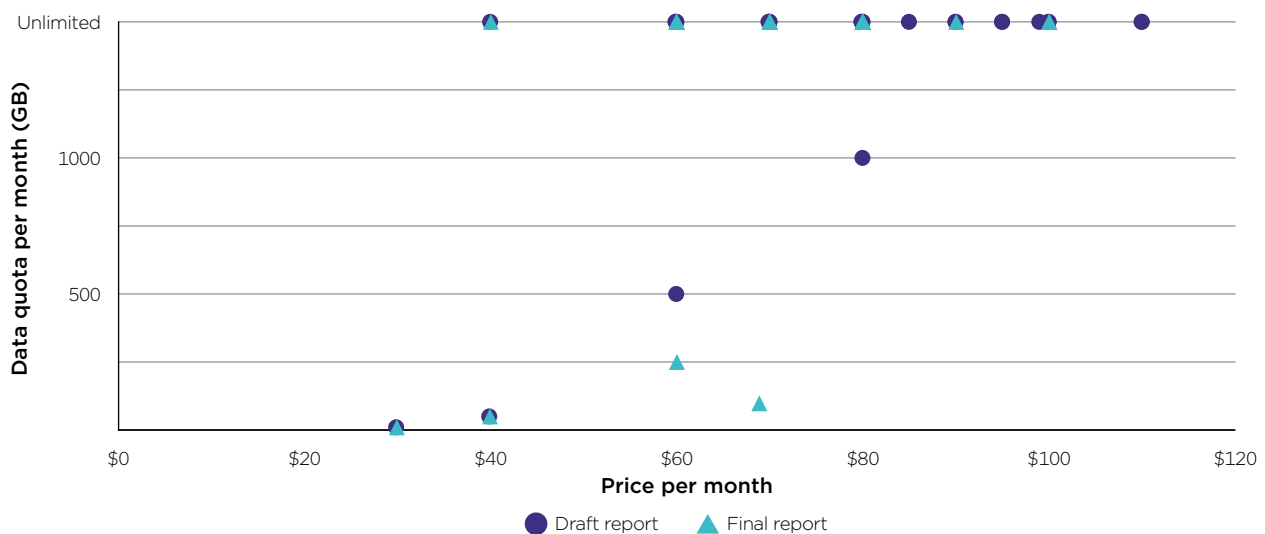
37   Company websites, viewed on 14 March 2018. This chart includes Amaysim, Belong, Dodo, iiNet, MyRepublic, Optus, Telstra, TPG, Vodafone.

38   Company websites, viewed October 2017 and March 2018. This chart includes Amaysim, Dodo, iiNet, MyRepublic, Optus, Telstra, TPG and Vodafone.

SkyMuster satellite services on the NBN

As at December 2017, there were 82 575 satellite services in operation on the NBN. Of these, around one-third were 12 Mbps services and two-thirds were 25 Mbps services. Satellite services currently represent 2.4 per cent of the total NBN services in operation.

There are 13 service providers acquiring satellite services directly from NBN Co with Active8me and SkyMesh supplying over 50 per cent of the market for NBN satellite services.
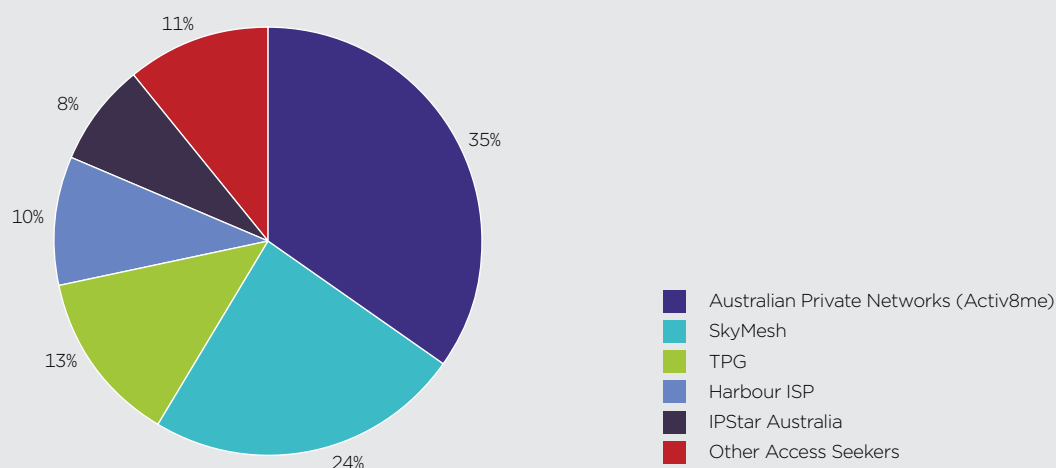
Satellite plans include peak (7 am to 1 am) and off peak (1 am to 7 am) data quotas.

Apart from TPG (through iiNet), the large service providers do not supply satellite services on the NBN. The top three service providers by (wholesale) services in operation, as at December 2017, are Active8me, SkyMesh and iiNet, as shown in figure 4.7.

Figure 4.7:   Market shares for NBN satellite services, December 2017[39]

- Australian Private Networks (Activ8me)
- SkyMesh
- TPG
- Harbour ISP
- IPStar Australia
- Other Access Seekers

The plans offered by these service providers are shown in figure 4.8. Currently, the largest peak download quota available is 150 GB per month for $124.95.

Figure 4.8:   Example of NBN SkyMuster plans for largest three service providers, peak data quota and 25 Mbps headline speed[40]

In comparison to wireless broadband plans that may also be able to service these remote areas using Telstra's mobile network, NBN satellite services are typically more expensive for consumers. However, in general they offer more options in terms of data inclusions, particularly for high data users, as shown in figure 4.9.

Figure 4.9: Example of NBN satellite prices compared to wireless services[41]
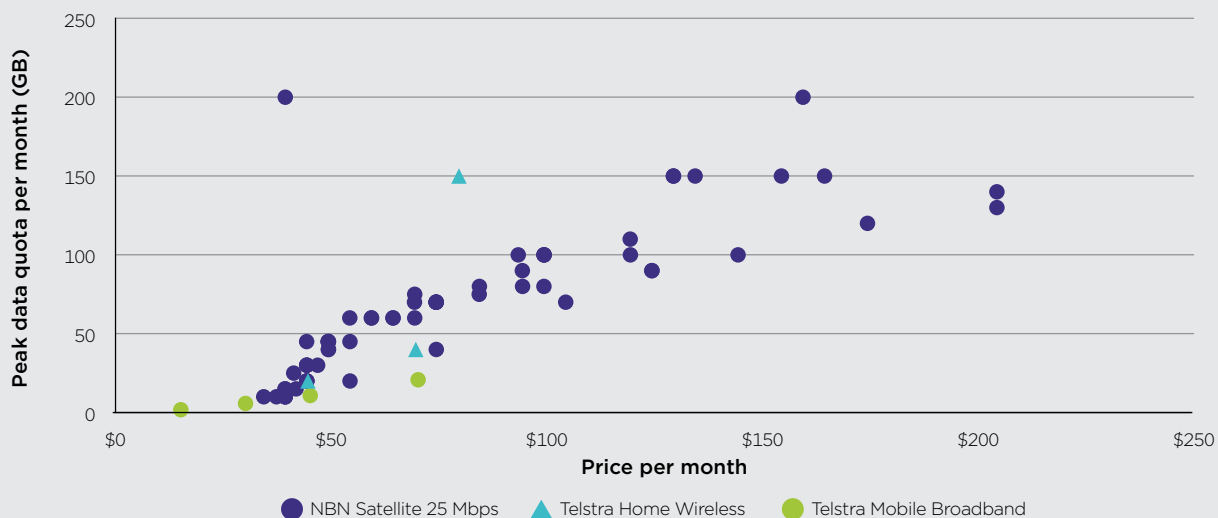
ADSL

We estimate that average real prices for legacy broadband services (ADSL and HFC) declined by about 11 per cent in 2016–17.[42] This continued the long-term decrease in these prices, which has reflected the concurrent fall in the average cost of supplying the services over the copper network.[43]

Most service providers are now offering 'NBN-ready' broadband plans, with equivalent price terms and inclusions irrespective of the underlying fixed network (ADSL or NBN). As a result, current price competition for ADSL broadband services is increasingly mirroring that for broadband services on the NBN at lower speed tiers.

Figure 4.10 shows a comparison of current prices for ADSL services for various service providers.

Figure 4.10: Example of ADSL broadband plans[44]

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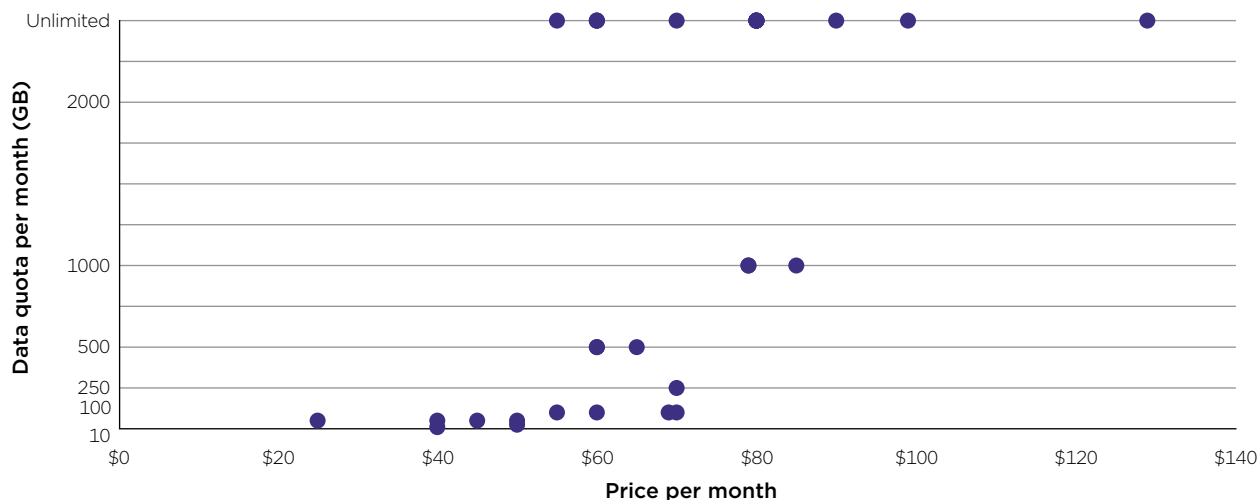
39 Australian Competition and Consumer Commission (ACCC), NBN wholesale market indicators report, ACCC, 31 December 2017.
40 Company websites, viewed February 2018.
41 Company websites, viewed February 2018.
42 ACCC, ACCC telecommunications report 2016–17, p. 3.
43 Australian Competition and Consumer Commission (ACCC), ACCC telecommunications report 2015–16, ACCC, 8 March 2017, p. 5.
44 Company websites, viewed on 14 March 2018.

Non-NBN fibre broadband services

Non-NBN fibre broadband services are supplied to consumers (typically in apartment buildings or new housing estates or developments) by service providers using networks built and owned by network operators, such as OptiComm, OPENetworks, RedTrain or LBN Co.

TPG also supplies wholesale and retail services using its own FTTB network to some apartment buildings. TPG offers its FTTB services for slightly less than its equivalent similar NBN retail services, as shown in table 4.2.

Table 4.2:   **Comparison of TPG broadband services**[45]

FTTB services on TPG fibre network	Services offered by TPG on the NBN
$49.99 (PAYG calls) (12 Mbps)	$59.99 (PAYG calls) (12 Mbps)
$59.99 (PAYG calls) (50–90 Mbps)	$69.99 (PAYG calls) (50 Mbps)
	$89.99 (PAYG calls) (100 Mbps)
$69.99 (L+N+M calls) (50–90 Mbps)	$79.99 (L+N+M calls) (50 Mbps)
	$99.99 (L+N+M calls) (100 Mbps)

For service providers who use both the NBN and non-NBN fibre networks, such as Exetel, retail non-NBN fibre broadband services are typically offered for the same price as retail broadband services supplied over the NBN, with equivalent speed tiers and data inclusions.

Wireless broadband services

Wireless broadband services include mobile broadband (tablet SIM and modem) and fixed wireless broadband services.

For mobile broadband the average prices paid decreased by 6.7 per cent in real terms,[46] and were accompanied by about an 86 per cent increase in the average data inclusions in 2016–17.[47] The data quotas for mobile broadband plans have increased, on average, by 33 per cent between 2014 and 2017.[48]

Figure 4.11 shows current prices for mobile broadband plans for tablets (SIM-only) and home wireless broadband services that use modems. Both of these products use mobile networks to supply broadband services.
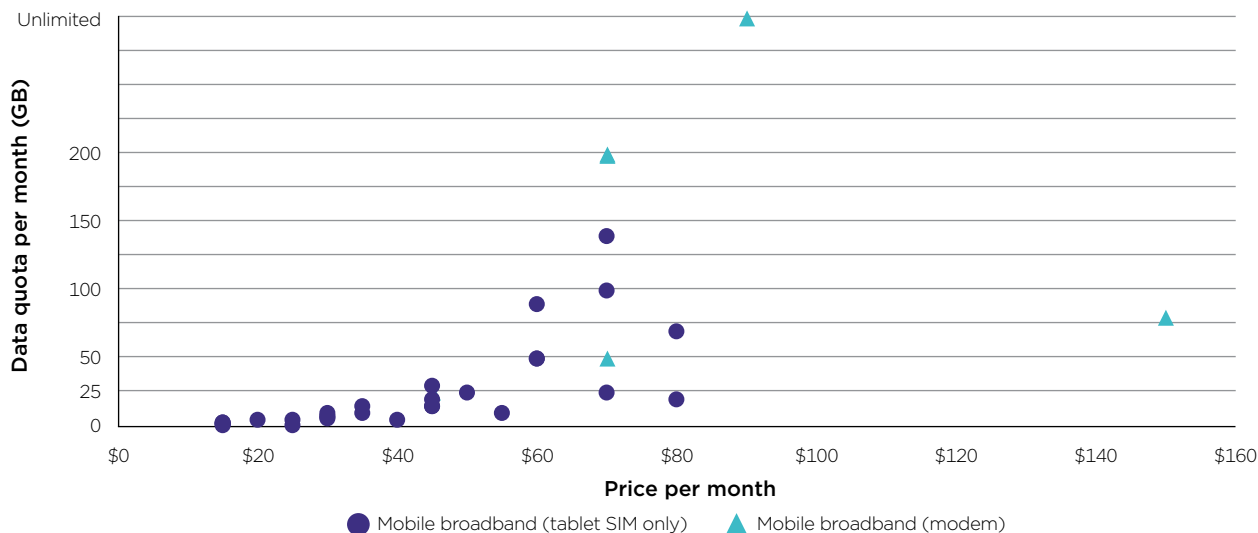
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45   TPG, NBN Plans and FTTB Plans, viewed February 2018.
46   ACCC, ACCC telecommunications report 2016–17, p. 3.
47   ibid, p. 32.
48   ibid.

Figure 4.11: Example of mobile broadband plans (tablet SIM-only and modem)[49]

We have observed increasing alignment of wireless broadband services with fixed line services, particularly for mobile broadband services that use a modem.

As shown in figure 4.12 is comparable to their current offerings of broadband services on the NBN. However, in general the amount of data included for wireless offerings continues to be significantly less than the typical data inclusions for fixed line plans. As shown in figure 4.12, wireless plans typically provide less than 200 GB per month, whereas fixed line plans typically provide 500 GB or more, with many now offering unlimited data. This variance in data quota may limit the substitutability of wireless for fixed line broadband at present for most consumers.

Figure 4.12: Example of home wireless and NBN broadband plans offered by Telstra and Optus[50]
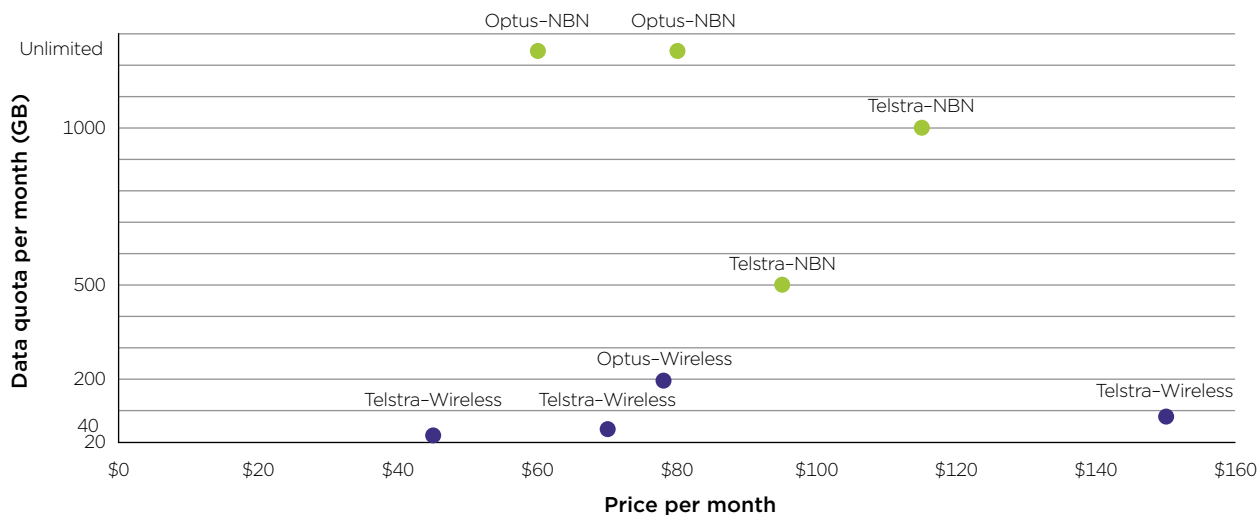
Wireless broadband services are also supplied using fixed wireless networks, which use a point-to-point signal transmission through the air rather than through copper or fibre. Fixed wireless services typically require an antenna or dish to be installed at a customer premises and proximity to a fixed wireless tower. Fixed wireless services can operate using licensed spectrum bands or using class-licensed spectrum for Wi-Fi networks. Fixed wireless services are often deployed where fixed line infrastructure is not yet available or is not cost effective to deploy given low population density.

NBN Co uses fixed wireless technology as part of its multi-technology mix to service customers in regional and rural areas and up to 6 per cent of premises will be connected to NBN fixed wireless services. Service providers supply fixed wireless broadband services on the NBN for the same price

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49   Company websites, viewed on 14 March 2018.
50   Company websites, viewed on 14 March 2018.

as NBN fixed line broadband services, and as such, these prices are captured in the discussion above about price competition on the NBN.

Fixed wireless services are also supplied by non-NBN network operators who are typically vertically integrated and operate in specific geographic areas.

A comparison of current fixed wireless broadband services supplied over non-NBN networks is shown at figure 4.13. These services are largely offered at similar prices to fixed line broadband services for various speeds but there are fewer plans available with larger data quotas.

Figure 4.13: Example of prices and data quotas for non-NBN fixed wireless broadband services[51]
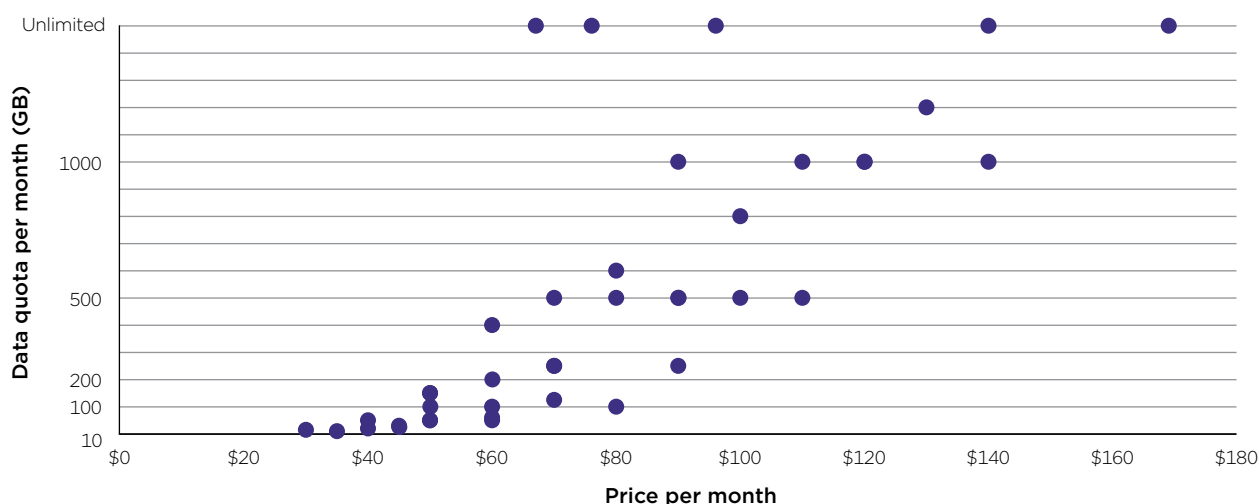
Fixed line voice services

As previously reported by the ACCC, there has been a long-term decline in voice service prices with average real prices paid for fixed line voice services falling by 7.5 per cent in 2015–16,[52] driven by a decline in the price of retail basic access services and fixed-to-mobile calls.[53]

We have observed that there are few standalone fixed voice services currently available in the market, with fixed voice services now commonly bundled with a fixed broadband service.

This may be influencing the observed trend of declining fixed voice-only Australian households (those who have a home phone but no fixed broadband service), which decreased from 25 per cent of total Australian households in 2013 to 18 per cent in 2016.[54]

Furthermore, most standalone fixed voice services only offer pay-as-you-go calls on the entry-level product, with additional charges for a mix of call inclusions such as local, national, calls to mobile and international calls. In some cases, the price of standalone fixed voice services is similar to the cheapest fixed voice and broadband bundle price, as shown in figure 4.14.

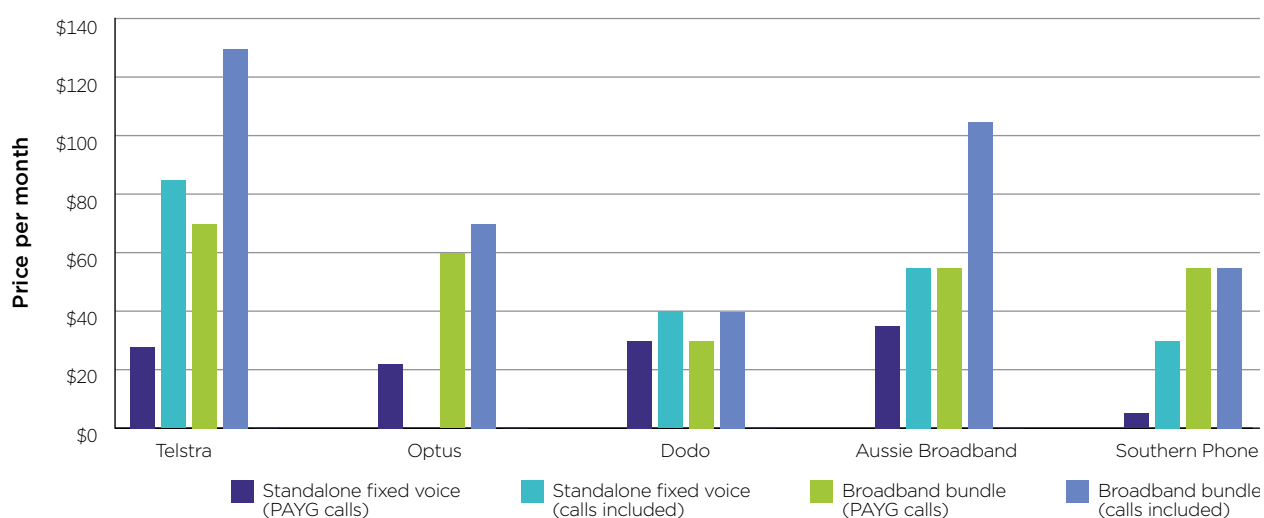51   Company websites, viewed on 14 March 2018.
52   ACCC, Telecommunications report 2015–16, p. 25.
53   ibid.
54   Roy Morgan Single Source (Australia), January to December 2016, n=17 489 and January to December 2013, n=11 178, Australian Households.

Figure 4.14: Example of prices for standalone fixed voice services compared to fixed voice and broadband bundles[55]

Chart legend:
- Standalone fixed voice (PAYG calls)
- Standalone fixed voice (calls included)
- Broadband bundle (PAYG calls)
- Broadband bundle (calls included)

Mobile phone services

We estimate that for 2016–17, average prices paid for (post-paid) mobile phone services decreased by 4.4 per cent in real terms[56] accompanied by a 49 per cent average increase in data quotas for (post-paid) mobile phone services.[57]

This continued the long-term downward trend in the price of mobile phone services in Australia. Overall, the ACCC's mobile phone services price index has fallen by an average of 4.2 per cent annually since it commenced in 1997–98.[58]

Price competition for mobile phone services is also reflected by the discounts offered by many service providers, for example, bonus data inclusions, half price for the first six months of a contract and/or first month free.

We have observed that most mobile phone plans now offer unlimited local and national calls, with many also including international minutes or included calls to specific countries. Some mobile phone plans also have international roaming inclusions or competitive add-ons.

We consider the generous call inclusions on mobile phone services are likely a response to OTT voice services that offer free calls between those using the same app, which has displaced (typically expensive) international calls in particular.

Mobile phone plans are available as pre- or post-paid options. In the market study, we have focused on post-paid plans to analyse the data quota included in these services. Post-paid plans are typically offered as contract plans that include a mobile phone handset (and repayments) and SIM-only. Plans with a mobile phone handset included are typically more generous in terms of data quota inclusions.

For example, figure 4.15 shows SIM-only mobile phone plans for select service providers, while figure 4.16 shows mobile phone plans that include a handset device.

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55   Company websites, viewed February 2018. Note the bundle services listed included different data quotas. The call inclusions are local, national and calls to mobiles for all service providers except Southern Phone which is only local and national calls.

56   ACCC, ACCC telecommunications report 2016–17, p. 3.

57   ibid., p. 27.

58   ACCC, ACCC telecommunications report 2015–16, p. 96.

Figure 4.15: Example of SIM-only mobile phone plans for various service providers[59]

Legend: Telstra, Optus, Vodafone, TPG, Dodo, Virgin, Amaysim
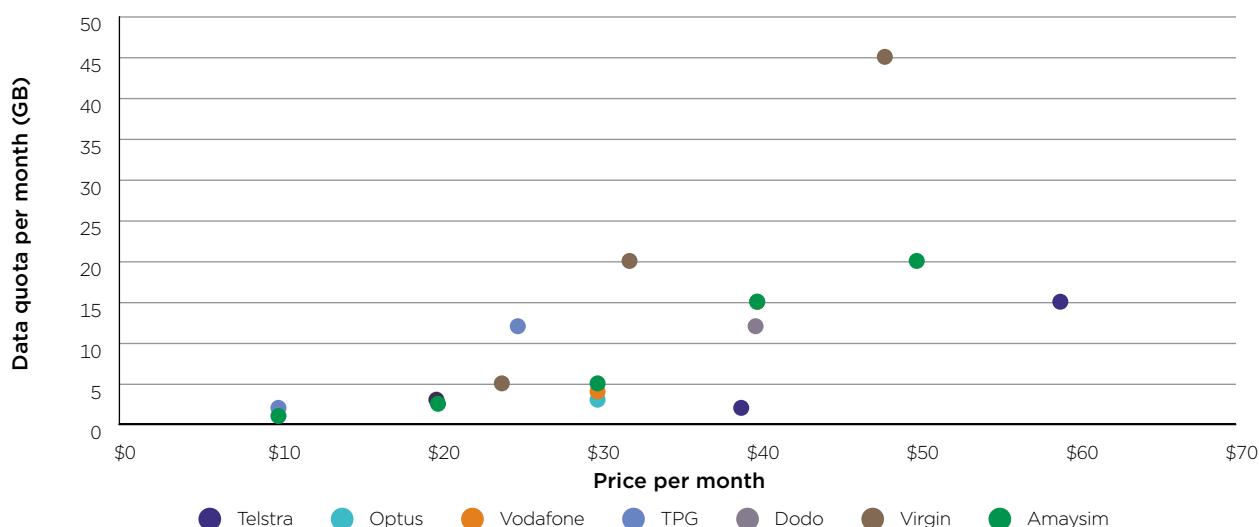
Figure 4.16: Example of mobile phone plans with handset[60]

Legend: Telstra, Optus, Vodafone, Virgin

Price competition in SMS is also very strong and has seen most service providers move to offering unlimited SMS. In the past, SMS inclusions were typically limited by number of texts or dollar value (charged at 25 c per SMS).

OTT voice and messaging services

OTT voice and messaging services are typically free for a consumer to download but incur indirect ongoing costs in using the service. These include the cost of data used to deliver the service (which would likely be minimal given the current data quotas of plans) as well as the indirect cost of personal data being collected and sold by OTT service providers to advertising and other companies.

The entry of OTT voice and messaging services has provided some competitive pressure on traditional fixed and mobile voice and messaging services by providing consumers with a low cost alternative, and likely influenced the movement towards unlimited call and message inclusions for relevant services.

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59   Company websites, viewed January 2018.

60   Company websites, viewed January 2018.

4.1.4　Non-price competition

There is a degree of non-price competition in the supply of broadband and voice services. We have examined the level of competition in terms of key product features including inclusions (such as data for broadband services and call minutes for voice services), contract length, bundle options, speed, service quality, customisation, and network coverage (for mobile services).

Data inclusions

Across all broadband services (both fixed and wireless) data inclusions have increased substantially in recent years.

We estimate that data quotas on (post-paid) mobile phone services increased by about 49 per cent in 2016–17 and 41 per cent on average between 2014 and 2017.[61] However, they still remain significantly lower than those for fixed line broadband services, as shown in figure 4.17. Data quotas for fixed line services are estimated to have increased approximately 39 per cent in 2016–17[62] with around a quarter of all fixed line broadband services including unlimited data.[63]

As shown in figure 4.17, the data inclusions for different technologies (wireless and fixed) continue to vary, with some fixed line service providers now only offering plans with unlimited data. In contrast, wireless offerings are typically more varied with several quota options available.

For consumers who need around 200 GB or less of data per month, there are many options now available. However, for those who download more than this, fixed line broadband remains the cheaper option.

Figure 4.17:　Example of prices and data quotas for broadband services on different technologies[64]
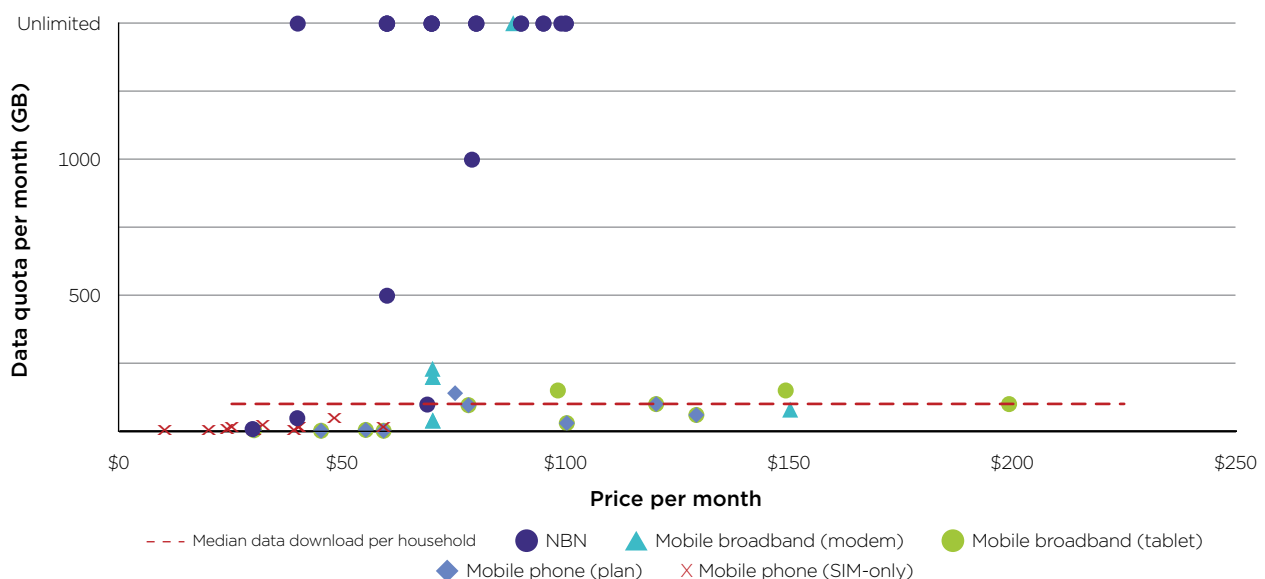
Contracts

There are several contract options available to consumers, providing a level of flexibility and choice to suit different consumers' needs. For example, many service providers, particularly smaller providers and new entrants are offering products with no lock-in contracts, for both fixed and mobile broadband and voice services. Most large service providers continue to offer services on 12-, 18- or 24-month contracts, but also provide the option of no lock-in contracts for an additional fee. Some service providers also waive their set-up or establishment fee if a consumer chooses to take a contract.

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61   ACCC, ACCC telecommunications report 2016–17, p. 27.
62   ibid., p. 22.
63   Ibid., p. viii.
64   Company websites, viewed January 2018, and New Street Research.

While contracts have the ability to lock-in consumers and impede switching, we do not consider that in general contracts are impacting competition as there are sufficient options (contracts and no-contracts) available to suit different consumers' preferences.

However, in the context of the transition to the NBN, we have some concerns that long-term contracts may be contributing to limited switching between service providers during this key migration period. This may have implications for future competition on the NBN. We discuss this further in section 5.4.

We also have concerns in cases where contracts are excessively long. For example, 36-month contracts are now offered by Vodafone in Australia. These contracts are marketed on the basis that you can spread the cost of a phone over a longer period, to reduce your monthly handset repayment. Longer contracts represent a further barrier to switching and have been been prohibited in the UK and EU for several years.

Network coverage

Network coverage relates to the availability of a network in different locations as well as the quality of the coverage for use of services.

The NBN is intended to provide national coverage and deliver wholesale headline speeds of at least 25 Mbps to all Australian premises by the end of the rollout. These services will be delivered primarily using fixed line technologies (FTTx[65] and HFC), as well as fixed wireless and satellite services in low density areas, mainly in regional and remote Australia.

Non-NBN fibre networks are typically only available in apartment buildings and new housing estates or developments, largely in metropolitan areas. Some fibre networks also supply services to student or community housing estates or aged care residences.

Non-NBN fixed wireless broadband services generally operate in specific geographic areas that may be a black spot for fixed line services and where they are a cost effective option.

Table 4.3 identifies the different locations where various non-NBN fixed wireless service providers currently operate.

These services need favourable geographic conditions, such as facilitating line-of-sight and consequently may not be available to all consumers. However, where they are available they play an important competitive role. For example, we understand there are currently instances where non-NBN fixed wireless services are being used to provide broadband services prior to NBN based broadband services being deployed in an area. These networks may also provide some competitive pressure on the NBN and other network technologies, as further discussed in section 4.2.

Table 4.3:   Available locations of some non-NBN fixed wireless service providers[66]

Service Provider	Available locations
Uniti Wireless	Parts of Adelaide and Melbourne
Node1 Internet	WA—Geraldton, Walkaway, Dongara, Perth
NuSkope	Adelaide
Clear Networks	Parts of Qld, NSW, Vic, Tas, SA and WA
Red Broadband	WA—Perth to Yallingup
Yourhub	Qld—all Townsville suburbs
Adam Internet/iiNet (owned by TPG)	SA only
Vividwireless (owned by Optus)	Sydney, Melbourne, Adelaide, Perth, ACT, Central Coast (NSW)

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65   Fibre to the x, where 'x' refers to any or all of FTTB, FTTC, FTTN or FTTP.

66   Company websites, viewed March 2018.

For mobile services, depth or quality of network coverage and geographic coverage are both important points of competition and product differentiation. The MNOs have undertaken significant investments to strengthen and expand their network coverage, reflecting the importance of coverage to remain competitive.

However, there are differences in geographic coverage of the three MNO networks and quality of coverage continues to differ between regional and urban areas. For example, Telstra claims to reach 99.3 per cent of the population, followed by Optus (which claims to reach 98.5 per cent), and Vodafone (which claims to reach around 97 per cent).[67] This means that regional consumers may experience more black spots in their coverage and in some areas they have limited choice of service provider. Our views in relation to possible avenues to address these issues are outlined in section 7.

In 2017, all three MNOs announced further network investment to continue to improve their coverage, capacity and performance.

While MVNOs are able to differentiate on service quality and network coverage, this is dependent on their individual commercial agreements with one of the three MNOs. MVNOs may have access to either the 3G or 4G networks and in some cases, their coverage may be less than that of the MNO. For example, of the MVNOs that use Telstra's mobile network, only Boost Mobile has an agreement for equivalent 4G coverage to Telstra's retail customers.

Customisation

Some service providers now offer consumers the opportunity to customise their services by selecting their own mix of inclusions rather than selecting from set options. For example, Exetel and Aussie Broadband allow customers to select their own mix of speed, data quota and contract length for broadband services, with additional options for home phone and calls, and modem inclusions. Aussie Broadband also offers add-ons such as the 'Night-Owl' (unmetered data between 1 am and 7 am for an extra $10 per month) as well as unmetered uploads for an additional $10 per month.[68]

Vodafone has announced a new series of month-to-month mobile phone plans that come with a mobile phone device available on interest-free monthly device repayment schedules spread across one to three years that are completely decoupled from the voice and data charges.[69] Vodafone also offers consumer the choice to mix inclusions such as local and international call minutes, SMS and data, as well as Qantas frequent flyer points.

Bundling and multi-product offerings

Bundling refers to the practice of offering different services together as one combined package, for example, home phone and home broadband bundles. Bundles are typically offered for a lower price than the price of separate products, or with other inclusions such as entertainment services.

Multi-product offerings refer to the ability of service providers to offer different services to consumers as separate products such as fixed line broadband, fixed voice and mobile services. Service providers may offer discounts if consumers take all their services with the one provider. Consumers may also enjoy other benefits such as the convenience of dealing with one provider or a single bill.

In 2016, approximately 64 per cent of consumer households with fixed broadband had their home phone and fixed broadband with the same service provider, according to Roy Morgan Research. Of these households, 65 per cent have services with Telstra, 18 per cent are with Optus, 13 per cent are with TPG/iiNet and 3 per cent are with Dodo.[70]

Of the households who had their home phone, fixed broadband and mobile phone with the same service provider, 76 per cent are with Telstra, 19 per cent with Optus, 4 per cent with TPG/iiNet and 1 per cent with Dodo.[71] This reflects Telstra's strong position over its competitors in being able to lock-in customers with multi-product offers.

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67   Australian Competition and Consumer Commission (ACCC), Domestic mobile roaming declaration inquiry final Report, ACCC, 23 October 2017, p. 5.

68   Aussie Broadband, Residential Internet Plans, Aussie Broadband, viewed on 19 March 2018.

69   Vodafone Australia, Mobile Plans, Vodafone Australia, viewed on 19 March 2018.

70   Roy Morgan Single Source (Australia), January to December 2016, n=50 144, Australian Households.

71   ibid.

In recent years, service providers have also started to include additional services with their telecommunications products to offer further value to customers, and stay competitive. For example, some service providers have secured exclusive content deals for major sporting events such as AFL, NRL and English Premier League, as well as offering (typically for a limited period) free access to music services (including Apple Music and Spotify Premium), video streaming services (such as Netflix, Stan or Foxtel) or their own entertainment channels (such as Yes TV by Fetch (Optus) or Telstra TV). Some service providers also offer these services with unmetered data on fixed and mobile broadband.

Service providers such as Amaysim and Dodo also offer consumers the opportunity to purchase other services (such as energy services) in addition to telecommunications services, in selected areas. Dodo also offers car, home and contents, and travel insurance products.

Bundling and multi-product offerings can have many benefits for consumers, such as discounted services, convenience of a single bill and provider. However, they also have the potential to impede competition if they force consumers to purchase products they do not want or need, or if one service provider is able to leverage its market power from one market to another.

We discuss the benefits and potential harm from bundling and multi-product offerings in more detail in section 5.4.

Speed

Fibre networks (such as those owned and operated by NBN Co, OptiComm, OPENetworks, LBN Co and RedTrain) offer different broadband speeds to consumers. In comparison, the legacy networks and mobile networks typically only offer one maximum line speed. For all networks, the actual speed a consumer receives is the product of a variety of factors including the maximum line speed available, the number of other users on the network, the consumer's personal equipment, the capacity provisioning of the service, and in some cases, the length of the access line.

The ability to offer different speed options on fibre networks affords these service providers another opportunity on which to differentiate and compete. At present, the most common speed tiers offered to consumers are 12, 25, 50 and 100 Mbps. However, on the NBN, there has previously been limited focus on differentiating by speed with most service providers focusing on promoting the lower speed tiers (12 and 25 Mbps) over higher speed (50 and 100 Mbps). We do not have oversight of the speeds being taken up on non-NBN fibre networks. As such, our discussion focuses on broadband services supplied on the NBN.

The lack of product differentiation by speed and take-up of low speed services was reflected in the ACCC's *NBN Wholesale Market Indicators Report* for June 2017. This report found that 84 per cent of NBN based broadband services[72] were 12 or 25 Mbps, with around 55 per cent being 25 Mbps services. In contrast, only 4 per cent of services were 50 Mbps and 12 per cent were 100 Mbps.[73]

Since the publication of the Draft Report, NBN Co has introduced several changes to its wholesale product and pricing structure. We expect these changes will influence greater take-up of higher speed services, particularly the 50 Mbps speed tier. The ACCC *NBN Wholesale Market Indicators Report* for December 2017 showed a slight increase in higher speed services, with 83 per cent taking 12 or 25 Mbps and 5 per cent taking 50 Mbps and 12 per cent taking 100 Mbps.[74]

However, as these price changes were only introduced in mid-December 2017, we will continue to observe how the industry responds to these developments in the next few months.

At the market study stakeholder forum in July 2017 and at various stages of consultation, some service providers contended that the low take-up of higher speed services on the NBN was due to uncertainty about retail margins on the NBN given the cost of provisioning sufficient capacity and consumers' retail price expectations. They argued this was causing them to actively drive customers towards lower speed NBN broadband plans, rather than promoting the NBN as an ultrafast broadband network.[75] Continued low take-up of high-speed services may have consequences for efficient use of the NBN infrastructure if the network is not utilised as intended and only provides low-speed broadband services. This may

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72   NBN Traffic Class 4 (TC4) services (best efforts broadband services).

73   ACCC, NBN Wholesale Market Indicators Report, 30 June 2017, viewed on 19 March 2018.

74   ACCC, NBN Wholesale Market Indicators Report, 30 December 2017, viewed on 14 March 2018.

75   'NBN margin uncertainty causing Vocus to drive customers towards lower speeds', Communications Day, Decisive Publishing, Sydney, 15 June 2017, p. 3.

also impact NBN Co's ability to recover its efficient costs of investment, which relies on assumptions of significant take-up of higher speed (and higher priced) services. We discuss this issue further in section 5.1.

> **Finding:** Limited consumer take-up of higher speed NBN plans may affect efficient use of NBN infrastructure if it continues in the long-term. It may also potentially have significant implications for NBN Co's ability to recover its investment costs.

In addition to these supply-side issues, there are a range of possible demand-side explanations for the low take-up of higher speed services on the NBN. For example, at present, consumers may simply prefer lower speed broadband given it is sufficient for most existing mainstream applications. Consumers may also:

- be uncertain about or perceive service quality issues with higher speed services (services not achieving the advertised/expected speed)
- lack awareness or understanding of what kind of experience different speed tiers can deliver (despite some service providers now offering speed information on their websites)
- be unwilling to pay for the additional cost of higher speed broadband services.

However, Roy Morgan Research suggests that consumers may be starting to value these features more when choosing a fixed broadband service provider. As shown in figure 4.18 of those Australian households who entered the fixed broadband market for the first time in the last 12 months, in 2016, for broadband services on the NBN, 'better connection/reliability' was the most common reason for choosing a service provider. For households with ADSL services, 'cheaper rates' was the most popular reason, reflecting the focus on price competition over non-price factors.[76]

Figure 4.18: **Reasons for choosing current fixed line broadband service provider (new entrant consumers) in last 12 months for 2016[77]**
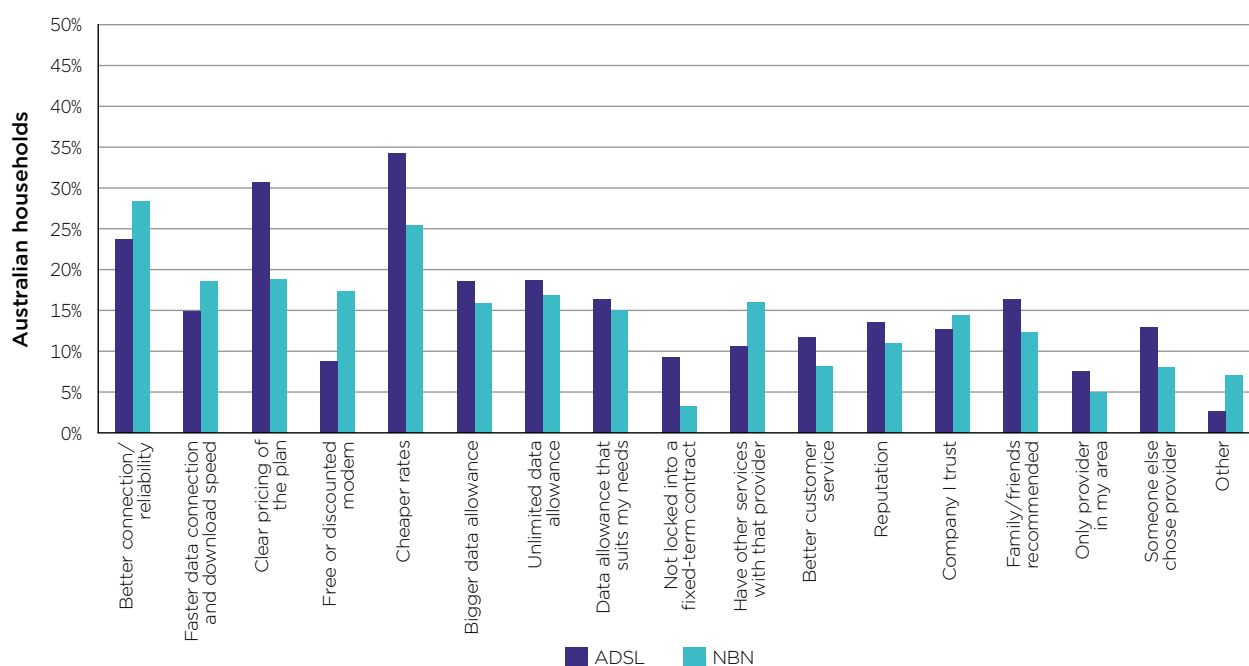
Mobile networks (4G and higher) and non-NBN fixed wireless networks can achieve comparable speeds to most fixed fibre networks. At present 4G is capable of delivering speeds between two and 100 Mbps, with 5G expected to deliver between one and 10 Gbps.[78]

However, actual speeds will depend on several factors including the number of users on the network and usage activities. Mobile service providers may compete with fibre networks at comparable speed levels and attract consumers who value other benefits offered by these networks, such as on-the-go

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76 Roy Morgan Single Source (Australia), January to December 2016, n=439, Australia Households.
77 Roy Morgan Single Source (Australia), January to December 2016, n=439, Australia Households.
78 Australian Communications and Media Authority (ACMA), 5G and mobile network developments – emerging issues, Occasional paper, ACMA, February 2016.

connectivity. However, at present the amount of data typically included in mobile plans is significantly less than typical data inclusions for fixed line plans.

Service quality

Service quality encompasses service performance and reliability. In this case, service quality is distinct from customer service elements. These factors do not yet appear to have been a significant area of non-price competition for fixed line broadband services. However, we are now observing some service providers seeking to differentiate themselves based on quality of service.[79]

On the NBN, service providers are able to influence the quality and performance of their broadband services (including reliability, speed and congestion) by purchasing different amounts of capacity from NBN Co (CVC).[80] While service providers have an opportunity to compete on service quality and performance, they do not appear to be have been actively doing so.

For 2015–16 and 2016–17, the TIO reported an increasing number of complaints about broadband services supplied over the NBN. In 2015–16 some of the most common complaints were about faults, such as slow data speeds (48 per cent increase), unusable services (19 per cent increase) and drop-outs (19 per cent increase).[81] In 2016–17, complaints about faults accounted for 59 per cent of NBN complaints received by the TIO.[82]

We previously received significant feedback from service providers throughout the market study about the price level of CVC restricting their ability to provision capacity that meets consumers' expectations. At the market study stakeholder forum in July 2017, a number of service providers contended that the cost of supplying enough capacity to meet consumers' expectations of service quality and performance is at odds with prevailing retail price expectations and consumer willingness to pay.

We consider that service providers may have been provisioning low levels of CVC to keep retail prices low (or at least competitive) and that this was contributing to significant network congestion, which led to slow speeds, and poor consumer experience. Consequently, many retail NBN services were not meeting consumers' expectations about service quality and performance.

Finding: Poor consumer experience on the NBN is partly due to the level of capacity provisioned by service providers and the inadequacy of information available to consumers to help them select the right plan with their preferred provider.

Since the Draft Report, NBN Co has implemented some changes to its wholesale pricing and products, which we anticipate will help relieve some of these issues. We discuss these new initiatives further in section 5.1.

We have also implemented some important consumer information initiatives (such as the broadband speed claims guidance and our Measuring Broadband Australia program) to help increase consumer awareness and understanding of NBN speeds, as well as, increase the incentive for service providers to improve their peak hour speeds and performance. These initiatives are discussed further in section 5.4.

4.1.5   Competitive constraints

The supply of voice and broadband services is highly concentrated, with a few large service providers supplying the majority of services. Some competitive pressure is exerted on these providers by the large number of smaller providers in the market, as well, as the growing presence of OTT service providers placing pressure on voice and messaging services. There is also growing competition between network technologies, with more consumers substituting between fixed and mobile networks for voice and broadband services.

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79   For example, Aussie Broadband has recently commenced publishing CVC graphs on its network performance. See www. aussiebroadband.com.au/network-centre/

80   This capacity is known as the connectivity virtual circuit (CVC) charge and represents one of three wholesale access charges that service providers pay to NBN Co.

81   Telecommunications Industry Ombudsman, Telecommunications Industry Ombudsman 2016 Annual Report, November 2016, p. 15.

82   Estimated with figures from the 2016–17 Telecommunications Industry Ombudsman Annual Report.

Competition for voice and broadband services

As shown in figure 4.19, Telstra holds the largest share of the market and offers prices at the higher end of the market.

We note that since the Draft Report, Telstra has introduced its first unlimited data broadband plan on the NBN, for services with 50 Mbps. This is likely in response to offerings from its main competitors (Optus and TPG), which typically include unlimited data for all speed tiers. It has also recently announced that it will shift all 25 Mbps customers onto 50 Mbps plans on the NBN. TPG has also removed its 25 Mbps services on the NBN since the Draft Report, and effectively replaced these offerings with 50 Mbps services. These movements are likely due to NBN Co's recently introduced wholesale price changes.

Figure 4.19: Example of broadband services on the NBN with 50 Mbps headline speed[83]

For mobile phone services, Telstra also has a leading position, but is subject to more competitive pressure from its nearest competitors, Optus and Vodafone, with similar data inclusions at relatively similar price points, as shown in figure 4.20.

**Figure 4.20: Example of mobile phone SIM-only plans with 10–15 GB data per month[84]**

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83   Company websites, viewed on 14 March 2018.
84   Company websites, viewed on 14 March 2018.

As shown in figure 4.21, Telstra is almost equally strong across fixed and mobile voice and broadband services. In contrast, its main competitors tend to concentrate on one service. As shown, TPG and Vocus Group are more dominant in fixed broadband services, while Optus and Vodafone are more active in mobile phone services. We note that this information pre-dates Vodafone's recent entry into NBN fixed broadband services.

Figure 4.21: Service providers market shares for fixed voice and broadband, and mobile phone services[85]
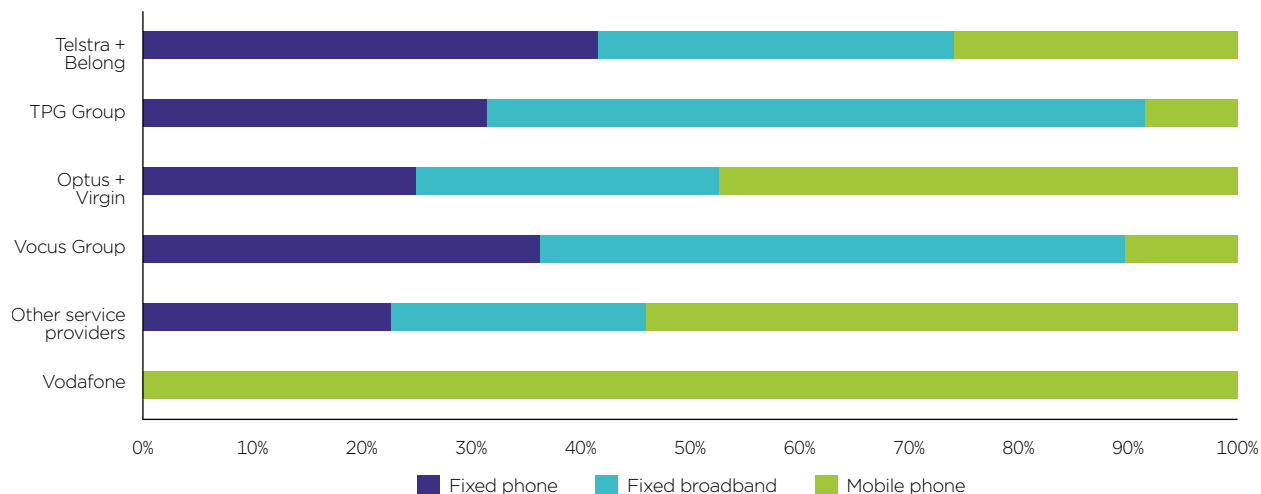
Telstra's large market share across voice and broadband services on both fixed and mobile networks may be partly due to its incumbency advantage, brand recognition and customer loyalty. For example, of those Australian households that have been with the same fixed broadband service provider for ten years or more, 65 per cent are with Telstra compared to 16 per cent with Optus.[86]

For communications services, consumers generally tend to be very loyal to their service provider. According to Roy Morgan Research, 68 per cent of Australian households with a fixed broadband service said they had been with their current service provider for over two years.[87]

Another contributing factor to Telstra's strong market position across all services (despite the more competitive offerings available from other service providers) may be that consumers are unaware of their options.

To ensure the benefits of retail competition are fully realised for consumers and service providers, consumers must be able to easily access comprehensible and clear information about their service provider options and product offerings so they can make informed purchasing and switching decisions. The importance of information and consumer choice in promoting competition is discussed further in section 5.4.

Competition between voice and broadband services

We have also considered the extent of competitive constraint on fixed broadband services from mobile broadband services given that the quality of mobile networks and product offerings are beginning to match those on fixed networks in terms of price, data quota and speed.

A consumer survey conducted by Venture Consulting co-funded by the ACCC (Venture survey), found that 30 per cent of respondent households with a fixed line broadband connection would be willing to move to a wireless service. Of those respondents who were considering switching to wireless or mobile broadband, 47 per cent said concerns about the NBN were a contributing factor.[88] We discuss the potential substitution from fixed to mobile networks further in section 6.1.

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85   Roy Morgan Single Source (Australia), January to December 2016, n=30 025, Australian Households, Roy Morgan Single Source
      (Australia), January to December 2016, n=42 961, Australia population (14+), and Roy Morgan Single Source (Australia), January to
      December 2016, n=31 727, Australian Households.

86   Roy Morgan Single Source (Australia), January to December 2016, n=8 674, Australia Households.

87   Roy Morgan Single Source (Australia), January to December 2016, n=14 330, Australian Households.

88   Venture Consulting, Consumer Survey, December 2017.

In contrast to broadband services, substitution of voice services from fixed to mobile is more prevalent. Voice services supplied over mobile networks are now of a comparable service quality to those on fixed networks and, unlike fixed services, can satisfy consumer demand for continuous connectivity. This, together with the reduction in price differences between fixed and mobile services, has led to increasing substitution to mobile voice services from fixed line by consumers in reliable coverage areas. From Roy Morgan Research, we can observe the continued decline of fixed line home phone ownership, falling to 68 per cent of Australian households in 2016 from 74 per cent in 2013.[89]

However, substitution of mobile voice for fixed line voice varies amongst different consumer segments. For example, younger generations are more likely than older generations to be mobile phone only users, as shown in figure 4.22. Furthermore, the extent of substitution from fixed to mobile voice may also be influenced by the limited number of service providers offering reliable network coverage in regional and remote areas with Telstra the only MNO having mobile coverage in some regional areas.

As noted in our *Domestic Mobile Roaming Declaration Inquiry Final Report*, consumers who require or value coverage in areas where only Telstra has coverage have limited choice of provider. However, they do benefit from competition in the national market through nationally consistent prices and can access Boost Mobile, as a cheaper alternative to Telstra.[90]

Moreover, consumers that do have a choice of provider, typically have regard to a range of factors other than geographic coverage (such as quality of service) when choosing their service provider.[91] This is reflected in Roy Morgan Research, which shows that, of those Australians who switched mobile phone service provider in the last 12 months (for 2016), the top two reasons for switching were related to price (cheaper rates—44 per cent) and data inclusions (bigger data allowance—34 per cent), rather than coverage.[92]

Figure 4.22: Mobile phone-only users by generation for 2016[93]
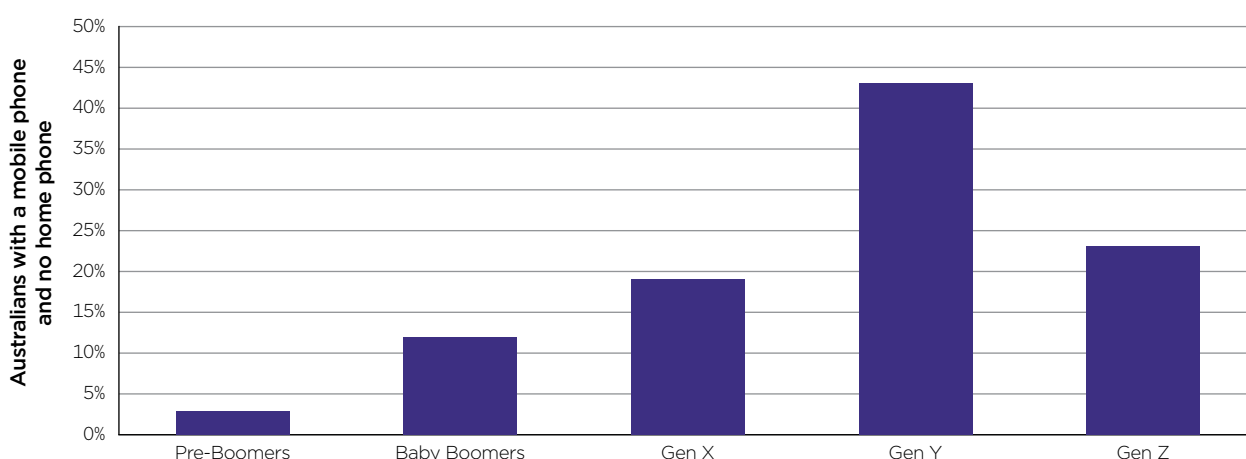
Fixed and mobile voice services also face some competitive constraint from OTT voice services, such as Skype and WhatsApp, which offer voice services through an app and do not directly charge consumers for calls. We consider it is likely that these OTT offerings influenced the move to unlimited call inclusions on fixed and mobile voice plans, as well as contributing to the ongoing decline in international call rates and increase in international minute inclusions. However, we note there are technical limitations such as the lack of any-to-any connectivity between different apps and the inability to call 13/1300/1800 numbers or make emergency calls (with the exception of Skype). This means that OTT voice services are unable to offer the same level of functionality as traditional voice services. Overall, we consider OTT voice services provide some constraint on fixed and mobile voice services, but the variance in functionality may restrict substitution between these services for some consumers.

89   Roy Morgan Single Source (Australia), January to December 2013, n=25 830 and January to December 2016, n= 50 144, Australian Households.
90   ACCC, Domestic mobile roaming declaration inquiry final report, p. 52.
91   ibid, p. 55.
92   Roy Morgan Single Source (Australia), January to December 2016, n=1011, 14+ Australian population.
93   Roy Morgan Single Source (Australia), January to December 2016, n=16 227, 14+ Australian population.
       Pre-Boomers (pre-1946), Baby Boomers (1946–1960), Gen X (1961–1975), Gen Y (1976–1990), Gen Z (1991–2005).

Voice services in general also face competition from non-voice services, with some consumer segments increasingly substituting voice services for messaging services (OTT and SMS) (both fixed and mobile). For example, Deloitte reports that, as of mid-2016, 27 per cent of mobile consumers claimed to have not made any standard voice calls in a given week, compared to 23 per cent in 2015. The majority of mobile consumers (88 per cent) preferred to use text messaging as their regular method of communication.[94]

The degree of substitution between voice and messaging is highly dependent on consumer preferences for communication style (voice or text) and the urgency of the required response, where voice is a real-time response and messaging can be delayed.

The messaging services market itself has also been disrupted by the entrance of OTT communication service providers, with most service providers now offering unlimited SMS and some international SMS inclusions in an effort to compete with OTT services.

However, the extent of substitution from traditional voice services to OTT voice services is limited by technical shortfalls (such as any-to-any connectivity) and consequently we do not consider OTT services to be full substitutes for voice services at this time. As a result, there is no basis for requiring equivalent regulatory treatment, particularly as generally there is no equivalent originating or terminating function.

We consider that OTT messaging services (such as Facebook Messenger and WhatsApp) provide a competitive constraint on SMS messaging services, and in some cases, they also have significant network effects. However, with the exception of the regulation of the SMS terminating service, SMS services have not been the subject of regulation and as such, there is no basis for requiring equivalent regulatory treatment of OTT messaging services at present.

Regulation of voice and broadband services

As set out section 3.2.2, Telstra's copper network infrastructure is a natural monopoly and there is therefore regulation in place to provide access to it to promote competition. At present, there is regulation of access to the network and to wholesale services supplied over the network. In addition, regulation of originating and terminating access services for fixed voice services and terminating access services for mobile voice services is in place to ensure any-to-any connectivity across networks and to prevent emergence of barriers to entry due to network effects of dominant service providers.

Regulation of access to Telstra's copper network within the NBN fixed line footprint will cease once the network is replaced by the NBN. In areas that are outside the fixed line footprint, such as those serviced by NBN fixed wireless and satellite, Telstra's copper network may still be used to supply fixed voice services. We note that, in these areas the NBN will provide infrastructure competition for the copper network for broadband services, but not for all fixed voice services.[95] As a result, in these areas, an appropriate level of regulation will need to continue.

There will also be an ongoing need to regulate originating and terminating access services as they are independent of the underlying network technology. Similarly, the regulation of terminating voice access services for mobile networks will need to continue.

4.1.6   Overall assessment of competition

There is evidence of reasonably effective competition in the supply of broadband, voice and messaging services to consumers, demonstrated by the ongoing price reductions, product innovation and differentiation in non-price terms and conditions. In particular, we have observed strong price competition for broadband services.

However, the market remains highly concentrated with large vertically and horizontally integrated service providers continuing to capture most of the market on both fixed line and mobile networks.

Furthermore, we consider that competition on the NBN has been occurring in a narrow manner, focusing primarily on price with little emphasis on differentiation based on speed, service quality and performance. We note recent developments (such as NBN Co's pricing changes, and our work in

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94   Paul Lee and Duncan Stewart, The rise of the data exclusive: *TMT Predictions 2016*, Deloitte, viewed 19 March 2018.

95   However, service providers that sell fixed wireless services over the NBN, may choose to offer their customers voice over broadband products in those areas as an alternative to landline telephone services over Telstra's copper network.

relation to speed claims and measuring broadband performance) may promote greater competition around speed and service quality. For example, some service providers have started to advertise their typical busy hour speed speeds, such as TPG who now advertises 42.8 Mbps for its 50 Mbps NBN services.

We note that some service providers have responded to NBN Co's recent price changes by replacing one product with another (25 Mbps for 50 Mbps), reducing the range of available products and potentially encouraging customers to take up the same product. Further, one provider who previously differentiated itself by only offering the highest NBN speed tier has now introduced a product based on NBN Co's 50 Mbps speed tier bringing it more in line with the rest of the market.

> **Finding:** There is strong price competition in the broadband services market, particularly for services on the NBN. While there is evidence of effective non-price competition for mobile broadband services, there has been limited competition at this stage on quality (speed and performance) on the NBN.

Competition from OTT communications services (both voice and messaging) has driven traditional service providers to compete with 'free' OTT services has influenced price reductions and increased inclusions.

There is also some competition between the different networks (fixed and mobile broadband), with mobile broadband providing some constraint on fixed services as data quotas and prices move closer to those offered for fixed services. However, at this stage we consider mobile broadband services are likely to only suit some consumer segments and are not complete substitutes for fixed services.

We received some feedback from submissions to the Draft Report about our findings in relation to the state of competition for broadband, voice and messaging services.

Submissions to the Draft Report

ACCAN: Agrees there are limited options for voice only households. The lack of information on choice for these consumers is detrimental to competition. ACCAN also notes that the lowest income quintile has seen a real increase in their telecommunications expenditure.

NBN Co: Agrees that there is limited differentiation of service provider offerings over the NBN in respect to speed and service quality. Welcomes the ACCC's actions on broadband speeds guidance, performance monitoring and enforcement activities in relation to service provider speed claims.

Regional Development Australia (NT): The ACCC should consider competition across geography to address differences. There is little discussion of NBN SkyMuster satellite service.

Telstra: Concentration in voice and messaging is not reflected in price/non-price competition in these services. Price competition for broadband service is increasing in intensity and expects this will continue in the short term as the NBN rollout reaches its peak. The current price competition may not be sustainable and hence, likely to shift to non-price elements (such as unlimited data and content). Speed competition will continue to be limited pending NBN speed and quality concerns being resolved.

Vodafone: The ACCC has not recognised the significant and unjust competition divide between metropolitan and regional Australia.

In response to the views from submissions and industry developments since the Draft Report, we have updated our analysis throughout this section where relevant. This includes more detailed analysis of competition in metropolitan and regional areas, as well as updating our previous analysis to include market movements in price and product offerings since the Draft Report.

We also received views in relation to the proposed action in the Draft Report to review our competition and price monitoring activities to ensure they are appropriate.

ACCAN: Supports the proposed action to review our competition and price monitoring activities.

Telstra: Supports the proposed action, but is wary of comparisons of bundle products, given there is increasing service differentiation.

Vodafone: Supports review of the ACCC's competition and price monitoring activities as it considers they are no longer fit for purpose. A statistically sound model for pricing should be developed in consultation with the Australian Bureau of Statistics (ABS).

Action 1

We will have regard to the views from stakeholder submissions in our review of our competition and price monitoring activities and undertake further consultation with interested parties as needed.

We also received submissions in response to our proposed action to examine the messaging services market to determine the need for ongoing regulation of SMS termination.

Submissions to the Draft Report

Macquarie Telecom: It is not clear why the ACCC would consider deregulation of SMS. In the next review of the mobile terminating access service (MTAS), the ACCC will need to deal with the planned shut off 3G services and SMS becoming more critical given its use for emergencies and cyber security.

MessageMedia: Supports continued regulation of SMS services, particularly business to people (B2P) services, which include appointment reminders, public service announcements, one-time passwords or PINs, rostering and marketing campaigns. SMS is a unique and essential input into universal B2P messaging services, and there is little or no substitutability between B2P SMS and OTT messaging.

Telstra: Supports the proposed action and does not consider regulation necessary due to substitution.

TPG: The mobile market is competitive and consumer's use of OTT messaging services has diminished the need for ongoing SMS regulation.

Vodafone: Supports examination for ongoing SMS termination regulation, as it does not believe there is an ongoing case for this.

We will take the views raised in submissions to the Draft Report into account in our review of the MTAS and undertake further consultation with interested parties as needed.

Action 2

We will examine the messaging services market to determine the need for ongoing regulation of SMS termination services in our next regulatory review of the mobile terminating access service.

4.2   Network technologies

Voice and broadband services can be supplied to consumers by service providers using the following fixed and/or mobile network technologies:

- legacy networks—copper and HFC
- next-generation fibre networks—NBN and non-NBN
- mobile networks
- fixed wireless networks—NBN and non-NBN.

In this section, we discuss the state of competition at the network infrastructure level and the implications for competition in retail voice and broadband services.

4.2.1   Network operators

The different network operators and some of the service providers that acquire their wholesale services are set out in table 4.4. Some service providers acquire services from multiple network operators in order to supply voice and broadband services to different parts of Australia and provide consumers with different technology options.

Table 4.4:   Network operators, wholesale services and service providers[96]

Network technology	Network operators*	Wholesale services	Service providers*
Legacy Copper	Telstra	ULLS (Unconditioned Local Loop Service), LSS (Line Sharing Service), Wholesale ADSL	Telstra, Optus, TPG Group, Vocus Group
Legacy HFC	Telstra	NA	Telstra
	Optus	NA	Optus
NBN	NBN Co	NBN access service	Telstra, Optus, TPG Group, Vocus Group, Aussie Broadband, Active8me, Harbour ISP, SkyMesh, Australian National Telecom, Clear Networks, IP Star Australia
Non-NBN fibre	OptiComm	Wholesale access services (access+capacity charge +possibly NNI charge)	2SG Wholesale, 6YS, Activ8me, Big Air, Brennan IT, City Communications, Clear Networks, Commander, Connected Australia, DCSI, Escapenet, Exetel, Foxtel, FuzeNet, HarbourISP, iiNet, Internode, iPrimus, iSeek, Leaptel, ManageMy, Occom, Oper8, OriginNet, OverTheWire, Sentrian, Siptalk, Summit Internet, Telarus, Telesurf, Vertel, X Integration
	OPENetworks		Anittel, Broadband Solutions, Clear Networks, Club Telco, Connected Australia, Exetel, Foxtel, FuzeNet, Harbour ISP, Internode, Manage My, Occom, Pivit, Polyfone, ToZoom, Valve Networks, Varsity Internet, World Dial Point
	Fiber Corp		Calix, Fibaro, Urmet
	RedTrain		Advanced Future Technology, Ascensa, Clear Networks, Exetel, FuzeNet, Occom.
	LBN Co		Activ8me, Active Utilities, Activenet, Amaysim, AusBBS, Clear Networks, Exetel, Fibreworks, FuzeNet, Harbour ISP, Leaptel, Occom, Varsity Internet
	TPG (FTTB only)		TPG
	iiNet (FTTP)		iiNet

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96   Company websites, viewed on 20 February 2018.

Network technology	Network operators*	Wholesale services	Service providers*
Non-NBN fixed wireless	Acenet AirStream,	NA	Vertically integrated service providers
	Adam Internet (iiNet/TPG Group), Beam Internet, Big Air, BITS Wireless, Bitwave Networks, Clear Networks,		
	Clearstream Broadband,		
	Countrytell, Dreamtilt, DCSI, Exetel, Goyder Connect, Gtelecom, iiNet WiMax,		
	Lightning Broadband,		
	March IT, Next Gen Wireless,		
	Node1 Internet, NuSkope, Ooki, Opencloud Communications		
	Red Broadband, South Western Wireless, Speedweb, Splash Internet,		
	The Signal Co, Vivid Wireless (owned by Optus),		
	Wi Sky, Wires Broadband,		
	Uniti Wireless, Yourhub.		
Mobile	Telstra	Wholesale end-to-end service	ALDImobile, Better Life Mobile, Boost Mobile, CMobile, GT Mobile, If Telecom, Lycamobile, PlanetISP Mobile, Southern Phone, TeleChoice, Think Mobile, Ugly Bill, Woolworths
	Optus		ACN Pacific, Adam Internet (iiNet/TPG Group), AINS Telecommunications, Amaysim, Boost Mobile, Club Telco, Coles Mobile, Commander, Community Telco, Dodo, Engin, E.Tel, Eftel Retail, Exetel, If Telecom, iiNet, Internode, iPrimus, iTalkBB, Jeenee Mobile, Live Connected, Moose Mobile, More Telecom, Motion Telecom, OVO, Southern Phone, Spintel, Startel, TPG, Trinity Telecom, Truphone, Vaya Mobile, Virgin Mobile, Yomojo
	Vodafone		CMobile, GoTalk, Hello Mobile, Just Mobile, Kisa, Kiss Mobile, Kogan Mobile, Lebara Mobile, PennyTel, Pivotel, Reward Mobile, Slimtel, Think Mobile

* The list of network operators and service providers is indicative and not exhaustive.

4.2.2   Fixed line networks

Legacy networks—copper and HFC

The copper network is natural monopoly infrastructure that was built and operated by the Government until privatised in the 1990s. The network is owned and operated by Telstra.

In 1991 the telecommunications sector was opened to retail competition when Optus was granted the second general carrier licence in Australia.

Service providers are able to provide on-net services to consumers by purchasing an ULLS or a LSS and installing their own equipment in the exchange. These are Layer 1 services and enable service providers to differentiate their voice and broadband services as they have full control over the line and are able to control the quality and specifications of the services. Service providers can also provide off-net broadband services by acquiring wholesale ADSL services from Telstra and re-selling under their own brand without the need to install equipment in Telstra exchanges. In these cases, service providers have very limited control over the quality of service as capacity provisioning is controlled by Telstra. Wholesale ADSL services are discussed further in section 4.3.

As noted above, Telstra first faced competition at the network level in the early 1990s with the rollout of Optus' HFC network. However, this was limited to specific, predominantly metropolitan areas. Telstra responded to this competition by constructing its own HFC network, initially to supply pay TV services.

As shown in figure 4.23, according to the ABS, as at June 2017 there were 4 233 000 internet subscribers using digital subscriber line (DSL) broadband services and 1 010 000 internet subscribers using HFC broadband services.[97]

Figure 4.23:   Number of subscribers of fixed line broadband services[98]
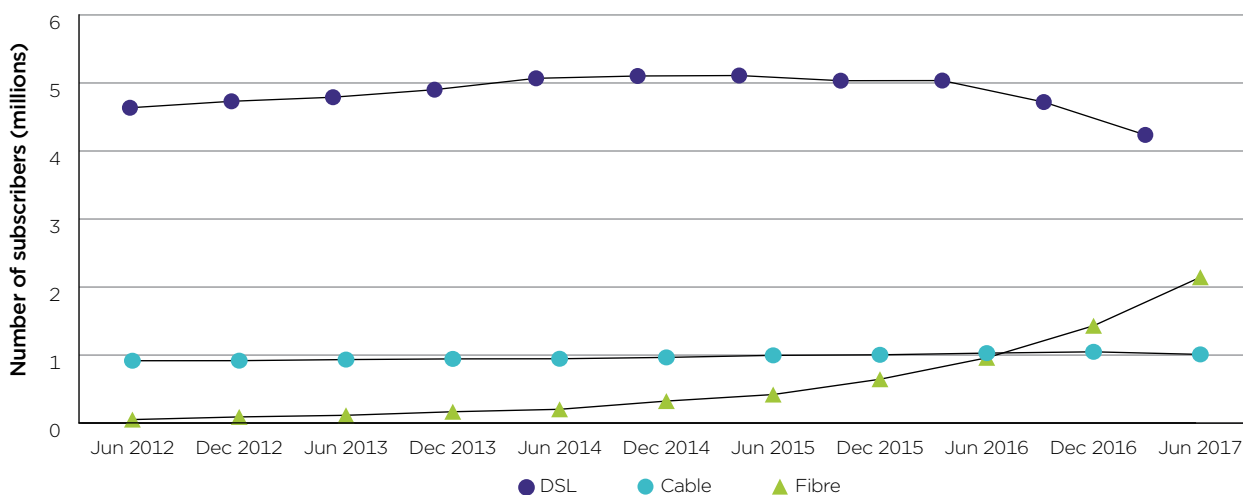
Next-generation fibre networks

There are multiple next-generation fibre networks currently in operation in Australia with the largest network being the NBN, which is owned by the wholesale-only network operator, NBN Co.

NBN Co has a mandate to design, build and operate a high-speed wholesale local access broadband network and ensure all Australians have access to fast broadband as soon as possible, at affordable prices and at least cost.

NBN Co utilises a number of different technologies in its network, including fibre to the curb (FTTC), fibre to the premise (FTTP), FTTB, FTTN, HFC, fixed wireless and satellite. As at 8 March 2018 the NBN had approximately 6.3 million premises ready to connect, of which approximately 3.6 million premises have an active NBN service.[99]

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97   Australian Bureau of Statistics (ABS), 8153.0 Internet Activity, ABS, June 2017, viewed on 19 March 2018.

98   ibid.

99   NBN Co Limited (NBN Co), Rollout information - weekly summary, NBN Co, for week ending 8 March 2018, viewed on 19 March 2018.

NBN Co is a monopoly network operator in much of its footprint and is subject to an SAU that sets out price and non-price terms that it can impose on service providers seeking to supply downstream voice and broadband services.

Other next-generation fibre network operators include OptiComm, OPENetworks, RedTrain, LBN Co, TPG and others. These operators typically compete to deploy networks in apartment buildings and new housing estates with NBN Co and each other, but tend to operate as local monopoly networks once installed. They are currently estimated to supply around 250 000 consumers in total.[100]

NBN Co's mandate means that it must build its network to all parts of Australia, including where it is uneconomic to do so. Consequently, it has higher investment costs per customer to recover than its competitors, who can make commercial decisions about where to build and tend to supply in lower cost-to-serve areas only. As a result, in order to ensure a level playing field for NBN Co, these non-NBN fibre network operators have a number of regulatory obligations imposed on them similar to those of NBN Co's SAU. If they supply or are capable of supplying services of 25 Mbps or more, they are required to be wholesale-only (for networks built after 1 January 2011) or provide wholesale access to other service providers (for networks built prior to 1 January 2011). The price of the 25/5 Mbps wholesale service supplied on these networks is regulated to be no more than that of the 25/5 Mbps service offered by NBN Co.[101]

To connect to the NBN, service providers must acquire three product components from NBN Co, the AVC, the CVC and the Network to Network Interface (NNI). Rather than acquiring inputs directly from NBN Co, service providers may acquire an NBN wholesale aggregation service, which is a wholesale end-to-end service from another service provider (at this stage Telstra, Optus, TPG (AAPT), Vocus, Wideband (Aussie Broadband) or MyNetFone/iBoss). This service is discussed further in section 4.3.

To connect to non-NBN fibre networks, service providers acquire wholesale services directly from the network operator in a similar manner to how they acquire NBN wholesale services.

4.2.3   Wireless networks

Mobile networks

There are currently three mobile networks in operation in Australia. They are owned by Telstra, Optus and Vodafone. These service providers are vertically integrated and supply both wholesale and retail mobile services. TPG (which currently re-sells mobile services on the Vodafone network) has announced plans to deploy its own wireless network to become the fourth vertically integrated provider.

Other service providers are able to acquire wholesale end-to-end mobile services from one of these MNOs and re-sell the mobile service under their own brand. These service providers are known as MVNOs. Wholesale end-to-end mobile services supplied to MVNOs are discussed further in section 4.3.

In addition to providing mobile voice services, mobile networks can be used to provide mobile broadband services on smartphones and other devices including tablets, dongles and portable modems. As shown in figure 4.24, there were 26 330 000 mobile handset subscribers and 6 107 000 internet subscribers using mobile wireless broadband services.[102]

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100 Bureau of Communications and Arts Research, NBN non-commercial services funding options – final report, Department of Communications and the Arts (DoCA), March 2016, p. 70.

101 Australian Competition and Consumer Commission (ACCC), Superfast broadband access service and local bitstream access service, final access determination joint inquiry – final decision report, ACCC, May 2017.

102 The ABS defines mobile wireless as "An internet connection which provides short range, high data rate connections between mobile data devices and access points connected to a network. Examples include mobile Worldwide interoperability for Microwave Access (WiMAX) and 3G/4G accessed through a data-card, USB modem, tablet SIM card or any other device used to connect a computer to a cellular network (excluding a mobile handset). Mobile wireless internet subscriptions via a mobile handset are currently excluded from this category for the purposes of the Internet Activity Survey, and are counted separately in the mobile handset chapter."

The deployment of 5G networks, anticipated to be widely offered from 2020, is expected to have a significant impact on the industry and number of subscribers. This new generation of wireless broadband technology will provide higher speeds and lower latency than 4G and will enable potentially greater competition with fixed line services.

Figure 4.24: Number of subscribers of wireless broadband services[103]
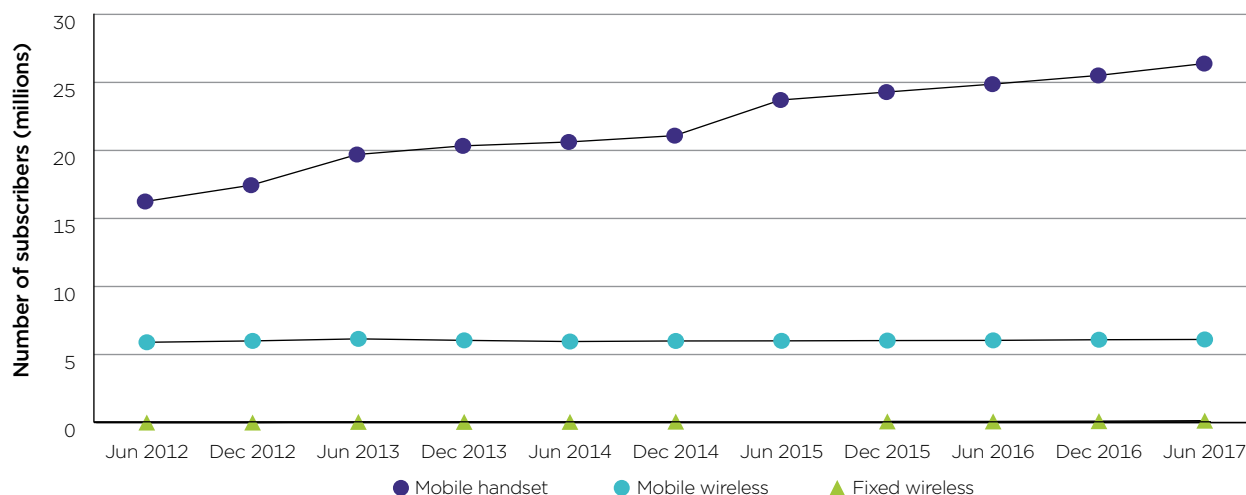
Fixed wireless networks

NBN Co operates a fixed wireless network as part of its multi-technology mix to supply home broadband services to less densely populated areas.

There are also many small non-NBN fixed wireless networks that operate in specific geographic locations. These are usually vertically integrated and supply retail services to consumers.

According to the ABS, as at June 2017 there were 138 000 internet subscribers using fixed wireless broadband,[104] an increase from 102 000 in December 2016.[105] However, we note that this data only includes service providers with more than 1000 subscribers.

4.2.4   Competition between networks

Traditionally, competition at the network level occurred in a similar manner to competition in the downstream market, where fixed line networks competed with fixed line networks, and mobile networks competed with mobile networks. Network operators were able to operate and supply services in both fixed line and mobile markets without much concern of cannibalising their market share in either market.

We are now observing substantial convergence between fixed line and mobile markets as network improvements and technology advancements mean that mobile networks are increasingly capable of delivering downstream voice and broadband services at a comparable cost and service quality to fixed line networks, in terms of speed and reliability in areas where they have coverage.

As a result, there is now a greater opportunity for competition at the network level, as the dominant fixed line network—the NBN—faces competition not only from other fixed line networks (such as non-NBN fibre networks) but also from wireless networks (predominantly mobile networks and to a lesser extent fixed wireless networks).

In particular, following the deployment of 4G+ networks, mobile networks are now a more credible threat to fixed line networks, with the ability to deliver broadband speeds between 2–100 Mbps on 4G networks. Further, the deployment of 5G mobile networks in the near future may see mobile services

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103 ABS, 8153.0 Internet Activity, June 2017, viewed on 19 March 2018.

104 The ABS defines fixed wireless as "A terrestrial point-to-point microwave or radio link, generally building to building or tower to building, which allows subscribers within the receiving building to access the internet. Sender and receiver must generally be within line-of-sight and no more than 22 km apart, although newer generations of this technology have overcome some of these obstacles. An example of this technology is fixed WiMAX".

105 ABS, 8153.0 Internet Activity, June 2017.

eventually capable of delivering speeds between 1–10 Gbps (which would be considerably in excess of most existing fixed line broadband services) and provide the added benefit of on-the-go connectivity.[106]

This affords horizontally integrated mobile service providers the choice of acquiring fixed line services from wholesale network operators or bypassing these networks and using their own mobile networks to supply retail services. All three MNOs are investing billions of dollars to upgrade their networks, signalling the growing importance of mobile networks and potential desire to drive greater substitution for fixed line services in the future. These mobile networks are capable of servicing most of the population. Telstra and Optus state that they currently provide 4G coverage to 99 per cent and 96.5 per cent of the total Australian population, respectively. Vodafone states that its 4G network covers over 22 million Australians.[107]

With TPG deploying its own wireless network, three of the four largest fixed line service providers will be horizontally integrated with their own mobile network. This, in addition to TPG's FTTB network, will likely place sizeable competitive pressure on other next-generation fibre networks, particularly the NBN.

However, a key consideration for these horizontally integrated network operators will be potential additional investment costs and the extent to which they might risk cannibalising their market share on fixed line networks if they seek to bypass the NBN. These factors may potentially limit the degree of competitive pressure MNOs are willing to exert on NBN Co in the future. These issues are discussed further in section 6.1.

NBN Co also faces some direct competition from non-NBN fibre networks, particularly in rolling out apartment buildings and new housing estates or developments. However, we do not have reliable information about the number of non-NBN fibre services in operation in different geographic locations. Once in place, these networks have tended to face limited competition.

In addition, we do not have reliable information about the costs of providing services on non-NBN fibre networks. However, there is potential for these network operators to offer services at a lower price than NBN Co as they do not face the same policy requirements and only deploy networks where it is profitable to do so.

Non-NBN fixed wireless networks also compete with fixed line and mobile networks but tend to operate in only specific geographic locations, as reflected in table 4.3.

These networks tend to have large up-front set-up costs for consumers and smaller data quotas compared to fixed line services, which may deter some consumers from taking these services. As a result, we consider that non-NBN fixed wireless networks are currently providing limited competitive constraint on fixed line broadband services, where these services are available and have similar technical capabilities.

Mobile and non-NBN fixed wireless networks may also compete with each other, where both networks are available and fixed line networks are not commercially viable.

Overall, the nature and extent of future competition between access network technologies will likely be significantly influenced by technological changes, consumer preferences and the degree of substitution of fixed line for wireless services in the downstream market for voice and broadband services. This is discussed further in section 6.1.

We also received some views from submissions in relation to the nature of competition between access network technologies, which we will take into consideration in relevant regulatory processes.

Submissions to the Draft Report

NBN Co: The ACCC should better assess the extent of infrastructure competition to the NBN and consider the constraints that operate on NBN Co.

Optus: Regulatory policy should recognise the economic benefits of the NBN that come from consumer use of superfast broadband services and the applications and services that run over the network.

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106 ACMA, 5G and mobile network developments – emerging issues, viewed on 10 October 2017.

107 Company websites, viewed on 20 February 2018.

Finding: The nature of competition between access network technologies is evolving as fixed line and wireless networks increasingly converge. Wireless networks are exerting greater competitive pressure on fixed line networks; however, the extent of future competition will depend on the degree of substitution in downstream voice and broadband markets.

4.2.5 Implications for downstream markets

Competition for the market at the network infrastructure level is closely linked to competition in downstream markets for voice and broadband services. In particular, the extent and nature of future competition between networks, particularly the NBN, non-NBN fibre and mobile networks will be influenced to a degree by substitution between these services by consumers in the downstream broadband services market.

As a result, we have identified several issues related to NBN services that could serve to undermine consumer experience and perceptions of the NBN and hence encourage greater substitution to other networks. These issues relate to the price of NBN services, NBN service standards and NBN rollout information.

Price of NBN access services

The price of NBN access services, particularly CVC, has the potential to contribute to poor consumer experience on the NBN. This is because the level of CVC provisioned has a direct impact on the speed and service quality of downstream broadband services.

In the Draft Report, we discussed the concerns expressed by service providers about how the AVC/CVC construct had failed to keep up with the faster than anticipated growth in consumer demand for data, and how NBN Co's pricing could damage future downstream competition if it limited their ability to differentiate broadband throughput speeds and service quality from its competitors.

At the time of writing the Draft Report, we observed that service providers appeared to be provisioning minimal levels of CVC, which may be have been contributing to poor service performance experienced by some consumers on the NBN.

Since the Draft Report, NBN Co has introduced several changes to its pricing structure, which are discussed in section 5.1 (such as introducing a CVC boost credit whereby service providers get 50 per cent extra CVC if they provision above a certain level). As a result, of these changes, we have observed some service providers provisioning higher levels of CVC per AVC. For example, for the quarter ending 31 December 2017, we observed the average CVC per AVC based on aggregate industry numbers to be 1.52 Mbps per AVC. This is a 37 per cent increase from the September quarter.[108]

The concerns about NBN pricing may also see some service providers (who have the option) encouraging consumers to take-up alternative network options, such as wireless services, particularly if this is more cost effective to supply. Although NBN Co has implemented some short-term changes to its pricing to relieve immediate concerns of service providers, we note that these are temporary offers and NBN Co's is still determining its long-term pricing approach. Any ongoing uncertainty around NBN Co's longer term pricing may play a role in future substitution between network technologies, which we discuss further in section 6.1.

Finding: The price of NBN services has the potential to lead to poor consumer experience and may encourage substitution away from the NBN.

NBN service standards

NBN service standards are contained in NBN Co's Wholesale Broadband Agreement (WBA), which sets out the commercial terms and conditions between NBN Co and its wholesale customers (service providers).

The WBA includes a Service Levels Schedule that sets out a number of service levels, performance objectives and operational targets that apply to the products and services that NBN Co supplies to wholesale customers. In certain circumstances, service providers may claim compensation or commercial rebates where NBN Co has failed to meet a service level or performance objective.

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108 Australian Competition and Consumer Commission (ACCC), NBN retailers acquired 37% more CVC, media release, 8 February 2018.

The Service Levels Schedule allows a service provider to claim compensation where the service provider owes a CSG payment and the fault is attributable to NBN Co. However, we note that the CSG standards were designed for legacy services and do not represent an appropriate baseline for all NBN services. For example, the CSG Standard only applies to standard telephone services and does not extend to broadband services.

At the market study stakeholder forum in July 2017, service providers expressed dissatisfaction with a number of service standards. The primary concern being that current NBN service levels do not represent an appropriate baseline to ensure a positive end user experience, and there is insufficient recourse to compensation where service levels are not met.

As a consequence of their limited ability to claim compensation or rebates under the WBA, service providers may be more likely to require consumers to waive their CSG rights in retail contracts to avoid attracting this liability. Under these circumstances, the consumer would have no potential claim to CSG compensation.

Service providers have also expressed concerns around a lack of coordination and/or information available to wholesale customers. In particular, as they are responsible for the relationship with the consumer, unclear allocation of responsibility and inadequate information can lead to inefficient outcomes and blame shifting between NBN Co and its wholesale customers. These issues are discussed further in section 7.

In response to the discussion of NBN service standards in the Draft Report, we received the following views from submissions.

Submissions to the Draft Report

Communications Alliance: We will continue to work with NBN Co and service providers on several areas related to customer experience.

Department of Communications and the Arts: The majority of customers are satisfied with their NBN service and given the increasing number of people migrating to the NBN, it is expected that complaints will also rise.

NSW Business Chamber: Agrees that there are issues with the current NBN service level standards and suggests that NBN delays and disruptions have cost businesses, on average, a one-off cost of $9000 each.

Since the publication of our Draft Report, NBN Co has implemented a new version of its WBA (WBA 3), which came into effect on 17 November 2017. Notably the changes in WBA 3 include a number of new or revised performance objectives and operational targets, a new service fault rebate mechanism and the ability for service providers to request certain information from NBN Co to assist them in making CSG claims.

Since the publication of our Draft Report, we have also commenced an inquiry into NBN wholesale service standards to determine whether current wholesale standards are appropriate. We also note that subsequent to the publication of our Draft Report, NBN Co has published its first customer experience progress report, which provides some service performance metrics including its performance in physically connecting premises and fault restoration times.[109]

We discuss NBN Co's WBA and our current inquiry further in section 5.2.

Finding: There are issues with current NBN service level standards, including risk allocation, ineffective coordination, poor risk management and limited compensation, which are likely to have flow on impacts for the consumer experience on the NBN if left unresolved.

NBN roll-out information

Service providers have raised concerns about the availability and accuracy of NBN rollout information in the market study as well as the NBN SAU variation process.

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109 NBN Co, How we're tracking: February 2018, 13 March 2018, viewed on 19 March 2018.

One particular issue is that information is less readily available to service providers who do not directly connect to the NBN but rather acquire NBN wholesale aggregation services from another service provider. These concerns appear to persist despite NBN Co taking steps to facilitate direct access for certain categories of service providers to key NBN information pursuant to an Information Agreement.[110]

Another issue raised by service providers is the persistent inaccuracy of NBN rollout information, despite the rollout having passed the half-way point. Inaccurate rollout information hampers the ability of service providers to undertake business planning, marketing and sales processes. This is particularly relevant for smaller service providers with limited budgets. We may see diminished levels of competition in the downstream market if service providers are unable to effectively market products to consumers in a timely way, particularly during the migration period when consumers are moving to the NBN. We discuss this issue further in section 5.4.

We received some feedback from submissions in response to our discussion of NBN rollout information in the Draft Report, which we will take into consideration as part of our assessment of NBN Co's proposed variation to its SAU.

Submissions to the Draft Report

Telstra: Agrees that NBN rollout information is insufficient.

Finding: Despite improvements to NBN rollout information for service providers, this information continues to be inaccurate and does not appear to be readily available to all service providers. This has important commercial consequences and may limit the ability of service providers to actively compete for customers during the migration period to the NBN.

4.3   Aggregation services

For the purpose of the market study, we are using the term aggregation services to describe the wholesale supply of a group of services that would otherwise be purchased individually. In particular, access (e.g. NBN or mobile), transmission and potentially other value add services (e.g. internet interconnection). Wholesale aggregation services can be used as inputs to provide downstream fixed line and mobile voice and broadband services.

This difference between aggregation services and separately acquired access and transmission services for the NBN is shown in figure 4.25 (the latter two are required for direct connection to the NBN). This also shows how aggregation services, which rely on the provision of these other services, may not serve as strong substitutes for access, transmission or dark fibre services.

Figure 4.25:   Aggregation services used in the supply of broadband over the NBN

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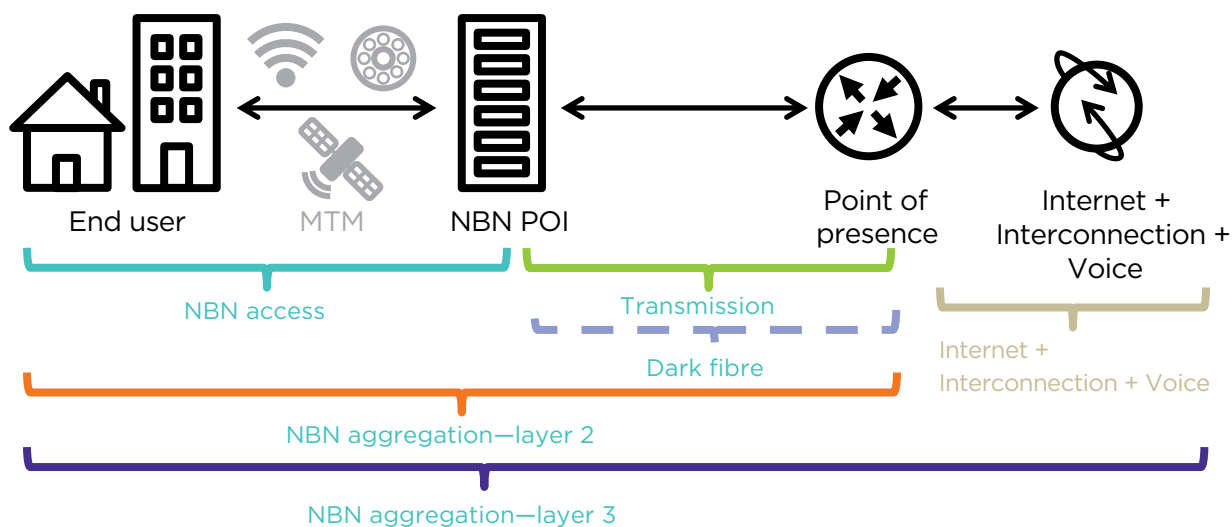
110 NBN Co, Business planning information, NBN Co, viewed 19 March 2018.

As set out in the following sections, NBN wholesale aggregation and wholesale MVNO services are, and will continue to be, important inputs to competitive supply of voice and broadband services.

We acknowledge that supply of NBN wholesale aggregation services is evolving and that it requires supporting business cases underpinned by demand for these services. However, our assessment is that there is currently relatively concentrated supply of these services by vertically integrated providers that may limit service providers' ability to compete in downstream markets. We understand that NBN price discounts may not be immediately passed through to the purchasers of wholesale aggregation services,[111] that there is limited differentiation between services offered, and there is some evidence of these services coming to market more slowly than equivalent retail services. This is likely to constrain the ability of acquirers to provide a differentiated product in a timely manner in downstream markets. This is set out below and section 5.3 examines these issues in more detail as well as potential responses.

We have less visibility over wholesale MVNO services, but note they are supplied in a relatively mature market, with approximately 60 service providers acquiring these services, and that there is an absence of significant complaints. However, as some concerns were raised during the course of our market study in relation to the ability to provide differentiated downstream services using wholesale MVNO services, we sought further information from some MVNOs through an industry survey on the ACCC Consultation Hub.[112]

4.3.1   Market structure and service providers

Aggregation services exist across different technologies as set out in table 4.5 that also identifies the current providers. The wholesale ADSL and NBN wholesale aggregation services (Layer 2 and 3) both enable the provision of retail fixed line voice and broadband services, with NBN wholesale aggregation services replacing wholesale ADSL as the rollout of the NBN continues. Ultimately, service providers will not have a choice and will have to acquire NBN wholesale aggregation services if they do not have the scale for direct connection. MVNO services enable the provision of retail mobile voice and broadband services by allowing MVNOs to resell mobile services over a MNO's network.

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111 Jennifer Duke, NBN discounts criticised for 'pricing out' small telcos, *The Sydney Morning Herald,* Sydney, 10 January 2018.

112 In December 2017 we conducted a short survey of some MVNOs to better understand the dynamics of this market. We were also seeking to gather evidence to support concerns raised about potential limitations faced by MVNOs that may impact their ability to provide differentiated downstream services.

Table 4.5:   **Characteristics and providers of aggregation services**[113]

Service	Characteristics of the service	Providers
Wholesale ADSL	Copper access network from the customer premise and a transmission service to the access seeker's POP.	Telstra
		Optus
		TPG (AAPT, Pipe)
		Vocus
		MyNetFone Group
NBN wholesale aggregation—Layer 2	NBN access network from the customer premise to the NBN POI and a transmission service to the access seeker's POP (generally in a capital city).	Optus
		TPG (AAPT, Pipe)
		Vocus (Nextgen)
		MyNetFone Group
		Aussie Broadband
NBN wholesale aggregation—Layer 3	NBN access from the customer premise to the NBN POI and a transmission service to the access seeker's POP (generally in a capital city).	Telstra
		Optus
	Internet, voice, interconnection services and potentially other value add services.	TPG (AAPT, Pipe)
		Vocus (Nextgen)
	May or may not connect to an access seeker's network (which would likely provide an application server, for content as well as having a billing system).	
Wholesale MVNO service	Includes the mobile radio access network from the customer device to the base station, transmission and core network services.	Telstra
		Optus
	Generally will not connect to the MVNO as they do not have a network.	Vodafone

There has been consolidation in the provision of NBN wholesale aggregation services over the last few years. Following several mergers and acquisitions, NBN wholesale aggregation services are now largely supplied by four providers (Telstra, Optus, TPG, and Vocus) as well as MyNetFone (iBoss). Aussie Broadband has also recently started to supply NBN wholesale aggregation services.

These providers are all vertically integrated, supplying both wholesale and retail services. As discussed, there are concerns identified by industry (shared by the ACCC) that this weakens the incentives for the competitive supply of wholesale services. These NBN wholesale aggregation services are acquired by a variety of other service providers.

If service providers intend to directly acquire access services from NBN Co, then prior to reaching the scale at which this is commercially viable they are likely to acquire NBN wholesale aggregation services. These service providers have been characterised as tier 2 service providers[114] and include Skymesh, Exetel, Aussie Broadband, Australian Private Networks, Harbor ISP and My Republic.

Service providers that do not intend to directly acquire access services from NBN Co have been characterised as tier 3 service providers. There are currently a large number of these providers (more than 150), although they serve a relatively small number of subscribers. They may be a pure retail broadband service provider, a wholesale reseller or part of a small business that sells NBN broadband (to both residential and business customers) in conjunction with other services, such as IT services and equipment.

For a period, some service providers may use a hybrid model of acquiring some NBN wholesale aggregation services and directly connecting to the NBN utilising access and transmission services.

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113 Company websites, viewed October 2017.

114 Tier 1 providers are the large providers who are vertically integrated.

4.3.2 Market shares

Wholesale ADSL services

In relation to wholesale ADSL services, the ACCC's February 2017 Final Decision on the Wholesale ADSL service declaration inquiry noted that while there are a number of providers selling wholesale ADSL services (Telstra, Optus, TPG and Vocus), competition in supply is extremely limited.[115]

While we have limited publicly available information in relation to market shares, the February 2017 Final Decision noted that confidential market share information provided by stakeholders during the 2013 Fixed Line Services Final Access Determination inquiry clearly indicates Telstra is the dominant provider in the market for wholesale ADSL services.[116]

NBN wholesale aggregation services

Since the start of 2016, the number of NBN Layer 2/3 wholesale aggregation services supplied by Telstra, Optus, TPG, Vocus and MyNetFone (iBoss) has been growing steadily.

As at 30 June 2017, the aggregation services provided by Telstra, Optus, TPG and Vocus accounted for around 5 per cent of all NBN services provided[117] and there appears to be some competition developing. Based on information provided by these four providers, there is significant disparity in their level of activity in the early stages of development of this market.[118]

This disparity relates to both the overall number of services supplied and to the characteristics of their wholesale customers, with some wholesale aggregation providers focused on tier 2 service providers and others on tier 3 service providers. This suggests that wholesale aggregation providers are targeting service providers with distinct characteristics, and not necessarily competing for the same customers.

The estimated HHI based on the estimated market shares of providers operating in the NBN aggregation market at June 2017 is approximately 3400, suggesting that the market is relatively concentrated.

Wholesale MVNO services

In relation to wholesale MVNO services, we understand that in 2016, there were around 60 MVNOs competing in the retail mobile services market:

- Optus appears to have the largest share of the wholesale MVNO market, with over 27 MVNOs acquiring wholesale MVNO services from Optus.[119]
- Telstra and Vodafone appear to have significantly smaller shares of the wholesale MVNO market compared to Optus. Over 12 MVNOs acquire wholesale mobile services from Telstra and over 16 MVNOs acquire wholesale MVNO services from Vodafone. [120]
- Some MVNOs also acquire mobile services from multiple MNOs.

There appears to be a degree of competition in the supply of wholesale MVNO services. The MNO's market positions appear to be quite different to those for the supply of retail mobile voice and broadband services, where in 2015–16 Telstra had the highest market share at 45 per cent, followed by Optus at 27 per cent and Vodafone at 18 per cent.[121]

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115 Australian Competition and Consumer Commission (ACCC), Wholesale ADSL service declaration inquiry final decision, ACCC, 3 February 2017, p. 18.

116 ibid.

117 ACMA, NBN consumer experience industry information-gathering exercise 2017.

118 Responses to informal information requests from the ACCC from Telstra, Optus, TPG and Vocus over 2016 and 2017.

119 Telstra, *Response to the ACCC's Discussion Paper on the declaration of a wholesale domestic mobile roaming service*, 2 December 2016, p. 17.

120 ibid.

121 ACCC, Telecommunications Report 2015–16, p. 29.

4.3.3   Price Competition

Wholesale ADSL services

As wholesale ADSL services are regulated, the ACCC determines access prices through its Final Access Determination, unless they are commercially negotiated. We note that exemptions from access regulation apply to all non-Telstra providers of the services.[122]

During the 2016–17 wholesale ADSL declaration inquiry, some submissions noted the importance of the declaration continuing so that these prices would remain in place while the NBN was being rolled out and enable competition to be promoted.[123]

NBN wholesale aggregation services

In contrast, NBN Layer 2/3 wholesale aggregation services are not regulated and prices are commercially negotiated. From the information available to us, we understand that:

- There is some differentiation between price structures and prices, although most seem to have connection and capacity charges as well as transmission charges.
- There have been some changes to price structures and prices over time.[124]

Information we have on Telstra and Optus' prices points to a degree of differentiation in the prices offered for aggregation services between these two carriers.

NBN wholesale aggregation service pricing is important in enabling downstream competition in the supply of fixed line voice and broadband services.

One aspect of this is the extent to which NBN Co's discounting of its access (AVC) and capacity (CVC) charges are being passed on in NBN wholesale aggregation prices. Concerns about this have been raised by purchasers of wholesale aggregation in relation to the service provider specific CVC discount (implemented by NBN Co on 1 July 2017) and NBN Co's more recent pricing discounts. We consider this further in section 5.3.

In our survey of service providers acquiring NBN wholesale aggregation services, seven of twelve service providers said that the prices they are paying do not have the service provider specific discount passed through, while three said it was unclear whether this was the case and one indicated the discount was being passed through.[125] This may be a timing issue, as the discount had only just been introduced, at the time of our survey. However, it could also suggest there is not strong competitive pressure in the supply of these services.[126]

Another aspect is that tier 2 service providers are using the Layer 2 NBN wholesale aggregation services as a stepping stone prior to achieving scale and directly acquiring NBN access and transmission services. We understand this is because a direct connection to the NBN provides greater ability to supply a differentiated service and that it is more cost effective once a threshold number of retail customers are being supplied.[127] Therefore, the cost of NBN wholesale aggregation services relative to NBN direct connection and transmission will influence these decisions.

From our analysis and modelling, and the information provided through the market study process, it appears that for metropolitan NBN POIs upwards of around 300 services in operation[128] are required in order to make direct connection commercially viable, given current average provisioning of capacity and retail pricing. This is a relatively small proportion (typically less than 0.7 per cent) of the average

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122 ACCC, Final access determinations for fixed services, 7 October 2015, Clause 5.1.

123 ACCC, Wholesale ADSL service declaration inquiry - Final Decision, p. 22.

124 Responses to ACCC survey in relation to NBN wholesale aggregation services. To assist in better understanding some of the issues associated with the supply of NBN wholesale aggregation services we developed a survey that involved multiple choice and free text responses to a variety of questions. Twelve service providers responded to the survey over June and July 2017 and we have used the responses to inform our analysis, noting that given the sample size the results are indicative only. This information was collected on the basis that it was confidential and only aggregated information would be disclosed.

125 Note that one service provider did not provide a response. Responses to ACCC survey in relation to NBN wholesale aggregation services.

126 Claims of the 'Focus on 50' discounts not being passed through by aggregation providers are reported in The Sydney Morning Herald, 10 January 2018.

127 Responses to ACCC survey in relation to NBN wholesale aggregation services.

128 ibid. The estimate of around 300 services in operation is based on the assumption that 1.5 Mbps is provisioned per service (for both the NBN access component, i.e. per AVC, and for the transmission component) and that a 25/5 Mbps speed service is acquired. Allowing for a range of retail costs, as well as a margin, the estimated wholesale costs are below a $60 retail price.

number of services in operation from an NBN POI once the NBN is fully rolled out.[129] When considered with current NBN and transmission pricing, it suggests that the barriers to entry in metropolitan areas are not a significant impediment to competition due to economies of scale.

This is different at regional and rural NBN POIs depending on the cost of transmission and where greater scale is required. From our analysis, it appears that at least around 500 services in operation are required on average to make direct connection commercially viable given current average provisioning of capacity and retail pricing.[130] While this is around double of what is required in metropolitan areas[131], this is still a relatively small proportion of the average number of services in operation from an NBN POI (1.4 per cent or less).

We further observe that, during 2017, there has been continued growth in direct connections to the NBN by service providers outside the top four. This is measured by the number of POIs to which they are connected.

Issues around the scale required to move from NBN wholesale aggregation services to a model of directly connecting to the NBN and acquiring transmission services are examined further in section 4.3.

Wholesale MVNO services

MVNOs negotiate access prices and terms and conditions directly with MNOs, and there have not been significant complaints about these prices or conditions.

While we do not have any specific pricing information in relation to wholesale MVNO services, respondents to our December 2017 MVNO survey noted that the price of their wholesale product had decreased or stayed the same. No respondents experienced an increase in the price of wholesale MVNO services.

All respondents to the survey noted that the wholesale charges for MVNO products represented more than half of the total cost of goods sold, with some reporting this charge to be above 80 per cent of total cost.

4.3.4   Non-price competition

Wholesale ADSL services

As noted above, Telstra's wholesale ADSL service is a declared service and as a result, the service definition specifies the scope of the service. This, and the limits of the technology, provides very little scope for differentiation and we understand that in general the services supplied are very similar.

In the 2016–17 wholesale ADSL service declaration inquiry, Optus raised concerns about product differentiation in terms of Telstra imposing an underlying requirement on access seekers to acquire additional transmission services in order to supply a functional wholesale ADSL service.[132] While the ACCC determined that it would not alter the service description, it did note that it would monitor the supply of transmission with Telstra's wholesale ADSL services to ensure that bundling of these services is not compromising competitive outcomes.

At this stage, as investigations have revealed limited industry concern about the bundling and pricing arrangements, and as Optus engages in similar bundling, we will further examine this matter as a part of the 2018 wholesale ADSL Final Access Determination inquiry.

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129 This is based on an estimated average that an NBN POI will supply around 73 000 services in operation. While the actual number of services in operation will differ per NBN POI, 500 services in operation would be 1.1 per cent of the services in operation at the NBN POI with the least services (44 000). This reflects information available from NBN Co's website.

130 The 500 services in operation estimate is also based on the assumption that 1.5 Mbps is provisioned per service (for both the NBN access component, i.e. per AVC, and for the transmission component) and that a 25/5Mbps service is acquired. Allowing for a range of retail costs, as well as a margin, the estimated wholesale costs are below a $60 retail price.

131 This is based on an estimated average that an NBN POI will supply around 73 000 services in operation.

132 ACCC, Wholesale ADSL service declaration inquiry - Final Decision, pp. 33–40.

NBN wholesale aggregation services

In relation to NBN wholesale aggregation services, the current key non-price differentiation appears to be whether the services are Layer 2 or Layer 3. As set out in table 4.6, there is not a significant amount of non-price differentiation occurring other than on this basis. However, we note that these are relatively new services and their development requires supporting business cases (including demand), capital investment and time.

Table 4.6: **NBN wholesale aggregation product summary**[133]

	Telstra	Optus	TPG	Vocus
Voice				
Analogue	✓	✓	✓	✓
VoIP	✓	✓	✓	✓
Speeds (peak and committed information rate)				
12/1	✓	✓	✓	✓
25/5	✓	✓	✓	✓
25/10	✓	✓	✓	✓
50/10	✓	✓	✓	✓
100/40	✓	✓	✓	✓
Capacity				
Dedicated CVC for each service provider	✗	✗	✗	✗
Shared CVC for each service provider	✓	✓	✓	✓
Aggregation supported and location of the POI				
ADSL	✓	✓	✓	✓
Non–NBN fibre access e.g. fibre access broadband (FAB), non-NBN FTTB	?	?	?	?
State based aggregation	✓	✓	✓	✓
National aggregation	✓	✓	✓	✓
Traffic management				
Prioritisation	?	?	?	?
Protection (providing alternative transmission path)	✓	✓	✓	✓
Capacity management	?	?	?	?
Layer 2 services	✗	✓	✓	✓
Layer 3 services				
Internet access	✓	Optional	Optional	Optional
Value added services	✓	Optional	Optional	Optional
Underlying access technology supported				
Fibre to the home	✓	✓	✓	✓
Fibre to the node	✓	✓	✓	✓
HFC	✓	✓	✓	✓
Fixed wireless	✓	✓	✓	✓
Satellite	✗	✗	✗	✗

The number of these aggregation products is growing, with Aussie Broadband also recently offering an NBN wholesale aggregation service. Further entry by tier 2 service providers supplying these services may occur where they move to a model based on direct connection to the NBN (depending on how they weigh the trade-off between the benefit of another revenue source versus the potential loss of retail market share). Supply by new providers may improve the extent of competition.

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133 Company websites, viewed October 2017 and responses to informal information requests from the ACCC to Telstra, Optus, TPG and Vocus over 2016 and 2017.

However, there is a tension here because as tier 2 service providers move away from acquiring NBN wholesale aggregation services, and potentially start to provide them, they are reducing the level of demand for those services. This may potentially undermine any business case around further development and innovation of NBN wholesale aggregation services.

The NBN wholesale aggregation products themselves are also evolving. For example, Optus announced in January 2017 the introduction of state based interconnection, more data centre handover points and that services would be available over HFC.[134]

The Competitive Carriers Coalition (CCC) noted in its submission to the market study Issues Paper that there is no national aggregator that provides Layer 2 NBN Traffic Class 2 (TC2) (business grade)[135] or NBN Traffic Class 1 (TC1) (voice grade) services.[136] While this appears to have been the case at that time, we understand that some providers of NBN wholesale aggregation services now have these services available or are intending to supply them (following an initial focus on developing and delivering Layer 2 and 3 NBN Traffic Class 4 (TC4) (residential and small business grade) services).[137]

A further concern expressed in relation to TC2 services is the time taken to provide these wholesale services and the lag compared to when the providers of the NBN wholesale aggregation services supplied them in the retail market.

Another concern from service providers is the extent to which they can control and differentiate the downstream fixed line broadband service being supplied using NBN wholesale aggregation services. This includes the influence they have over product design and control over the operational quality of their services using NBN wholesale aggregation services. For example, we understand that, in most cases, a service provider is generally dependent on the aggregation provider's CVC dimensioning. With no dedicated capacity, this could potentially compromise the quality (speed) of the service the service provider is seeking to achieve. We are aware, however, that at least one provider offers some ability to dimension CVC for different average peak hour traffic outcomes within a limited range of capacity.

This was also somewhat evident from our survey where seven service providers (out of 12) indicated that they acquired a service that does not enable a different bandwidth to be supplied to that being supplied to the provider's retail customers, while four acquired a service that enables a differentiated service.[138]

Some service providers have also expressed concern in relation to the information available from the providers of NBN wholesale aggregation services, in particular, operational information that would help them in managing their service is either not provided or not available in a consistent manner. This is limiting their ability to compete effectively.

While these concerns can be an inherent limitation of network services supplied over a shared wholesale network, and may be occurring as we are in a stage of transition, some acquirers of these services feel that the fact that they are purchasing from vertically integrated providers weakens incentives to supply competitive NBN wholesale aggregation services.

These issues, which are fundamental to whether there is an effective market for the supply of NBN wholesale aggregation services, are discussed further in section 5.3.

Wholesale MVNO services

In relation to wholesale MVNO services, all three MNOs provide 3G and 4G services, but are differentiated as follows:

- Other than in relation to Boost, Telstra's wholesale MVNO service provides a smaller coverage area (98.8 per cent of the population) relative to the service available to Telstra's retail customers (99.3 per cent of the population). However, Telstra's wholesale MVNO service still offers the greatest geographic coverage of all the MNOs.[139]

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134 Optus, Optus wholesale expands NBN introducing HFC access to improve flexibility and speeds, media release, 10 January 2017.
135 NBN Traffic Class 2 – enterprise grade traffic class used for delivering high-speed symmetrical internet (supports video conferencing, IPTV, gaming).
136 Competitive Carriers Coalition, ACCC Issues Paper, Competition in evolving communication markets, Submission to the communications market study issues paper, October 2016, p. 15.
137 NBN Traffic Class 4 – standard traffic class used for delivering residential and small business broadband services.
138 Responses to ACCC survey in relation to NBN wholesale aggregation services.
139 Telstra, Response to the ACCC's Discussion Paper on the declaration of a wholesale domestic mobile roaming service, 2 December 2016, p. 16 and ACCC, Domestic mobile roaming declaration inquiry - Draft Decision, May 2017, pp. 7, 37.

- As far as we can tell, MVNOs using the Optus and Vodafone networks have access to the entire network footprint. It is less clear whether MVNOs using either of those networks have access to the same technology (i.e. 3G and 4G) footprint.

In response to our survey of MVNOs, more than half of respondents reported full access to their wholesale provider's network, with a small number citing restrictions limiting regional coverage and a lack of global roaming functionality.

In its submission to the market study Issues Paper, the CCC raised the possibility of MNOs supplying wholesale MVNO services that limit the ability for service providers to differentiate services and compete effectively. It provided an example of this with Telstra requiring MVNOs to move to a new wholesale platform that limits their ability to manage data usage across their customer base, therefore constraining them to reselling services.[140]

The CCC also considered that similar issues undermine competition in machine-to-machine (M2M) services (for example, commercial fridges capable of ordering new supplies when needed and remotely readable meters), which rely on wholesale mobile services. It noted that one of its members has not been able to supply an M2M drone service as Telstra has not supported the underlying wholesale mobile service.[141]

The CCC also noted the importance of MVNOs being able to supply bundled product offerings to provide an additional competitive dynamic to the MNOs.

Our recent survey of MVNOs did not provide clear evidence about the extent to which these types of issues are restricting competition in the supply of downstream mobile and M2M services. In response to the survey, some MVNOs reported that their wholesale product did enable them to support M2M and IoT devices, with several respondents also reporting the ability to support e-SIM devices (even if not currently offering these).

We note that with mobile technology evolving to 5G services there is likely to be greater network functionality through network slicing, which may enable different wholesale MVNO service offerings (e.g. in relation to IoT). As 5G services evolve, and are deployed, we will examine their impact, if any, on MVNO services.

4.3.5   Competitive constraints

NBN wholesale aggregation services

A potential competitive constraint in relation to the supply of NBN wholesale aggregation services is the possibility of NBN Co providing a similar service.

NBN Co has previously consulted with stakeholders about the development of a 'CVC trunking' product directed at assisting smaller service providers to overcome barriers to entering the retail market for supply of NBN services. This would essentially be an aggregation service (comprising NBN access and transmission) provided by NBN Co that would allow service providers to interconnect with the NBN network on an aggregated basis rather than at each of the 121 POIs.

We understand that NBN Co has not proceeded with developing a CVC trunking product, but instead has decided to develop what it has termed an NNI Link product. The NNI Link product would enable a service provider to use the NNI of another service provider at NBN POIs, buy the user network interface—voice (UNI-V), AVC and CVC directly from NBN Co and purchase backhaul services from the service provider with which it is sharing the NNI.[142]

NBN Co considers that the NNI Link product will offer an additional means for aggregators to offer wholesale services over the NBN and help address concerns from service providers about the absence of competitive wholesale aggregation products.[143]

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140 Competitive Carriers Coalition, *ACCC Issues Paper: Competition in evolving communication markets*, October 2016, pp. 10–12.
141 ibid, p. 13.
142 NBN Co, nbn submission to the ACCC in response to the Communications Sector Market Study Draft Report, December 2017, p. 15.
143 ibid.

We consider that this will only be of assistance to service providers if there is sufficient competition in the provision of aggregation services, such that aggregators would be prepared to offer the necessary transmission services in conjunction with its shared NNI at reasonable prices. We are looking into this further as part of our 2018 inquiry into the declaration of the DTCS.[144]

4.3.6   Overall assessment of competition

Wholesale ADSL services

There is limited competition in the supply of wholesale ADSL services, with Telstra having a dominant position in the market. This is reflected in our February 2017 Final Decision on the Wholesale ADSL service declaration inquiry where we determined regulation of the service should be retained. As the NBN is progressively rolled out, wholesale ADSL services will no longer be required and service providers may decide to use NBN wholesale aggregation services or directly connect to the NBN.

> **Finding:** There is limited competition in the supply of wholesale ADSL services, with Telstra having a dominant position in the market.

NBN wholesale aggregation services

The supply of NBN wholesale aggregation services appears to be evolving, as is the degree of competition. The significant rollout of NBN services expected over the next couple of years provides an opportunity for the market to grow, product innovation to occur and the potential for new entry.

> **Finding:** NBN wholesale aggregation services are being used by some service providers as a stepping stone prior to directly connecting to the NBN, while other service providers are using them in an ongoing capacity to supply retail broadband services on the NBN. Under both possible models of use, it is important for there to be competitive supply to promote competition in the supply of downstream retail broadband services.

There is concern from downstream service providers that NBN wholesale aggregation services do not meet their needs and that the vertically integrated providers of these services may have conflicting incentives to supply their own retail voice and broadband services in preference to competing for NBN wholesale aggregation market share. This is discussed further in section 5.3.

Reflecting the information currently available to us and our modelling, economies of scale at the NBN POIs do not appear to be a significant barrier to entry given it is commercially viable to offer services at a POI when there are upwards of 300 services in operation (out of around 70 000 on average when the NBN services are fully rolled out). This is less clear in regional and rural areas, and scale issues in these regions are discussed further in section 5.3.

> **Finding:** Economies of scale at the NBN POIs do not appear to be a significant barrier to entry in metropolitan areas. However, this is less clear in regional and rural areas.

Wholesale MVNO services

Wholesale MVNO services are currently available from the three MNOs who compete for wholesale MVNO customers.

At the market study stakeholder forum in July 2017, several MVNOs suggested that restrictions on the scope of their access imposed by MNOs limited their ability to effectively compete with the infrastructure-owning MNOs.

In response to these claims and to better understand the competitive conditions of this market, we undertook a survey of MVNOs to examine whether or not MVNOs face any impediments to competing with MNOs in the provision of retail mobile services.

Generally, the MVNOs who participated in the survey did not raise strong concerns about their ability to compete downstream. As discussed above, all MVNOs who participated in the survey reported that the price of their wholesale product had decreased or stayed the same. Some also noted that the technical capacity and overall value of their wholesale product had increased, including the ability to offer more data to customers.

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144 ACCC, Domestic Transmission Capacity Service, An ACCC Discussion Paper reviewing the declaration for the Domestic Transmission Capacity Service, March 2018, pp. 23, 31.

In response to the survey, MVNOs most commonly cited price, service speed, service reception and coverage, and the ability to self-manage retail plan offerings as features of their wholesale product that enabled them to provide a competitive retail product.

When asked what features of their wholesale product they would like to see improved, a number of MVNOs said they would like to see improvements to value-add features such as data rollover and device data sharing, as well as media products to enhance the competitiveness of their retail product. Only one MVNO reported they had access to value added media products such as music or video streaming services.

Some MVNOs also reported they would like to see improvements to the process for customer movement between mobile service providers on the same network (same carrier porting) to reduce the occurrence of manual processing errors and unsatisfactory delays.

Most MVNOs reported that they did not think they were adequately able to contract with either device manufacturers or retailers. Some believed they were adequately able to contract with retailers but not manufacturers.

Finding: There appears to be some competition in the supply of wholesale MVNO services. However, there is demand from some MVNOs for additional wholesale products and features to enable them to better differentiate their retail mobile services and improve their ability to compete.

Submissions to the Draft Report

Macquarie Telecom: Negotiating access to MVNO services is characterised by excessive pricing, limited service offerings and delayed wholesale service offerings.

4.4   Transmission and dark fibre services

Transmission and dark fibre services enable large volumes of aggregated communications traffic (e.g. voice, data, video) to be carried from one point to another, in many instances over long distances. These generally involve high capacity data links and are acquired by service providers as a wholesale input to the supply of voice and broadband services (fixed line and mobile) to end users. We have mainly focused on the use of these services to supply retail fixed line services to reflect where most of the concerns have been raised. There is significant use of these services by tier 1 and 2 service providers in the supply of services over the NBN. They are also used by tier 1 service providers to supply mobile services.

Our assessment is that competition in the supply of transmission services, including to NBN POIs, continues to develop and is particularly strong in metropolitan areas. However, there are some routes where competition is more limited and this may be impacting competition in the supply of downstream voice and broadband services. This is discussed further in section 5.3.

The information we have suggests there is limited competition in the supply of dark fibre services, including to NBN POIs, with only two active larger suppliers and a small number of other providers supplying more niche services in metropolitan areas. Dark fibre and any potential need for its regulation is discussed further in section 5.3.

4.4.1   Market structure and service providers

The differences between transmission types (the DTCS and other transmission services) and dark fibre services are set out in table 4.7. Our March 2014 Final Report on the declaration for the DTCS considered dark fibre was not a transmission service and was not a direct substitute.[145]

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145 ACCC, Domestic Transmission Capacity Service, An ACCC Final Report on the review of the declaration for the Domestic Transmission Capacity Service, March 2014, p. 29. We noted that while dark fibre was capable of being used as in input to provide transmission services, it is nevertheless an unconditioned product, which requires access seeker to connect equipment and management systems in order to replicate the DTCS.

Table 4.7: Characteristics and wholesale providers of transmission and fibre services[146]

Service	Characteristics of the service	Wholesale providers
DTCS	Can be provided using fibre, copper and microwave	Telstra
	Point-to-point	Optus
	Rates above 2 Mbps	TPG (Pipe, AAPT)
	Symmetric	Vocus (Nextgen)
	Uncontended	Others, e.g. utility and rail corporations*
	Includes DTCS to the NBN POIs	
	Prices based on radial distances	
Other transmission services	Can be provided using fibre, copper and microwave	Telstra
	Point-to-point, or point-to-multipoint	Optus
	Rates generally above 2 Mbps	TPG (Pipe, AAPT)
	Symmetric/Asymmetric	Vocus (Nextgen)
	Contended/Uncontended	
	Additional functionality such as proactive monitoring and service assurance	
	Includes transmission to the NBN POIs	
	Prices may be averaged based on zones and route types and/or based on radial distances	
Dark fibre	Unlit fibre	TPG (Pipe, AAPT)
	Requires connecting equipment and management system to be provided by the access seeker to supply a transmission service	Vocus (Nextgen, Firstpath)
		Others—e.g. Superloop, Nexium, Wideband, Telstra
	Scalable	Others, e.g. utility corporations
	Generally utilised in metropolitan areas where the shorter distances suit its technical capabilities	

* Although not subject to the declaration they are considered as a part of the DTCS competition assessment.

As with the wholesale aggregation services, there has been consolidation of the providers supplying these transmission services over the last few years and these services are now predominantly supplied by the four larger providers (Telstra, Optus, TPG and Vocus). Transmission may be acquired from providers selling it over their own transmission infrastructure or from providers reselling transmission services supplied by another operator.

Dark fibre services are provided commercially by a subset of these providers, with TPG and Vocus having commercial offers. There are also a small number of other providers that have developed niche services, such as on a geographic basis and generally in metropolitan areas. Our understanding is that Optus does not currently provide dark fibre services, while Telstra provides dark fibre services for specific use cases where there is a business case to do so,[147] including to NBN Co under the Definitive Agreements.

The four larger providers mentioned above are vertically integrated, supplying wholesale services as well as downstream retail voice and broadband services.

Similar to wholesale aggregation services, transmission and dark fibre services are acquired by a variety of service providers. In the context of the NBN, this includes the tier 2 service providers noted in section 4.3 that are directly connecting to the NBN once they have reached a commercially viable scale at an NBN POI. In submissions to the market study Issues Paper and Draft Report, as well as in responses to our survey of service providers acquiring transmission and dark fibre services, some service providers considered that dark fibre is a pre-requisite for managing exponentially growing

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146 Company websites, viewed 6 March 2018.
147 Telstra, Telstra submission to ACCC Communications Sector Market Study Draft Report, December 2017, p. 16.

consumer demand, is more cost effective for large data volumes and offers greater flexibility in supplying downstream services, providing for increased product differentiation.[148]

In our recently released discussion paper reviewing the DTCS declaration (the DTCS discussion paper) we are seeking submissions on whether alternative technologies, including dark fibre, have become more or less viable in the provision of transmission services since 2014.[149]

4.4.2 Market shares

Transmission services

We assessed the state of competition in the supply of transmission services in our 2014 review of the declaration for the DTCS. Our framework for this assessment involved examining specific Telstra exchange service areas (ESAs), rather than across a national market. As a result, the competition assessment was disaggregated and an assessment of aggregate market shares on a national basis is not available.[150] Our assessment involved examining whether there were at least three providers of fibre infrastructure at, or within close proximity to, a Telstra exchange,[151] as well as a number of other quantitative and qualitative assessments.

Our findings in that review were that:

- The majority of already deregulated ESAs and routes were competitive with three or more providers,[152] and that competition was effective on most inter-capital routes, a number of regional routes and between a large number of metropolitan ESAs.[153] In total, 27 regional routes and 200 metropolitan ESAs were deregulated.[154]

- Telstra remained the dominant supplier of transmission service in regional areas.[155]

- There were some ESAs/routes where competition was not sufficient, including where there were fewer than three providers, and as a result, these routes were declared and regulated. This included three regional routes that were previously deregulated (Maryborough, Bundaberg and Rockhampton).[156]

- In some areas there were providers with existing optical fibre networks located within very close proximity to, but perhaps not connected to, an exchange. They were not providing transmission, and would need to make additional, not insubstantial investments to do so. We considered there were some routes where demand was sufficient for investment to occur and was more likely to be encouraged if regulation was removed. In other cases, where investment was not considered likely, the route remained declared.[157]

Reflecting the importance of transmission services to NBN POIs, we examined this issue in the 2014 review of the declaration for the DTCS.[158] The ACCC's March 2014 Final Report on the declaration for the DTCS found that transmission on routes from 46 of the NBN POIs to POPs should remain declared— they were served by less than three infrastructure providers and, therefore, did not demonstrate

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148 Vodafone, ACCC Communications Sector Market Study Draft Report, submission by Vodafone Hutchinson Australia, December 2017, pp. 19–20; MNF Group, Submission in response to the ACCC Draft Report Communications Sector Market Study October 2017, December 2017, p. 3 and in responses to ACCC survey in relation to transmission and dark fibre services. This survey was issued at the same time and on the same basis as our survey in relation to NBN wholesale aggregation services noted above.

149 ACCC, Domestic Transmission Capacity Service, An ACCC Discussion Paper reviewing the declaration for the Domestic Transmission Capacity Service, March 2018, p. 38.

150 When examining the state of competition, the ACCC did not consider it was necessary to define a national market. While access seekers may require access on a national basis, we considered that they typically acquired transmission services from specific Telstra exchanges and as such the services are not substitutable. We therefore assessed competition on an ESA basis. ACCC, Domestic Transmission Capacity Service, An ACCC Final Report on the review of the declaration for the Domestic Transmission Capacity Service, March 2014, pp. 26–27.

151 In many cases this would be Telstra plus two others.

152 ACCC, Domestic Transmission Capacity Service, An ACCC Final Report on the review of the declaration for the Domestic Transmission Capacity Service, March 2014, p. 46.

153 ibid., p. 82.

154 ibid., p. 54.

155 ibid., p. 8.

156 ibid., p. 47.

157 ACCC, Domestic Transmission Capacity Service, An ACCC Final Report on the review of the declaration for the Domestic Transmission Capacity Service, March 2014, p. 82.

158 Noting that the ACCC made this assessment in each Telstra ESA where there was an NBN POI.

sufficient competition. We also found that transmission to 75 of the NBN POIs located in relevant ESAs was sufficiently competitive and that declaration was not required.[159]

Since the declaration inquiry in 2014, there has been further investment at some NBN POIs, which will have improved the state of competition.[160] In particular:

- Optus is now connected to all NBN POIs via a combination of its own transmission infrastructure[161] and transmission services acquired from other providers for a small number of these POIs.
- TPG has invested to expand its own network to reach most NBN POIs, although it still acquires transmission services to some regional POIs.
- Vocus has increased the number of NBN POIs to which it provides its own transmission services. It has been able to do so through its merger with Nextgen.
- Superloop is deploying a new national backbone including connectivity to all the NBN POIs.[162]

Vodafone raised concerns in its submission to the Final Report that there is only one supplier of services at some POIs.[163] However, we note that while there are some NBN POIs where there is limited infrastructure competition (i.e. where Optus, TPG and Vocus acquire transmission to reach them), the transmission routes from POIs with limited infrastructure competition are regulated. We also have some evidence to suggest that commercial agreements are being negotiated for transmission to these POIs. For example, Aussie Broadband and M2 have negotiated transmission agreements with Telstra for access to all 121 NBN POIs.[164] We are also aware that some service providers have been able to negotiate commercial competitive rates for ring structures, including from Tasmanian POIs back to Melbourne.

There have been concerns expressed during the market study, including through our survey of service providers acquiring transmission and dark fibre services, that there is limited choice of active suppliers of transmission services and limited choice of service. For example, in response to our survey one service provider noted that there are limited supply options for fully protected (dual path) feeds to all NBN POIs.[165]

As set out in our DTCS discussion paper, we will undertake a competition assessment of specific transmission routes and ESAs to determine whether there is sufficient competition.[166] The DTCS declaration review will specifically examine the state of competition at the NBN POIs, including the availability and use of substitute (e.g. aggregation) and complementary (e.g. NBN Co's NNI Link) services.

Dark fibre

We understand dark fibre services are provided commercially by a subset of the providers who supply transmission and wholesale aggregation services.

In particular, TPG (including AAPT and Pipe Networks) and Vocus are offering commercial dark fibre services in the market. This was confirmed via our survey of service providers acquiring transmission and dark fibre services. Seven of the 12 service providers surveyed were acquiring dark fibre services. Three of these were acquiring services from Vocus, one from TPG and two from both Vocus and TPG.[167]

TPG's involvement in the market is also illustrated by the significant agreement it entered into with Vodafone for the supply of dark fibre services to 3000 Vodafone base stations (being the majority of its mobile network). This is a $1 billion agreement over 15 years, which has been designed to prepare

159 ACCC, Domestic Transmission Capacity Service, An ACCC Final Report on the review of the declaration for the Domestic Transmission Capacity Service, March 2014, p. 24.
160 This reflects the information provided under the Infrastructure RKR for the period to 31 January each year.
161 Optus, *Submission in response to ACCC Issues Paper Competition in evolving communications markets*, October 2016, p. 33.
162 Superloop, H1 FY18 Results Presentation, 26 February 2018, p. 29.
163 Vodafone Hutchinson Australia, ACCC Communications Sector Market Study Draft Report submission by Vodafone Hutchinson Australia, December 2017, pp.19–20.
164 Aussie Broadband, Aussie Broadband building to all nbn POIs, viewed on 15 February 2018 and M2 Group, Investor Presentation Investor Presentation, 24 August 2015, presented by Geoff Horth CEO, viewed on 15 February 2018.
165 Responses to ACCC survey in relation to transmission and dark fibre services.
166 ACCC, Domestic Transmission Capacity Service, An ACCC Discussion Paper reviewing the declaration for the Domestic Transmission Capacity Service, March 2018, pp. 15–17.
167 Responses to ACCC survey in relation to transmission and dark fibre services. One purchaser of dark fibre did not advise the name of its dark fibre supplier.

Vodafone for the requirements of 5G.[168] It will likely also have benefits in terms of TPG's entry into supplying mobile voice and broadband services.

As noted above, we understand that Optus does not supply dark fibre services, while Telstra supplies it for specific use cases. From our survey, four of the seven service providers acquiring dark fibre had approached Telstra, with only one receiving a quote, while three had approached Optus with two receiving a quote. None of the seven service providers subsequently acquired dark fibre services from Telstra or Optus.[169]

Further, we understand from our survey of service providers acquiring transmission and dark fibre services that, while some providers are supplying dark fibre services, their availability at NBN POIs is limited.[170] One service provider noted that dark fibre services are supplied by one provider to around 40 NBN POIs.

In its submission in response to the Draft Report, Vodafone submitted that access providers are likely to have incentives to restrict supply of dark fibre services, given they are likely to generate lower margins, and allow access seekers many advantages in terms of technology choice and cost control and certainty.[171] MNF Group and the CCC also expressed similar concerns in their submissions to the Issues Paper in relation to vertical integration playing a role in limiting the supply of dark fibre services.[172]

The other providers of dark fibre appear to have developed niche services, such as connectivity between data centres or in specific geographic areas. While we do not have good visibility of the extent to which these services are being used in the market, we note that in its submission to the Draft Report, MNF considered that dark fibre between data centres and other fibred buildings was available on competitive terms from up to three suppliers.[173]

On the limited information that we have in relation to dark fibre services, the market appears to be relatively concentrated with only two active larger suppliers and a small number of other providers supplying more niche services.

4.4.3   Price competition

Transmission

Prices for regulated DTCS services are set out in our 2016 Final Report on the Public Inquiry to make a Final Access Determination for the DTCS.[174] These are dependent on the route (metropolitan, regional, tail end and routes to/from Darwin and Hobart), the radial distance (0–4000 km) and the capacity (2 Mbps–1 Gbps). These are regulated prices and different prices can be commercially negotiated. Prices for transmission services reflect the outcomes of competitive market processes.

We have obtained information informally about the current commercial pricing of transmission services to the NBN POIs. Some of these routes are subject to price regulation under the 2016 Final Access Determination and others are not. This information suggests that there is a reasonable degree of competition at many NBN POIs and with varying prices between providers. The information from several providers for selected NBN POIs for 1 Gbps services show that the commercial prices at these POIs are below the regulated prices that would apply under our 2016 Final Access Determination.

However, other pricing information suggests that competition remains limited in relation to the supply of transmission services on some regional NBN POIs that are regulated, and there are instances of list prices being above those set in our 2016 Final Access Determination. While service providers have been able to negotiate prices lower than these list prices, there are cases where these are still above our 2016 Final Access Determination prices. For example, in its submission to the Draft Report, Vodafone

168 Vodafone and TPG, *Vodafone and TPG announce $1 billion deals*, media release, 30 September 2015.
169 Responses to ACCC survey in relation to transmission and dark fibre services.
170 ibid.
171 Vodafone Hutchinson Australia, ACCC Communications Sector Market Study Draft Report submission by Vodafone Hutchinson Australia, December 2017, pp. 23–24.
172 MNF Group, MNF Group Limited (MNF) response to the ACCC Issues Paper 'Competition in Evolving Communications Markets', September 2016, pp. 1–2. Competitive Carrier Coalition, ACCC Issues Paper: 'Competition in evolving communication markets' Submission to the communications market study issues paper, October 2016, p. 16.
173 MNF Group, Submission in response to ACCC Draft Report Communications Sector Market Study October 2017, December 2017, p. 3.
174 ACCC, Public Inquiry to make a Final Access Determination for the Domestic Transmission Capacity Service Final Report, April 2016.

expressed concerns with Telstra charging a substantial premium on regulated pricing.[175] (This is related to Vodafone's concern about Telstra requiring the purchase of DTCS on an exclusive basis, which we discuss in the following subsection.)

This pricing information raises concerns about the ability of tier 2 service providers to negotiate reasonable transmission service pricing outcomes at regional NBN POIs, and therefore, impacting competition in the downstream supply of retail broadband services in these locations. As such, it may represent a barrier to entry for smaller service providers offering services at these NBN POIs (as well as in national retail voice and broadband markets) meaning service providers may have to rely on wholesale aggregation services in some regional areas.

A small service provider told us that, while it supported these observations (noting that inter-capital transmission is very competitive), its key concern is in the lack of competition to access NBN POIs. It noted this is making it hard for it to compete as margins are poor on 'direct connect' routes (particularly to regional POIs where bandwidth costs are high and sales are poor).

This may also reflect the concerns raised in our survey of service providers acquiring transmission and dark fibre services. Of the service providers surveyed, four of the six that were acquiring transmission services had concerns that transmission pricing was not competitive.[176]

In our DTCS discussion paper, we are seeking submissions on accessing transmission services to NBN POIs and mobile sites in rural and remote areas, in particular whether there are any obstacles to accessing the regulated prices.[177]

Dark fibre

We have limited information in relation to the prices of dark fibre and whether providers are actively competing based on price.

As a part of our survey, we asked whether service providers had any concerns in relation to the price and non-price terms and conditions that limit their ability to compete. Of the twelve service providers surveyed (including seven acquiring dark fibre), no one raised concerns in relation to the price and non-price terms and conditions.[178] Further, the information provided in our survey about dark fibre pricing indicated that, of the seven service providers acquiring dark fibre, three had experienced price decreases over time,[179] suggesting that there are no pricing concerns from those providers that have been able to negotiate supply.

4.4.4   Non-price competition

Transmission

While price is the key differentiator of DTCS services, service providers also have the ability to purchase other transmission services with additional functionality and components beyond the basic DTCS service. As noted in table 4.7, these other services provide very similar services to DTCS but have additional functionality such as proactive monitoring and service assurance.

However, in its submission to the Draft Report, Vodafone raised concerns that Telstra does not allow it to acquire both the regulated DTCS and other transmission products, i.e. it must exclusively acquire either DTCS, or other transmission services on a commercial basis, not both.[180] Vodafone was of the view this is making it impossible for existing customers to purchase DTCS without causing major impacts.

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175 Vodafone, ACCC Communications Sector Market Study Draft Report submission by Vodafone Hutchinson Australia, December 2017, p. 14.

176 Responses to ACCC survey in relation to transmission and dark fibre services.

177 ACCC, Domestic Transmission Capacity Service, An ACCC Discussion Paper reviewing the declaration for the Domestic Transmission Capacity Service, March 2018, pp. 19–20.

178 ibid.

179 ibid.

180 Vodafone Hutchinson Australia, ACCC Communications Market Study Draft Report: submission by Vodafone Hutchinson Australia, December 2017, p. 16.

In relation to this issue, we note that where there is no current access agreement for declared DTCS in place and where there is no commercial agreement requiring all transmission services to be acquired under a particular wholesale agreement, an access provider is obliged to supply the services under the standard access obligations (unless the circumstances in s. 152AR(4) CCA apply). However, under the regulatory hierarchy, the terms and conditions (including price) in an access agreement will take precedence over the terms and conditions in the Final Access Determination for a declared service. Therefore, if an access provider has negotiated terms and conditions that require an access seeker to purchase all new/future transmission services under an existing agreement, then this may preclude the access seeker from purchasing DTCS services without first terminating that agreement.

As part of our DTCS discussion paper we are seeking submissions on whether the DTCS service description adequately captures the service that is generally provided in the transmission market or whether it should be varied to include other service features (such as some of those provided with the other transmission products that many service providers are acquiring, often instead of the DTCS).[181]

While the focus of this section has been on transmission services used as inputs for the supply of fixed line broadband services, they are also used as wholesale inputs to provide mobile services. In our recent DTCS discussion paper, we are seeking submissions on the accessibility of transmission services to mobile sites in rural and remote areas.[182] This follows our domestic mobile roaming declaration inquiry and concerns raised in that context about whether transmission that is used to provide mobile backhaul in remote areas (particularly for towers funded under the Government's Mobile Black Spot Program) should be distinguished from other transmission services (both more generally and where they are used to supply fixed line broadband services in remote areas).[183]

Another issue we are seeking input on in our DTCS discussion paper is the extent to which current or planned business grade services supplied over the NBN are considered by stakeholders as a potential substitute for the DTCS. [184]

Dark fibre

We do not currently have significant information about any non-price differentiation that exists in relation to dark fibre services. However, as dark fibre services are an unlit fibre service, we do not anticipate much non-price differentiation, other than perhaps the option of path diversity for resiliency.

Geographic coverage may be a point of differentiation when negotiating agreements. Vocus appears to offer greater coverage with its dark fibre services (including those it acquired in its merger with Nextgen) than TPG.

4.4.5   Overall assessment of competition

Transmission

Competition in the supply of transmission services, including to NBN POIs, continues to develop. This is especially the case as the rollout of the NBN progresses, particularly in metropolitan areas. The presence of other transmission services (in addition to the DTCS) and the possibility of regulatory intervention also facilitate competitive outcomes.

There are some transmission routes where there is more limited competition, particularly in regional areas, and this may be impacting competition in the supply of downstream voice and broadband services.

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181 ACCC, Domestic Transmission Capacity Service, An ACCC Discussion Paper reviewing the declaration for the Domestic Transmission Capacity Service, March 2018, p. 17.

182 ibid, pp. 26–27.

183 ACCAN, *Submission to the ACCC's Domestic Mobile Roaming Inquiry Draft Decision*, 16 June 2017, p. 4.

184 ACCC, Domestic Transmission Capacity Service, An ACCC Discussion Paper reviewing the declaration for the Domestic Transmission Capacity Service, March 2018, p. 31.

Regional Development Australia (NT): Supports the intention to examine transmission routes used to supply mobile services, particularly in regional areas, and consideration of whether such transmission should be distinguished from other transmission services.

Telstra: The market for transmission services (including to NBN POIs) is characterised by increasing competition and growth with a positive effect for customers, including in regional and rural areas. There is no evidence transmission is a barrier to NBN market entry.

TPG: Believes the market for transmission services to NBN POIs is competitive.

Vodafone: Expresses concerns with Telstra charging a substantial premium on regulated pricing. Also raises concerns about Telstra only allowing acquisition of the regulated DTCS if it exclusively purchases the DTCS.

We note the submissions made on the competitiveness of transmission services and the ability to access regulated services. These are issues that we will explore as part of our 2018 inquiry into the declaration of the DTCS. Our DTCS discussion paper seeks views on the state of competition for transmission services, and whether access seekers are able to access the DTCS (and regulated pricing under the 2016 DTCS Final Access Determination), including for services to mobile towers in regional and remote areas.[185]

Finding: Competition in the supply of transmission services, including to NBN POIs, continues to develop, particularly as the rollout of the NBN progresses, and in metropolitan areas. However, there are transmission routes, particularly in regional areas, where there is more limited competition.

The potential role of transmission services in regional and rural areas in promoting competition on the NBN is discussed further in section 5.3.

Dark fibre

While we do not have significant information, the data we have suggests that there is limited competition in the supply of dark fibre services, including to NBN POIs, with only two active larger suppliers and a small number of other providers supplying more niche services in metropolitan areas.

Macquarie Telecom: Considers limited availability of dark fibre at NBN POIs constrains providers such as itself from competing in downstream markets. Argues this limitation also applies more broadly, i.e. where fixed network operators have built fibre directly to customer premises.

MNF: Access to NBN POIs via dark fibre is its primary concern noting there is only one supplier to NBN POIs (compared to three offering services to data centres in metro areas), enabling it to dictate pricing.

Optus: The ACCC should focus on the wholesale inputs required rather that the technology over which the service is delivered. For example, dark fibre, wavelength or certain other transmission technologies are substitutes for one another in inter-capital high bandwidth transmission.

Telstra: Considers the market is characterised by increasing competition and entry of new providers.

TPG: Considers that dark fibre competes with the DTCS. Argues the market exists because Telstra and Optus decided not to offer dark fibre, which allowed TPG and Vocus a niche to compete.

Vodafone: Considers access providers are likely to have incentives to restrict the supply of dark fibre since they are likely to generate lower margins for the access provider and allow access seekers advantages in terms of technology choice, cost control and certainty.

We note the above submissions on the availability and competitiveness of the supply of dark fibre, including to the NBN POIs.

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185 ACCC, Domestic Transmission Capacity Service, An ACCC Discussion Paper reviewing the declaration for the Domestic Transmission Capacity Service, March 2018, pp. 23–25.

Our DTCS discussion paper specifically seeks views on the state of competition and accessibly of dark fibre service to the NBN POIs.[186] As discussed further in section 5.3 we are proposing to consult industry on an RKR, which will enable us to monitor the supply of dark fibre services to determine whether any regulatory intervention is required.

With respect to Optus' comments, our DTCS discussion paper seeks views on the relevant downstream markets for which the DTCS is an input and whether there are substitutes for the DTCS, as well as more broadly on the way we define and analyse the market for transmission services.[187]

Finding: The market for dark fibre services appears to be relatively concentrated with only two active larger suppliers and a small number of providers supplying more niche services, limiting competition in the supply of these services, including to NBN POIs.

The role of dark fibre in metropolitan, regional and rural areas, and any potential need for regulation, in order to promote competition in the supply of fixed line broadband services is discussed further in section 5.3.

4.5   Internet interconnection

The internet comprises many independently owned, managed, and operated networks that connect with one another to create the global internet. In order to achieve any-to-any connectivity and enable the exchange of data between users across the internet, individual networks make direct connections with one another, as well as indirect connections through other providers that transport data traffic. The overall goal of internet interconnection is to ensure that content and data can get to and from end users in a reliable, efficient, and cost effective way irrespective of where the data originates or the location of the end user.

To access content hosted on (or originating from) another service provider's network, a broadband service provider must interconnect directly or indirectly (i.e. via a third party network) with that service provider. Further, the broadband service provider must also interconnect with another network in order to deliver any communications or content generated by its own end users (or content and application service providers hosted on the broadband service provider's network), to end users on the other network.

The larger the other network (in terms of content it hosts and the number of end users on its network), the more important it becomes for a broadband service provider to directly interconnect with it. This may give rise to an imbalance in bargaining power when negotiating internet interconnection arrangements with large broadband service providers. As a key input into retail broadband services, it is important that all service providers can obtain internet interconnection on competitive terms so as not to deter entry or expansion in the supply of downstream communications services.

4.5.1   Interconnection arrangements between networks

There are two key types of commercial models for interconnection: transit and peering—Australian networks of all sizes will generally use a combination of both arrangements:[188]

- Transit agreements are bilateral interconnection agreements between two networks where the larger network interconnects with the smaller network in exchange for a fee.
- Peering is an agreement between networks to carry traffic for each other and for their respective transit customers, either on an offsetting basis[189] or more typically on a settlement free basis. In a settlement free peering agreement, the networks usually share the fixed costs associated with setting up and maintaining the interconnection, but do not charge each other for the exchange of traffic.

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186 ACCC, Domestic Transmission Capacity Service, An ACCC Discussion Paper reviewing the declaration for the Domestic Transmission Capacity Service, March 2018, p. 33.
187 ACCC, Domestic Transmission Capacity Service, An ACCC Discussion Paper reviewing the declaration for the Domestic Transmission Capacity Service, March 2018.
188 While large Australian networks will generally peer with other large Australian networks for interconnection, they tend to enter into transit agreements to gain access to very large global telecommunications networks.
189 Where both parties charge the other for traffic sent from their network.

Peering agreements tend to arise where traffic flows between the networks are of a similar value or other commercial incentives make the agreement mutually beneficial. Internationally, it is common for large networks to develop and promulgate a set of criteria another network must meet in order to qualify for a peering arrangement. These criteria often relate to the scale, coverage, quality and traffic characteristics of the requesting network.

Where a requesting network does not meet the requirements for peering, the larger network will typically charge the smaller network for interconnection under a transit agreement. Transit provides full internet connectivity to the smaller network, and is an essential wholesale input in supplying downstream broadband services including residential and business broadband services over both fixed and mobile access networks.

In figure 4.26 transit relationships are represented as a solid line and peering relationships are represented by a dash line. Internet service provider (ISP) B buys transit from ISP A and in doing so gains access to all the other ISPs in the diagram (i.e. ISPs C, D, E and F). Access to ISP E and F is obtained through a peering relationship ISP A has with ISP E. In essence, the transit agreement imposes an obligation on ISP A to exchange traffic with ISP B directly and to use its network to carry traffic from third party ISPs to ISP B's network through ISP A's peering and transit relationships.

Figure 4.26: Interconnection arrangements between various networks
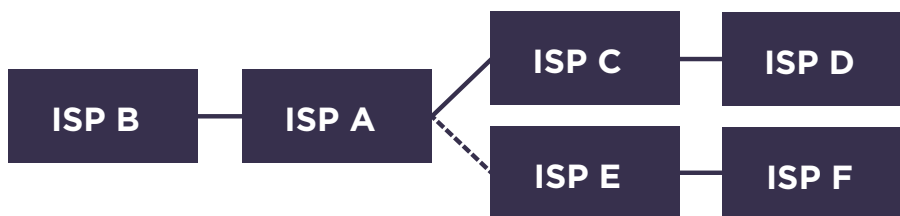
4.5.2 Internet interconnection arrangements in Australia

In Australia, there are four ISPs who have long-established peering relationships being Telstra, TPG, Optus and Verizon (TTOV).

Due to the size and number of end users on TTOV, smaller broadband service providers seek to interconnect directly with at least one of TTOV to supply retail broadband services (which they may also do via an aggregator such as Vocus). Direct interconnection with one of TTOV provides access to all four of TTOV networks through their peering relationships. This arrangement reflects international practice for internet interconnection but may give TTOV networks a cost advantage over smaller service providers. It may also allow these larger networks to set price and non-price terms to their advantage.

Transit has largely become a homogenous wholesale product offered by TTOV networks providing full access to the domestic internet, which may be bundled with international transit (providing international internet connectivity). TTOV networks tend to charge a unit based price (based on committed capacity) for the volume of traffic flowing between the two networks.

4.5.3 Interconnection options for smaller networks

While smaller broadband service providers generally require direct access to TTOV for the reasons mentioned above, there may be a range of full and partial substitutes to acquiring transit from TTOV. These include:

- Purchasing transit from aggregators rather than directly from TTOV (for example, Vocus aggregates and re-sells a mix of domestic and international transit to other networks).

- Interconnecting with other networks and content and application providers through settlement free peering at internet exchange points (IXPs), sometimes referred to as 'public peering.' These IXPs are located within carrier-neutral data centres and attract a range of networks and content providers to co-locate for the optimal and low-cost exchange of traffic. While this may provide a large volume of the traffic requirements of smaller broadband service providers, it does not provide access to TTOV.

- Networks may also use international transit as a substitute for some domestic transit should they be able to obtain it at a lower price or be able to access other inputs (such as international transmission) on a cost effective basis. A disadvantage of this is that it can increase the latency due to the distance being travelled to the international transit provider and impact on the quality of service for some applications.

The volume of traffic a network can exchange through public peering or international routes will vary depending on the characteristics of the traffic it is seeking to exchange. While transit is an unavoidable cost in providing downstream broadband services, the proportion of the total cost in providing the downstream service comprised of transit costs will vary between service providers.

Although alternative interconnection options exist in relation to non-TTOV traffic, access to TTOV (either directly or through an aggregator) is generally considered necessary for broadband service providers. Respondents to the market study noted that key content providers and businesses often require their broadband service provider to be directly connected to TTOV in order to obtain direct access to their customer bases for quality of service reasons.

This necessity is likely to collectively confer a degree of market power on TTOV in the supply of transit. Their control over the supply of transit may provide TTOV, individually or collectively, with the ability to set unreasonable terms of access to interconnect and exchange traffic with their networks, and raise their rivals' costs in downstream markets to the detriment of competition.

We note that while transit prices have been trending down (largely associated with declining costs of inputs such as technology) a number of respondents commented that prices are significantly above the costs of supply and are still much higher than in Europe and North America. Some respondents to the market study alleged that TTOV's market power enables them to charge smaller networks for transit without taking into account the value that they derive from the transit agreements (i.e. arising from the traffic the smaller network sends to TTOV).

Long standing competition issues

Competition concerns in relation to internet interconnection with key networks have been an issue in Australia since Telstra gained dominance in the internet market. In 1998 we issued Competition Notices to Telstra which led to Telstra entering into peering arrangements with Optus and two other networks (which ultimately became TPG and Verizon through acquisitions). These three networks subsequently entered into peering arrangements with each other. There has been no material change in these arrangements since that time, despite significant market developments over the past 20 years.

During this period we have received complaints from other network operators about the prices charged to them by TTOV for transit. In 2004 we conducted an inquiry into whether we should declare an internet interconnection service. Despite having concerns about interconnection arrangements, we did not have sufficient information to declare the service.

4.5.4   Developments in interconnection arrangements

TTOV peering arrangements appear to be resulting in weak competitive incentives in relation to the supply of transit services. The peering arrangements have endured in a static manner. This is despite other broadband service providers reaching network scale of relative parity with TTOV while some networks party to the peering arrangements are diminishing in importance (such that it is questionable whether they provide equal value to the other peering parties). In a dynamic market, we would expect these peering relationships to change with the relative value of traffic on each network and other mutual value considerations. This is unlikely to be aided by the fact that TTOV have not published peering criteria on their websites (in contrast to networks of similar status internationally), which a number of respondents to the market study have argued would provide guidance on the minimum attributes they must meet in order to enter into a peering arrangement with each of TTOV.

While the TTOV peering structure has remained the same, two key developments have occurred in the communications sector that have influenced interconnection arrangements in Australia over recent years:

- Market consolidation in the broadband access market has meant that many smaller networks have been absorbed by TTOV. This has resulted in these networks gradually leaving public peering

arrangements, meaning that other networks need to acquire transit to exchange traffic with these networks.

- Internet usage is now dominated by streaming and multimedia content, which is provided by independent content and application providers. The huge growth in the consumption of OTT content services (such as Netflix, Facebook and YouTube) has led to content providers accounting for increasing volumes of domestic traffic. Large content and application providers distribute their traffic to end users by utilising content delivery networks (CDNs) to cache content in IXPs across the country and even in ISPs' POPs themselves. CDNs can be operated by third parties or be owned by the content and application providers themselves. These IXPs facilitate public peering between content hosted on CDNs and broadband service providers allowing cost effective local hand-off of content, and providing increased service quality for end users.

As a result, of significant changes in internet usage patterns, smaller broadband service providers targeting the residential market are exchanging a lower proportion of their traffic with TTOV under transit agreements than in the past. Instead, as their end users consume greater volumes of OTT services supplied by independent content and application providers, this traffic is obtained at a lower cost through IXPs. Notwithstanding this development, concerns were raised in the course of the market study that certain key content continues to be hosted on TTOV which each of TTOV can access on a settlement-free basis, whilst charging smaller networks inefficiently high transit prices to access it (although Optus has clarified that it does not host such content).

Furthermore, as a result of industry consolidation, there has been a shift of traffic from previously independent broadband service providers onto TTOV and this is likely to have resulted in a reduction in traffic exchanged between broadband service providers themselves at public exchanges.

Information obtained as part of our investigation into peering and transit arrangements indicates that Verizon's participation in the TTOV peering arrangements has diminished. While Verizon retains some access to these legacy arrangements, Verizon no longer proactively participates in the market for wholesale transit services. As a result, we consider that Telstra, TPG and Optus are the only suppliers actively seeking to offer wholesale transit services and would be the only attractive parties to other ISPs seeking to peer to obtain TTOV access.

4.5.5   Impact on downstream markets

The proportion of the total cost in providing downstream broadband services which transit comprises may vary significantly between service providers, their business models and products.

The TTOV peering arrangements aside, interconnection arrangements have evolved in response to changing patterns of internet use and consumption. Residential broadband service providers are decreasingly reliant on transit arrangements with TTOV and obtain a large proportion of their data directly from content and application providers. This is likely to reduce their input cost profiles and reduce their cost disadvantage in supplying residential broadband services. However, given the dynamic nature of the internet, it cannot be guaranteed that this trend will continue. For example, new applications such as virtual reality (VR) and virtual presence may shift back the focus to the importance of direct and low latency connections between end users on different ISP networks.

The changing patterns of consumption and traffic profiles may currently be working to reduce the input costs of smaller broadband service providers serving residential end users. However, this may not be a uniform trend across all end user segments. Corporate end users may offer services that rely on high quality access to the residential customers of TTOV for sales and the increasing trend for staff to work from home or remotely (when those staff are customers of TTOV) may have the opposite effect on broadband service providers in the business and corporate segments.

As a result, transit requirements are likely to be higher for corporate end users than residential end users and may significantly advantage TTOV in securing key corporate customers particularly where transit requirements represent a material cost in the supply of the downstream service. Market consolidation, which has increased the proportion of end users connected to TTOV, may also make access to TTOV increasingly important for corporate end users.

Finding: Transit costs in Australia, while declining on a unit basis, appear to be relatively high compared to other jurisdictions such as Europe and the United States.

Finding: Telstra, TPG, Optus and Verizon (TTOV) collectively appear relatively unconstrained in determining their price level and structure in the supply of transit services and appear to enjoy a degree of market power in relation to access to their networks. Australia's geographic isolation, which makes international transit an inferior substitute, is likely to be one reason for this.

Submissions to the Draft Report

Macquarie Telecom: Supports the finding that TTOV are relatively unconstrained in their transit pricing and considers that their peering arrangement is a cartel that has protected their market shares and repelled competition.

MNF: Considers the finding about TTOV being relatively unconstrained is correct and that despite decreases in domestic transit prices they remain far above cost and disadvantage smaller providers.

Optus: Considers there is little evidence that internet interconnection arrangements are not working well. Concerned that the ACCC has mischaracterised the nature of Internet Protocol (IP) interconnection, as Optus does not host content, there is no need for any service provider to interconnect with Optus to obtain access to content hosted on the Internet. Does not believe that any service provider has market power in this area and that there is no bottleneck that prevents small service providers from connecting to the internet.

Regional Development Australia (NT): States that it is clear that peering arrangements between TTOV are resulting in weaker competition regarding the supply of transit services.

Telstra: Does not agree with the finding about TTOV being relatively unconstrained. Argues the relative value of its transit product compared to total industry internet revenue makes it difficult to conclude that transit pricing could affect competition in downstream markets. Also argues that competition between transit suppliers is passing cost savings onto customers but that transit prices may be higher than overseas in part due to Australia's geographic location and population density.

With respect to the impact on downstream markets, argues that TTOV don't necessarily have a cost advantage as they have costs that smaller providers don't have. Argues that corporate customers are also likely to access content supplied via CSPs/CDNs such as Microsoft and Amazon, while Telstra's own cloud platforms are generally for internal purposes and it does not generally seek to supply web hosting services to enterprise customers.

TPG: Argues that peering fabrics have been established to enable much traffic to be passed between willing service providers cheaply, thereby reducing the IP transit requirements. Considers that the transit market is competitive with prices trending downwards and that as a result, peering is now largely a non-issue.

Vocus: Considers the TTOV peering arrangement is a prima facie cartel, impedes the ability of other providers to compete and also impacts global service providers. Considers concerns with the arrangements are exacerbated by the growth in data usage.

Vodafone: Notes that the current internet peering arrangements were put in place many years ago, which may be at odds with a dynamic market, and appear to be anti-competitive. Notes that in many instances domestic traffic costs more than traffic sourced from international providers/destinations due to this arrangement.

With respect to Optus' that concerns we have mischaracterised the nature of internet interconnection and, in particular, the need to connect directly to TTOV, we note that even if a service provider does not host content, other service providers or content providers still require interconnection with that service provider in order to reach its customer base. For such service providers or content providers, it is not clear there are viable alternatives to direct interconnection with at least one of TTOV. The main alternative is to trombone the traffic overseas. Given Australia's geographic isolation, ISPs and particularly their corporate customers do not generally consider this a viable substitute due to the latency involved and subsequent impact on quality.[190]

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190 We note that TTOV do not generally offer direct interconnection to their networks via internet exchanges. While the service provider can purchase interconnection to TTOV via an aggregator, that aggregator must still purchase direct interconnection from TTOV.

In relation to the pricing of transit, we acknowledge that transit prices are declining, but a price decline alone does not necessarily mean the prices are efficient, if costs are also falling (which we understand they are). We acknowledge that for some downstream segments (such as the residential broadband market), transit costs may make up a declining proportion of the cost of providing an internet service. However, transit remains an essential input, and may still make up a significant proportion of the costs of providing internet services to other downstream customer segments, such as corporate end users, which we are reviewing as part of our assessment.

We acknowledge respondents' advice that TTOV does not necessarily host content or cloud platforms, at least to the extent envisaged in the Draft Report, but consider that the general need to directly connect with TTOV remains (particularly to access their large end user bases), evidenced by the fact that many ISPs continue to do so.

4.6   Data centres

Data centres are dedicated facilities which house and operate IT equipment (including servers, routers, and 'racks') and may house interconnection infrastructure to accommodate POPs. Data centres range from simple 'in-house' facilities in a basement or IT room, to large-scale specialist facilities.

While in their most basic form, data centres provide the physical infrastructure for networks to co-locate equipment and interconnect, they are increasingly providing value-added services. Data centre operators can provide a range of services to a broad range of customers including:

- co-location services
- interconnection services
- enabling storage for some cloud storage services, and
- managed storage services.

Data centres are increasingly becoming central hubs where key activities of a range of service providers are taking place.

Broadband service providers and other users seeking efficient and cost-effective access to each other's networks and services seek to locate POPs at data centres. OTT service providers (such as Google, Amazon and Apple and service providers who support content distribution such as Akamai) have been key drivers of this trend, demonstrating the cost and performance benefits of utilising highly interconnected data centres.

Data centres also provide the infrastructure for cloud and IoT services to store and access the data collected by the growing number of connected devices.

 There are broadly three types of data centres in Australia:

- specialist independent data centres
- broadband service provider owned data centres
- data centres owned by other users of communications networks.

There has been growth in data traffic over networks (due to adoption of cloud services and uptake of subscription video on demand (SVOD) and other OTT services), a rise in use of CDNs and an increased demand for interconnection. This has driven increased demand for independent large scale data centres, where enterprise, cloud/content providers and broadband service providers interconnect with each other. Cisco's latest Cloud Index forecasts a tripling of annual global data centre traffic from 6.8 Zettabytes (Zb) per year in 2016 to 20.6Zb in 2021. Cisco notes that video applications will continue to be the main driver for data centre usage, projected to account for 85 per cent of traffic between data centres and end users by 2021, compared to 78 per cent in 2016. [191] Specialist independent data centre service providers are carrier neutral, which encourages the development of business ecosystems (such as for carrier-to-carrier connectivity) within their facilities, and attracts both local and global cloud and IT service providers to their facilities.

Enterprises that typically benefit from co-locating in independent data centres are those that rely heavily on cloud services and value low latency, highly redundant connections to broadband service providers and other service providers. The location of data centres reflect the structure of how cloud

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191 Cisco, Cisco Global Cloud Index: Forecast and Methodology, 2016–2021 White Paper, 1 February 2018, viewed on 7 February 2018.

computing, content and a range of other OTT service providers seek to distribute their network infrastructure, balancing factors such as proximity to end users as well as efficient aggregation. It also aligns with the general aggregation points of broadband service providers and MNOs where they route, switch and exchange data traffic. In early 2018, there were over 200 data centres in Australia, run by approximately 100 operators, located in key business and government locations in Melbourne, Sydney, Brisbane, Perth, Adelaide and Canberra.[192]

4.6.1 Overall data centre market

Table 4.8 provides a summary of the overall data centre market. Frost & Sullivan estimate that the Australian data centre industry revenue will grow by a compound annual growth rate (CAGR) of 12.4 per cent until 2022, from $976 million in 2015, to approximately $2 billion by 2022. In table 4.8 we present the four largest independent data centre providers as a proportion of Frost & Sullivan's forecasted industry revenue for 2017 ($1.233 billion). The market represented includes all data centre service provision including revenues from specialist providers, IT services firms, and telecommunications companies.[193] The two largest data centre operators by annual revenues are international firms, namely Equinix and Global Switch. The next two largest are the local firms Metronode and NextDC. However, in December 2017 Equinix announced that it would be acquiring the Metronode business.[194]

Table 4.8:   Approximate forecast major independent data centre market shares for 2017

Data centre operator	Annual revenue ($m)	Estimated Market Share
Equinix[195]	155.4	13%
Global Switch[196]	146.8	12%
Metronode[197]	131.4	11%
NextDC[198]	123.6	10%
Others	675.8	55%
Total industry (forecast) revenue[199]	**1233**	

4.6.2 Independent data centres

Independent data centre operators are independent from the networks that interconnect within them. This is attracting both local and global cloud service providers to their data centres as carrier neutrality encourages the development of business ecosystems within the data storage and interconnection facility. The largest four data centre operators in Australia (see table 4.8) are independent operators.

There are two broad types of independent data centre providers—wholesale providers and retail providers. Wholesale providers typically operate very large data centres containing a smaller number of large companies who require extensive physical space. Retail providers operate a larger number of mid and small sized companies in their data centres, offering a greater range of interconnection opportunities.

Independent data centres are benefiting from network effects, where many different users are co-locating and interconnecting in carrier neutral facilities, making it attractive for new users to join 'data centre ecosystems'. The majority of service providers are co-located in independent carrier neutral facilities (with Equinix, NextDC and Global Switch, all carrier neutral, in aggregate, accounting for over 50 per cent total of the service providers co-locating in data centres in Australia). It is also notable that (prior to the Metronode acquisition) despite only operating large data centres in Melbourne and Sydney (with an estimated 13 per cent of total industry revenue), approximately 28 per cent of service providers

192 Cloudscene, Australia, viewed January 2018.

193 Frost and Sullivan, Australian Data Centre Market Offers Sizeable Growth Opportunities, 15 June 2016.

194 Equinix Investor Relations, Equinix to Extend Market Leadership in Australia through Acquisition of Metronode, 17 December 2017, viewed on 19 January 2018.

195 B Lo, IBIS World, J5922 Data Storage Services in Australia Industry Report, October 2017. Note Equinix figure is from 2017 calendar year.

196 ibid. (Global Switch figure is from 2016–17 financial year).

197 ibid. (Metronode figure is from 2017 calendar year).

198 'NextDC Limited investor centre', accessed January 2018 (Financial year 2016–17).

199 Frost and Sullivan, Australian Data Centre Market Offers Sizeable Growth Opportunities, 15 June 2016.

are located in Equinix data centres.[200] This highlights the significant network effects from which Equinix is benefiting, as many broadband service providers, cloud/content providers and business enterprises co-locate in its facilities.[201]

Notwithstanding the network effect advantages enjoyed by existing operators, new data centre entry is still occurring. In September and November 2017 new entrant, AirTrunk opened large data centres in Sydney[202] and Melbourne respectively.[203] AirTrunk noted that these data centres support its strategy to cater for the rapid adoption of cloud services in the Asia-Pacific region.[204]

4.6.3   Broadband service provider operated data centres

Broadband service providers own both data centres and networks. Leading broadband service providers that operate data centres located in Australia include TPG, Vocus, Optus and Telstra. These data centre operators do not house as many third party service providers as the major independent data centre operators.[205] Increasingly, broadband service providers are choosing to retire their old and less efficient data centres, and lease out data centre space from the independent operators, as this is likely to be more cost effective.[206]

Broadband service provider owned data centres have different characteristics to independent data centres. Generally, networks interconnect at broadband service provider owned data centres to acquire Layer 2/3 network services and connectivity including, for example, wholesale transit from that broadband service provider (see section 4.5). For smaller networks this can provide their full internet connectivity needs. However, for larger networks this may limit the connectivity and flexibility they desire. As a result, larger networks may seek to locate at independent data centres, which offer more options in terms of connectivity as the customer can choose the network provider and can opt to use more than one network provider, as well as interconnect directly with a range of OTT service providers.

4.6.4   Other data centre operators

Content providers both own and operate data centres (usually located abroad), and acquire data centre space from third parties.

For data security reasons, some government departments and financial institutions operate their own data centres, including the Department of Defence, the Department of Health, National Australia Bank and the Australian Securities Exchange.

4.6.5   Strategic and potential competition issues

As the digital economy continues to increase in size and scope, the role of the data centre is undergoing transformation from 'data centre as real estate' to 'data centre as a strategic element in the digital economy'. The growth of data due to OTT applications, the uptake of cloud computing services and IoT has heightened the need for cost effective data transmission, storage and management. Data centres serve a critical role in this by co-locating the related data services (including communications, storage and security) and facilitating interconnection between them.

Data centres have become intermediaries between many of the OTT and communications service providers and act as a key component in the supply chain of many communication related services. This means that it is becoming increasingly important for many service providers to be physically located within the same facility as other key players. This is reflected in industry submissions in response to the European Commission's review of the Equinix/Telecity merger in Europe,[207] which stated that when deciding to purchase data centre services, a key consideration is whether the data centre provider already hosts a number of large content/cloud providers. This reflects the importance of network effects.

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200 Cloudscene, Australia, viewed on 17 January 2018.

201 As a result of its acquisition of Metronode, Equinix will have data centre assets in all mainland state capital cities.

202 AirTrunk, Airtrunk unveils world class hyper scale data centre in Sydney, 20 September 2017, viewed January 2018.

203 ibid.

204 ibid.

205 Cloudscene, Australia, viewed on 23 January 2018.

206 Frost & Sullivan, Cloud computing driving outsourced data centre market up in Australia, says Frost & Sullivan, 1 September 2015.

207 European Commission, Case M. 7678—Equinix/Telecity, Regulation (EC) No 139/2004 Merger Procedure, 15 June 2016.

There currently appears to be strong competition in the provision of data centre services in Australia and this is likely to continue over the next few years as the industry is rapidly expanding. There are a large number of different data centre operators (including independent providers, broadband service providers, content owners and other large enterprises) and we are seeing expansion by global providers (such as Equinix and Global Switch). Key points of differentiation between data centres appear to be the quality of connectivity offered by the data centre and the presence of a large number of service providers in the data centre (as a result of the network effects arising from the growing strategic role of data centres in facilitating interconnection between service providers).

Overall, we consider that data centre services in Australia will remain competitive over the next five years. However, based on experience in some overseas markets, competition concerns could potentially arise over the longer-term due to increases in barriers to entry and industry consolidation (which we have recently witnessed in the Equinix acquisition of Metronode) driven by a combination of factors including:

- high sunk costs of establishing a presence in the market
- economies of scale
- network effects
- costs of churning between providers by customers.

Finding: There currently appears to be strong competition in the provision of data centre services in Australia and this is likely to continue over the next few years as the industry is rapidly expanding. However, we expect that this market may become more concentrated over time due to factors including large economies of scale, very low churn between data centres and the presence of considerable network effects.

4.7 Content delivery networks

A content delivery network (CDN) is a system of distributed servers that improves the quality of service and consumer experience of a content service, and reduces transmission costs for OTT services by storing content closer to end users.

The use of CDNs in the transmission of traffic is growing rapidly and they are expected to account for 73 per cent of all traffic by 2021.[208] The growth of CDNs is strongly linked to the rapid growth in OTT video consumption (as well as other OTT services). CDNs seek to address the performance issues associated with the internet as a 'best efforts' communications network by minimising packet delay, packet loss and network congestion.[209]

There are broadly three types of CDN services used in Australia:

- independent third-party CDN services offered by providers (such as Akamai)
- content provider owned and operated (such as those used by Netflix)
- broadband service provider owned and operated (such as those used by Telstra).

OTT content providers may use one or more of the above types of CDN services to transmit their content depending on their scale and needs. Independent content providers commonly use specialist third-party CDN providers who co-locate their servers with various broadband service providers. A recent trend is for very large content providers to deploy their own content delivery infrastructure, which may also involve the use of caching at local broadband service provider POPs. They may use their own CDNs in conjunction with third-party services to ensure that they can meet peaks in demand. Broadband service providers who offer content services to their consumers, such a Telstra, are likely to use their own CDN services.

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208 Cisco, The Zettabyte Era: Trends and Analysis, 7 June 2017.

209 C Drake, *CDN Future Scenarios: a growing market delivers new business opportunities*, Informa Telecoms & Media/Ovum, 11 September 2012.

Finding: The provision of content delivery network services in Australia currently appears to be reasonably competitive given the presence of global providers such as Akamai, and broadband service providers and large content providers who have also deployed their own CDN infrastructure. However, the market is rapidly growing and evolving, so at this stage it is difficult to assess whether competition issues may emerge in the future.

4.8 Over-the-top content services

OTT services are those services delivered to consumers over a broadband access network that are not offered or managed by that consumer's broadband service provider. The range of OTT services is extensive and includes services such as communication and social media platforms and apps, video content and audio services. OTT services are provided to consumers via apps developed for devices and operating systems used by consumers on smartphones, tablets, computers and Smart TVs.

The availability of OTT services provides consumers with new services (such as social media, ride-sharing and internet shopping etc.). It also permits the entry of new service providers offering voice and messaging services. As these services run over the top of third party networks, the service providers cannot guarantee the quality of the service. However, advancements in access speeds and content delivery technologies are continually improving the quality of OTT services. In many cases, consumers can access OTT communications services for free, due to advertising-based revenue models.

The increased usage of OTT services, particularly data intensive content services (notably video content) is driving rapid growth in data consumption, which must be accommodated by broadband service providers. As the OTT services often compete with or displace the usage of these providers' own communications (voice and text) and content services (where offered), there are mixed implications for broadband service providers from the continued growth of these services. On the one hand, broadband service providers benefit from the complementarity between broadband access and OTT services, which is stimulating demand for broadband access. On the other hand, their business models are disrupted by increasing substitutability away from their own communications and content services to OTT services. As a result, the revenues accrued from consumers' use of voice and messaging services are being eroded.[210]

In general, OTT service providers are subject to fewer regulatory obligations than those providing traditional services. However, the increasing use of OTT services as substitutes may provide opportunities in the longer-term for regulations on traditional services to be relaxed or harmonised.

4.8.1 OTT content services

There are a large and diverse number of OTT content suppliers with various business models with the common characteristic that they offer a library of content to access 'on-demand'. In the supply of audio-visual content, OTT service providers range from new entrants such as Netflix to traditional providers of content such as Foxtel and the free-to-air (FTA) networks. Key categories of OTT content services include:

- SVOD services (such as Netflix and Stan)
- transactional video on demand (TVOD) services (such as the Apple iTunes store)
- subscription TV (STV) services (such as Fetch TV and Foxtel Now which offer a range of linear (broadcast) and on-demand content)
- advertisement funded video on demand (AVOD) services (such as YouTube)
- catch-up services from FTA broadcasters (such as ABC iView)
- broadcast of live sports events (with digital rights often held by communications service providers).

The essence of OTT content is that the content aggregator or provider can establish a direct relationship with the consumer on both fixed and mobile access networks. There appears to be relatively low technical barriers to entry in supplying OTT content services. These services are often supplied using apps on mobile devices, internet connected TVs, games consoles and set-top boxes. OTT content service providers can deploy or utilise infrastructure and services to enhance the quality of their service to consumers (for example, CDNs and new coding compression techniques).

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210 L Schiavoni, *How Regulators are approaching OTTs*, Ovum, 22 September 2016, p. 22.

However, they remain susceptible to any congestion or traffic management practices employed by the consumer's broadband access provider.

While we consider there to be currently no technical impediments to entering the OTT content services market, the acquisition of compelling content remains a key barrier particularly in the SVOD market. As a result, concentration is relatively high in the SVOD market segment, with Netflix and Stan capturing most of the market.[211] However, when the video content market is defined more broadly to include a range of catch-up, pay TV and other internet content services (such as YouTube), there does not appear to be any major competition concerns at present.

Whilst OTT services bring benefits to fixed and mobile broadband service providers in terms of increasing demand for access and data, service providers may face a relative decline in revenues as OTT content services capture larger proportions of consumers' spend. To combat this, we have seen broadband service providers continue to acquire and distribute content both to re-capture value from OTT providers and to differentiate their service offerings from other broadband service providers and mobile service providers. Similarly, in response to the growth of OTT services, traditional content providers (such as Foxtel and the FTA broadcasters) have also continued to acquire exclusive rights for both premium sports and other premium content to maintain their audience and advertisement shares. Both have also sought to utilise OTT distribution to expand their reach across increasingly fragmented audiences.

As noted above, access networks controlled by broadband service providers and MNOs are a potential point in the supply chain where OTT services may encounter traffic management that affects the quality of service. Where this occurs, and affects third party services, it raises network neutrality or 'net neutrality' issues. Where this traffic management extends to selective discrimination of third party services it raises competition issues. While this has been a significant issue for regulators in the US and the EU (due to highly publicised instances of OTT services being blocked or impeded by network owners) it has yet to emerge as an issue in Australia.[212]

We consider that net neutrality issues have not generally arisen in Australia partially because the incentive and opportunity to discriminate or foreclose are not as evident as in other jurisdictions. Key to this is that retail competition is likely to discipline the behaviour of Australian network operators more than those in other jurisdictions such as the United States. This is because Australians enjoy a greater ability to switch to other providers (than, for example, consumers in the United States) should they dislike discriminatory traffic management policies of their service provider. Net neutrality, however, is important for competition and if a net neutrality issue were to arise in Australia, it would be a matter of concern to us and we would rely on our enforcement powers to address any anti-competitive effects. The countervailing power of key OTT service providers may also reduce the potential for broadband service providers to discriminate against these services.

4.8.2   Characteristics of OTT platforms

As there is zero financial cost, consumers tend to sign-up to and switch between a variety of different OTT communications and social media services for different uses. This is known as 'multi-homing'. For example, consumers may use different services for communicating with different groups of friends. While this can diminish the potential for services to acquire market power, there are particular categories of OTT services where other characteristics can give rise to competition concerns. These are where a particular service enjoys network effects (which refers to the value of a particular service increasing with the number of other users) and interoperability issues (which prevent a user of one service or platform being able to communicate with a user on a competing service).

A further feature of many digital platforms is that many are 'multi-sided markets', that is, they act as 'market makers'—platforms with two or more distinct groups of users that the platforms are designed to match. For example, Uber and Airbnb connect drivers and rooms with consumers seeking transport and accommodation. The more drivers and rooms available, the more valuable the platform is to prospective consumers, and, in turn, as the number of consumers grows, the more attractive the platform is to drivers and providers of rooms.

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211 M Mason, Netflix leads the way as streamers set to take down pay TV, *Australian Financial Review*, 7 August 2017.

212 Regulations upholding net neutrality have been made in both the European Union and United States. At the time of writing this report, the US regulator, the Federal Communications Commission, had recently repealed those regulations (https://apps.fcc.gov/edocs_public/attachmatch/DOC-348261A1.pdf).

Multi-sided platforms need critical mass in order to achieve sustainable growth. They must obtain enough customers on each side of the platform. This means that there can be particularly high barriers to entry in markets with established players. This can lead to market concentration and the acquisition of market power and could potentially elevate the risk of competition issues arising. While social media platforms co-exist, they do so by offering a significantly differentiated user experience (Facebook, Instagram, and Twitter). There appears to be a tendency towards monopoly in each market segment as seen by the dominance of Facebook to the exclusion of similar platforms such as MySpace.

As in the case of these social media platforms, dominance by other major platform operators such as Google and Amazon in the Australian market is reflective of their position in global markets. The dominance of these firms and in particular their ability to exploit network effects has attracted significant scrutiny from the European Commission.[213]

Digital Platforms Inquiry

On 4 December 2017, following a direction from the Federal Government, we commenced an Inquiry into digital platforms, such as Google and Facebook. The Inquiry is examining the effect that digital search engines, social media platforms and other digital content aggregation platforms are having on competition in media and advertising services markets. The Inquiry is in response to growing concerns that digital platforms are affecting traditional media's ability to fund the development of content. It will also consider the impact of digital platforms on the choice and quality of news and content being produced.

A preliminary report is to be submitted to the Treasurer by early December 2018 with a Final Report due by early June 2019.[214]

OTT services continue to grow in popularity and are necessitating continued investment in capacity by network operators and service providers. However, risks remain that bottlenecks may emerge if capacity investment is not sufficient throughout the supply chain.

The developments and trends we have observed suggest that competition for the provision of OTT content services generally appears to be vigorous and dynamic. In many areas, we are seeing new entry from international and local players, continued competitive responses and innovation of services, which means that consumers are benefiting from greater choice.

While net neutrality issues continue to be low risk in Australia, we recognise that network operators and service providers use traffic management tools, particularly during periods of congestion, to reduce demands on their network and promote economically efficient investment decisions. In doing so, they should ensure that they fully disclose to new and existing customers how these traffic management policies may affect their services.

Although OTT services do not directly contribute to the costs of additional network investment, the availability of OTT services increases the value proposition of broadband services, which in turn is likely to drive further take-up and adoption of higher value plans. It would appear that, currently, this complementarity between broadband access and OTT services is supporting continued investment by broadband service providers in their networks. Both broadband service providers and OTT service providers appear to be making complementary investments in infrastructure and technologies to expand capacity and promote a high quality of service.

There is still the potential for broadband or mobile service providers to employ strategies or conduct to foreclose competition from new and innovative services, particularly where those services do not possess any countervailing power. Where the ACCC is alerted to or otherwise identifies such conduct, we will address this through use of our competition law powers.

Finding: Over-the-top services continue to grow in popularity and are necessitating continued investment in capacity by network operators and service providers arising from the broad complementarity between these services and broadband access. However, minor risks remain, including the potential for bottlenecks to emerge if capacity investment is not sufficient throughout the supply chain, and the potential for discriminatory traffic management to occur.

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213 For example, the EC fined Google in June 2017 for systematically favouring its own comparison shopping service in general search results pages (L Schiavoni, EU's fine on Google is a further step in its fight against internet giants', Ovum, 22 June 2017).

214 For more information, see https://www.accc.gov.au/media-release/accc-commences-inquiry-into-digital-platforms.

4.9   Cloud computing

The terms cloud computing and the cloud are used to describe information and communications technology (ICT) services that can be accessed over a network from a remote location on demand. Cloud computing has been defined as 'the practice of using remote internet servers to store, manage and process data'.[215] Cloud computing services allow users to store and access data in an external environment (i.e. not within the user's own physical computer), which they can access when connected to the internet. The advent of broadband and increasingly ubiquitous connectivity has provided the conditions for new services, such as cloud computing, to develop.

4.9.1   Service models

Service models can be defined by the level of end user control in the cloud computing infrastructure. Cloud computing is developing along three different models:

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS).

Examples of these services are provided in table 4.9.

Table 4.9:   Cloud computing service models[216]

Service model	User control and access	Examples of key services
SaaS	Web interface, software application	iTunes, iCloud, Dropbox, OneDrive, Spotify, Gmail, Facebook, Office 365
PaaS	Software development platform and tools, operating systems and web servers	Amazon Web Services (AWS), Elastic Beanstalk, Windows Azure, Google App Engine
IaaS	Virtual machines, network equipment, servers and storage	Amazon EC2, Rackspace, Windows Azure, OpenStack, IBM

4.9.2   Deployment models

Cloud computing services can be further differentiated according to their deployment model. These deployment models are described here:

- **Public cloud**—Public cloud services are available to the general public on a shared basis. The benefits of a public cloud service include the ability to scale computing resources to match demand fluctuations and the potential for economies of scale (through using large data centres housing IT infrastructure). Internet electronic mail providers such as Gmail and Hotmail are examples of a public cloud service.
- **Private cloud**—A private cloud is a service deployed exclusively for use by a single organisation (e.g. a business) or restricted group of organisations and is usually hosted in private data centres. The primary users of private cloud computing services in Australia are businesses and government. Compared to other deployment models, the private cloud model is considered the most secure in terms of data protection.

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215 Julia Love, CRN, Google acquires Australian data science platform Kaggle; touts new cloud customer wins, 9 March 2017, viewed 22 February 2018.

216 ACCC analysis from various sources.

- **Hybrid cloud**—Hybrid cloud services involve extending private cloud infrastructure to access public cloud resources. For example, in 2016, AWS announced a strategic partnership with VMware, where VMware's private software-defined data centre offering would run on the AWS public cloud.[217] This 'hybrid' model addresses the concerns of businesses of 'losing' control of their data in a public cloud, but allows the scalability, collaboration and efficiencies of public cloud offerings.
- **Community cloud**—Community cloud is shared by several organisations that wish to make use of a common cloud computing environment. The cloud may be managed by the organisation or a third party and may be on-premises or off-premises. The costs are spread over fewer users than a public cloud (but more than a private cloud), so only some of the cost savings potential of cloud computing are realised.

The benefits of cloud computing are already being realised by many businesses, with over 80 per cent of Australian businesses using cloud computing for some software requirements while over 60 per cent use cloud for their storage requirements.[218]

A number of factors are making cloud computing increasingly more important to the way businesses and consumers store, use and distribute content and data:
- the scalability of cloud services
- lower costs
- opportunities for collaboration
- demand for mobility and the proliferation of portable devices, and
- rollout of the NBN.

According to Ovum, AWS, Microsoft Azure and IBM SoftLayer are the dominant IaaS and PaaS cloud computing service providers in Australia, with AWS and Azure alone accounting for around two-thirds of the market. All three providers have data centre footprints in the Asia-Pacific region.

Overseas cloud service providers are increasingly locating data centres in Australia or partnering with local businesses to provide locally based services. This is largely driven by the need to overcome challenges of data sovereignty and to improve latency and performance.

As cloud computing involves the combination of telecommunications network and IT infrastructure technologies, the growth in the demand for cloud services has resulted in broadband service providers in Australia entering the market to take advantage of this opportunity. Large broadband service providers are partnering with established cloud-based players to launch their own services. In partnering with established cloud service providers, broadband service providers increasingly act as 'brokers' or cloud portals, that is, they can resell a range of cloud services from the global wholesale providers.

A key advantage that broadband service providers have over specialised cloud computing providers is their control over the quality of service connectivity to and from data centres. Having control over the network allows broadband service providers to offer customer connectivity that is flexible and tailored to the needs of their users.[219] Another advantage is their established customer base. Broadband service providers are likely to seek to leverage these advantages by offering customers bundled connectivity and cloud platforms.

This is consistent with international trends. Ovum estimates that over 400 telecommunication networks worldwide are now offering cloud services, often involving low-margin reselling of third party public cloud services (AWS, Azure, etc.). Internationally, the reselling model is generally accompanied with product bundling, where the network operator will bundle technical support services with access to IaaS public cloud services.[220]

According to Ovum's statistics, the revenues earned by Australian telecommunication network operator's from selling or re-selling cloud services is approximately 22 per cent of the total cloud revenues earned in the sector and is forecast to remain at this proportion over the next five years.[221]

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217 Joseph Tsidulko, CRN, The biggest Amazon Web Services stories of 2016, 20 December 2016, viewed 22 February 2018.

218 Venture Insights, *Cloud Computing—Are We All In?*, November 2016.

219 J Gabrielsson et al, *Cloud computing in telecommunications*, Ericsson Review, p. 30.

220 Mark Newman, *Telcos grow into their role as cloud service providers*, Ovum Knowledge Centre, 11 May 2016.

221 Ovum Knowledge Centre, *Enterprise Cloud Service Forecast 2015*, 20 January 2016.

4.9.3 Links to the broader communications sector

The ongoing development and increasing importance of cloud computing is a key element of the evolving communications sector, and is closely related to broader trends, such as the growth of data consumption over higher capacity networks, the proliferation of internet connected devices, increasing capabilities of these devices and the availability of ubiquitous connectivity.

The shift of data and software from being held on end users' computers or servers to the cloud is a strong driver of data usage on networks. For businesses, this is contributing to day-time traffic volumes. For residential consumers, their use of cloud services such as storage may be more pronounced during the busy evening period. These trends have implications for the investment and use of transmission infrastructure for network owners.

The demand for cloud services is also a key driver of the growth of data centres where cloud servers are located and co-located with other elements of the supply chain and complementary services. These include CDNs and the servers of broadband service providers who interconnect with cloud providers and CDNs to deliver a range of content and OTT applications to end users.

As broadband availability and download speeds grow with the deployment of the NBN and other high-speed access networks, end users are increasingly using software and apps stored and manipulated in the cloud. Cloud services mirror the trends that we are observing across the business and consumer segments of the communications sector. These include the demand for remote access (mobility), backing-up of data, collaboration and analysis of data as well as security and redundancy through distribution of data across multiple sites. To support these uses, high bandwidth, low latency data connections become essential for cloud service providers and broadband service providers to deliver the quality of service those end users require. This in turn increases the necessity for broadband service providers to directly interconnect with the cloud service providers in many geographically distributed data centres.

The use of cloud services is forecast to continue to grow strongly. Cisco forecasts that global cloud data centre traffic will reach 19.5 Zb per year in 2021 compared to 6.0 Zb in 2016. This will represent 95 per cent of all traffic in data centres in 2021 compared to 88 per cent in 2016, reflecting the strong linkage between the two services. Cisco notes that the two biggest drivers of cloud services are big data and the IoT (discussed in section 4.10) which will result in a near quadrupling of data stored in datacentres between 2016 and 2021.[222]

Notwithstanding the general shift to cloud models of service provision in many consumer and business market segments, there are signs that some new services are utilising a model whereby the storage and processing occurs on the 'edge' rather than the centre of the network. For example, some IoT services, particularly those incorporating artificial intelligence applications must make decisions instantly (such as autonomous vehicles). The algorithms controlling these applications are therefore optimally located on the device itself rather than at a central location, which would result in a lag in response times. More generally, the need for decisions to be made quickly using the data collected by a device appears to be driving a shift towards devices themselves being made more intelligent to perform this role on-site, and for data centres to be distributed more locally. This trend also saves the cost of transmitting large amounts of data to a central location. Analysts believe this trend is not likely to herald the decline of cloud computing but will be the optimal processing model for particular applications.[223] Consequently, both cloud and edge based models are likely to continue to develop to accommodate the growing expansion of IoT and other data heavy applications.

4.9.4 Potential competition and consumer issues

The various components of the market for public cloud computing services are at different stages of development. The most mature market is SaaS, which Ovum forecasts to grow from $761 million in 2016 to $1.2 billion in 2021.

The SaaS market has a large number of providers, including most of the leading content providers such as Salesforce.com, Microsoft 365, and WebEx (Cisco's web conferencing solution). There are low entry barriers for developing a new SaaS application, and this segment has a plethora of diverse applications generally targeted at end users (i.e. Gmail, Facebook, Spotify, Soundcloud, etc.).

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222 Cisco, Cisco Global Cloud Index: Forecast and Methodology, 2016–2021 White Paper, 1 February 2018, viewed 7 February 2018.

223 The Economist, 'The era of the cloud's total dominance is drawing to a close', 18 January 2018, viewed 22 January 2018.

The IaaS market is developing rapidly with AWS and Microsoft as the two largest providers, and Google as a relatively new entrant. The IaaS segment is difficult for broadband service providers to address because significant scale is needed to offer competitive services. Thus, broadband service providers generally resell Azure or AWS and seek to value add by bundling access to IaaS products with technical services for enterprise customers. Ovum forecasts the IaaS market in Australia to grow from $435 million in 2016 to $738 million in 2021.[224]

As broadband service providers are increasingly moving into the cloud computing market, there is a potential concern that they may seek to leverage their position in the communication sector, given that cloud computing services are heavily reliant upon access to the internet and bandwidth capacity. For example, a broadband service provider seeking to protect its own cloud services could impede end user access to rival platforms through degrading the quality of service of access to other cloud services. There is also the potential for a network service provider to discriminate in favour of its own (or affiliated) cloud computing services against competing services. In early 2014 there were reports in the media that US-based network service provider Verizon was limiting bandwidth to competing cloud providers such as AWS (and by extension Netflix).[225] However, as noted above in section 4.8.1, there have been no specific instances of network traffic discrimination of this kind identified in Australia so far.

Potential concerns in relation to bundling strategies may arise if broadband service providers seek to bundle their own or affiliated cloud services with access products in a manner that independent cloud service providers cannot replicate. This would be a particular concern if either the broadband service provider or cloud service provider was dominant or the bundle was exclusive. Our analysis to date suggests that both the cloud services market and broadband access market are sufficiently competitive to mitigate this kind of conduct. We note that many cloud service providers are well established global brands who are likely to wield significant countervailing power.

The quality and performance requirements end users seek when accessing the cloud may also impact on competition at the broadband service provider level due to the requirement for high quality interconnections. If a dominant broadband service provider is able to create a cloud service or exclusively host a cloud service provider on its network, it may be able to set terms of access to that service that are less favourable for competing broadband service providers. This is relevant to our consideration of whether current internet interconnection arrangements in Australia are detrimental for smaller broadband service providers seeking to obtain direct access to the larger providers who host key services (discussed in section 4.5). While we have not received evidence to date that dominant broadband service providers are positioning themselves as access bottlenecks to cloud services, these services do have the relevant characteristics, which could provide broadband service providers with direct access a competitive advantage in downstream markets.

A common feature of some cloud computing services is the use of proprietary standards and service agreements that effectively lock users in to particular cloud computing services, through an absence of interoperability between cloud platforms. These arrangements may make it difficult for a business or an individual consumer to transfer their data ('data portability'), or to access their content via other services. This may result in a 'lock-in', where a business or consumer is unable to easily switch between providers.

Entry costs to supply of cloud computing services appear relatively high but surmountable particularly by well-resourced global providers. As a result, cloud services both internationally and in Australia are dominated by global providers such as Amazon, Salesforce, and Microsoft. In Australia, we have recently seen entry from other international providers such as Google and Oracle who have the scale and brand to inject competitive tension in the provision of cloud computing services. While competition appears to be intensifying currently, we note that more mature markets such as the US are becoming more concentrated (for example, Amazon's AWS appears to dominate the US cloud computing market).[226]

224 Ovum Knowledge Centre, *IT Services Market Forecast: Cloud Services*, 2015–21, viewed 11 May 2017.

225 B Butler, 'Verizon denies throttling Amazon's cloud, Netflix services', ARNNet, viewed 7 February 2018.

226 Synergy Research Group, 'The Leading Cloud Providers Continue to Run Away with the Market', viewed 7 February 2018.

We consider that current and prospective indications of competition for the provision of cloud computing services in Australia are positive. As noted in our Issues Paper, a potential issue for consumers and ongoing competition in cloud computing may arise from the collection, storage and use of data by cloud service providers and concerns about 'vendor lock-in' to proprietary standards. [227]

Moving between cloud service providers can incur substantial costs. Costs may be incurred through technical problems associated with extracting data from cloud databases and data warehouses, as well as migrating that data without loss of application functionality (which may arise from a lack of standard interfaces and open application programming interfaces (APIs)). Potential competition and consumer issues related to the collection, storage and use of data by cloud service providers reflect those across the broader digital economy, with increasing volumes of consumer data being transferred to or collected by third party service providers as part of the service being offered. In addition, there is the potential for service providers to make misleading claims with regard to particular aspects of the cloud computing service (such as security and availability levels) given the complex product structures and information asymmetries present.

With regard to Macquarie Telecom's concern that local cloud service providers are unfairly disadvantaged against global providers, we note that the ability of multinationals operating in Australia to avoid certain tax obligations is currently an issue for Australian-based competitors and policy makers across a wide range of sectors.

Finding: Indications suggest continued strong growth and competition in the provision of cloud computing services. Similar to many other services in the digital economy, modest risks to this outlook relate to the collection, storage and use of data by cloud service providers and the potential for 'vendor lock-in'. In this regard we note that increased data portability through the Productivity Commission's proposed Consumer Data Right (discussed in section 7.4) may make it easier for users of cloud services to switch service providers.

4.10   Internet of Things

IoT encompasses a diverse range of emerging technologies with the common attribute of communication between devices or 'things'. A subset of IoT technology is M2M communication, which occurs without direct human intervention. The Communications Alliance considers that IoT is the evolution of M2M that has been in existence for a considerable period. IoT describes a much broader and more sophisticated gathering and analysis of data from multiple devices.[228]

These technologies range from low data rate static sensor networks communicating on an intermittent basis to high data rate mobile systems requiring continuous communications while operating things such as autonomous vehicles. The growth of IoT applications has been driven by a number of enablers including large reductions in the costs of the intelligent sensors installed on 'things', increasing availability of connectivity (such as broadband networks) and increasingly sophisticated methods for data analysis (computing power).[229]

The innovations associated with the growth of IoT applications are likely to have a significant impact on the economy and society more broadly over the five year period of the market study and beyond. Sectors where IoT applications will have the greatest impact include agriculture and food supply chains, transport, home (automation and security), healthcare and fitness, retail, manufacturing and logistics. There are also numerous and growing applications for communities and municipal authorities to enhance service delivery and improve public amenity in areas such as water and air quality monitoring, energy efficiency and wildlife conservation. The Communications Alliance predicts that by 2025, IoT

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227 ACCC, *Competition in evolving communications markets Issues Paper*, September 2016, p. 55.

228 Communications Alliance Ltd, *Enabling the Internet of Things for Australia*, October 2015, p. 6.

229 ibid.

will provide a one to two per cent uplift in gross domestic product per year and have an impact of $45 billion to $116 billion across all key sectors of the economy.[230]

As foreshadowed by the Communications Alliance we are seeing the rapid deployment of IoT across the economy and country. Globally, it is expected that 29 billion devices will be connected worldwide by 2022, of which 18 billion will relate to the IoT.[231] In addition to industrial and manufacturing use, IoT is becoming increasing prevalent in applications described as 'smart' including cities, communities, homes and cars. For example, the Government has a *Smart Cities Plan* incorporating IoT applications in the public realm,[232] while in July 2017, Telstra announced a partnership with Google to offer its customers smart home technology using voice-activated Google Home.[233] IoT is already a significant growth area of the MNOs, with Telstra reporting its M2M revenues grew by 14.7 per cent in 2017.[234]

The very heterogeneous nature of IoT services makes it difficult to assess competition in the supply of these services and to make broad observations. However, significant segments are emerging with more homogeneous characteristics (for example, low data rate IoT applications used in a number of vertical sectors such as agriculture).

Just as the applications are diverse, so are the types of connectivity currently in use or being developed to support them. For example, connectivity can range from Wi-Fi or Bluetooth for short distance communication to existing mobile networks, narrowband or other low powered wireless technologies for wide area communications.

Broadly, the participants in an IoT supply chain can be categorised as:

- the connectivity service provider who provides the underlying connectivity
- the service provider who provides the IoT platform and controls the sensors and other infrastructure and may include data storage and analysis
- the application provider—depending on the supply chain this can be a manufacturer or service provider who engages an IoT solution to obtain the productivity benefit or include as part of a retail product
- the consumer.

However, vertical integration means that each supply chain can look very different and business models are likely to continue to evolve in response to new developments and applications.

4.10.1   Deployment of new specialised IoT networks

At the connectivity layer, barriers to entry have been lowered due to the availability of alternative wireless technologies and standards (as distinct from traditional mobile networks). This has enabled the entry of new specialist wireless connectivity providers. These new entrants (such as NNN Co and Thinxtra) are deploying low-power wide-area (LPWA) networks almost as extensive as the existing mobile networks. These new entrants are able to deploy geographically extensive networks which support connectivity to large numbers of low cost, low power sensors. While revenues per sensor are very low, the large number and low cost of sensors makes the solution feasible. In addition, two of the key LPWA technologies being deployed in Australia use 'class-licensed' (shared) spectrum (the third technology is being deployed by MNOs using their existing spectrum holdings and networks).

LPWA networks are particularly useful for low-power, low-cost IoT solutions that cannot be met by relatively higher cost M2M connectivity which has, until now, relied on 2G, 3G and 4G mobile networks. The sensors and devices connected to LPWA networks tend to send low volumes of data intermittently. Key sectors that are targeted with these IoT applications include agriculture, water metering and logistics. As noted above, the existing MNOs are also entering this IoT space by implementing narrowband standards on their networks. Telstra has recently activated two IoT technologies on its network, Cat M1 and NB-IoT. Telstra notes that Cat M1 is well suited to applications with data in the 100s of kbps with extended range and battery life such as personal health monitors. NB-IoT is better suited to applications sending even smaller amounts of data and requiring even longer battery life, such

230 Communications Alliance Ltd, *Enabling the Internet of Things for Australia,* October 2015, p. 6, figure 29.
231 Ericsson, The Ericsson Mobility Report, viewed 26 February 2018.
232 Department of Infrastructure, Regional Development and Cities, Smart Cities Plan, viewed March 2018.
233 Telstra Smart Home Bundles, viewed March 2018.
234 Telstra, Financial results for the full year 2017.

as moisture sensors. [235] Both Optus and Vodafone have also recently trialled NB-IoT, technology on their networks.[236] In addition to these macro deployments, we understand that smaller fixed-wireless operators are also rolling out niche IoT networks, for example on-farm IoT network deployments.

In contrast, other IoT applications have more demanding connectivity requirements. In the automotive industry the 'connected car' is at a very nascent stage in Australia, and the low latency, high-bandwidth requirements of connected cars are likely to be best served by mobile networks.

As the IoT sector is in relative infancy, we consider that these technologies will continue to develop and compete. Each technology is likely to have its own strengths and weaknesses and target different sectors and uses.

4.10.2   Potential inhibitors to growth and competition

There are a number of barriers to entry and potential competition issues relevant to the development of IoT. Some of the key issues identified include:

- competing technologies and standards and the ability to achieve interoperability (both at the network and service layers)
- spectrum availability—which will be an important enabler of competition and innovation in the supply of IoT services. Further, there is unlikely to be a one sized solution in terms of spectrum for the various IoT technologies and applications
- the development of suitable NBN products for niche IoT applications (which has been raised with NBN Co by IoTAA), and
- access to infrastructure and services (such as regional transmission) for new entrants seeking to supply new services.

There are also a large number of other issues that may present challenges to the continued growth of a competitive and dynamic IoT sector (including consumer trust in these services) these include:

- legacy telecommunications regulations which may impose costs or complexity on the development of IoT services
- new privacy and security concerns and availability of accessible consumer information on relevant consumer protections which may deter take-up
- consumer lock-in (through standards or the collection of data) which may also deter take-up and subsequent switching, and
- the challenging economics of extending networks to ensure connectivity to support remote IoT deployment (such as in remote farms).

There is also currently a lack of information on the progress of IoT deployment in Australia. Greater visibility and sharing of information on IoT adoption may assist in enabling faster diffusion of IoT across the economy and society, as well as identifying areas where IoT adoption strategies could be focused. Work is underway both domestically and internationally to address many of these key issues, involving industry bodies and relevant regulatory and policy agencies. For example, the IoTAA is currently developing an IoT Adoption Index involving a broad range of stakeholders, which it expects to release in early 2018.[237] To help address privacy and security issues and build consumer trust, the IoTAA also released the *Internet of Things Security Guideline* in February 2017 and intends to publish a second version in future.[238]

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235 R Denholm, Chief Operations Officer—Telstra, 'New Internet of Things capability a huge opportunity for Australia start-ups', Telstra Exchange, 12 January 2018, viewed 18 January 2018.

236 R Crozier, 'Vodafone switches on NB-IoT network', IT News, 11 October 2017.

237 IoTAA, IoT Adoption Survey, viewed March 2018.

238 IoTAA, Resources and Publications, viewed 7 February 2018.

Consumer issues relevant to the IoT are likely to come under ACCC attention as the IoT becomes increasingly pervasive. In February 2018 we initiated a sweep on toys that are 'connected devices' (toys that communicate to another device or application). The aim of the sweep is to monitor transparency in the collection and use of data collected by the toys and is part of a broader program of reviewing terms and conditions in the digital economy.

As with other communications markets, there is the potential for entities that control access to key inputs or enjoy other advantages to leverage this to inhibit or foreclose competition in nascent downstream markets. However, the nascent IoT sector ought to be allowed to evolve without upfront regulation, noting that there are currently a number of ACMA, industry (largely through the IoTAA) and other government processes examining issues of concern as outlined above.

Submissions to the Draft Report

ACMA: Agrees with the ACCC's observations in relation to IoT and supports the view that the sector be allowed to develop without ex-ante regulation.

Communications Alliance: Supports the ACCC working with the IoTAA on emerging issues, and emphasises the importance of considering constraints regulation could impose on innovation during this time of change.

Telstra: Agrees with the ACCC's assessment of IoT services. Telstra notes that new entry by connectivity service providers demonstrates technological advancement and the correct government and regulatory settings.

Finding: The diverse and fragmented nature of different IoT applications is likely to create disparate service markets with different competitive dynamics For example, specific sectors may tend towards concentration or vertical integration, and other IoT applications may involve more contestable supply chains. We will continue to monitor competitive dynamics as the downstream market develops.

5.   Immediate issues requiring action to promote competition

5.1   NBN wholesale access prices

In the Draft Report we observed that competition for the supply of broadband services on the NBN may not be working as well as it could be for consumers in terms of encouraging take-up and use by delivering quality broadband services on the NBN.

We acknowledged that while some of these issues may be transitional there are immediate and longer-term factors that could dampen future competition on the NBN, and consequently warrant further examination.

Many consumers claimed to be worse off on the NBN compared to their legacy broadband service with slow speeds and congestion, particularly in peak evening periods. There has also been wide-spread media coverage of NBN speed issues, with NBN Co acknowledging the problems and estimating 15 per cent of users are dissatisfied.[239]

This poor consumer experience may be the result of a number of factors including misaligned incentives of NBN Co and service providers in relation to the structure and level of prices. However, we note that NBN Co's recent pricing initiatives and longer-term pricing changes are indicative of a better alignment than existed previously.

In this section we will explore underlying reasons for poor consumer experience on the NBN, including the conflicting incentives of service providers and NBN Co, the role of NBN access prices, as well as, consumer expectations and willingness to pay.

Since the Draft Report was released, NBN Co has been working with industry stakeholders to address some of these issues. We have updated our analysis to reflect these developments.

In December 2017, NBN Co announced the following changes to its wholesale pricing structure:[240]

- An immediate transitional promotion offer where service providers can purchase the 50 Mbps AVC product for the same price as a 25 Mbps AVC product (a saving of $7). In addition, service providers can also obtain an extra 50 per cent of CVC per AVC for no extra cost to help support products across speed tiers.

- A new 50 Mbps wholesale bundle with 2 Mbps CVC included for $45 per month and a new 100 Mbps wholesale bundle with 2.5 Mbps CVC included for $65 per month, expected to come into effect later in 2018. Additional CVC for these bundles can be purchased at a lower price of $8 per Mbps.

A lower cost entry-level wholesale bundle for voice-only and basic broadband access customers will also be introduced at a later date. These bundles will have 50kbps of included data, which is enough to provision a basic telephony service. Service providers can purchase this 12 Mbps bundle product for $22 per month. These new products have been designed to promote take-up of higher speed NBN services, improve customer experience by encouraging more CVC provisioning and meet the growing demand for fast broadband in peak usage times.

We have already observed some service providers adopting these new offers and heavily promoting 50 Mbps services, as well as cheaper 100 Mbps services.

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239 Jennifer Dudley-Nicholson, News Corp Australian Network, *NBN Co admits more users 'than ever' are suffering slow downloads as consumer groups call for reform*, viewed on 11 October 2017.

240 NBN Co, NBN Co announces new pricing options to boost broadband speeds, media release, 14 December 2017.

5.1.1　Take-up and efficient use of the NBN

NBN Co has incentives to encourage both take-up and use of the network, particularly higher speed services, to drive revenue growth over time and ensure efficient use of the network.

Service providers have similar incentives to drive take-up of NBN services to maintain or grow their market share, particularly during the migration period from the legacy networks. However, they may not face the same incentives to drive take-up of higher speed services at this time given the additional costs of provisioning adequate CVC to support the service.

Despite the NBN rollout recently passing the half-way point with approximately 6.3 million premises eligible for connection, only 3.6 million premises had an active NBN service as at 8 March 2018.[241] As shown in figure 5.1 there has been a lag in take-up since the beginning of the rollout.

This lag is partly due to the 18-month migration window, designed to allow consumers time to choose the NBN plan that best suits their needs and afford service providers enough time to migrate customers before the legacy networks are de-commissioned.

However, we have observed that some service providers may be incentivised to keep customers on legacy services for as long as possible if they earn better margins, which may also be contributing to the lag in take-up.

On the other hand, service providers, particularly new entrants, also have incentives to attract new customers and build their market share during the migration period. We are observing this currently through strong price competition in the retail market as discussed in section 4.1.

Figure 5.1:　Take-up of NBN services compared to premises ready to connect[242]
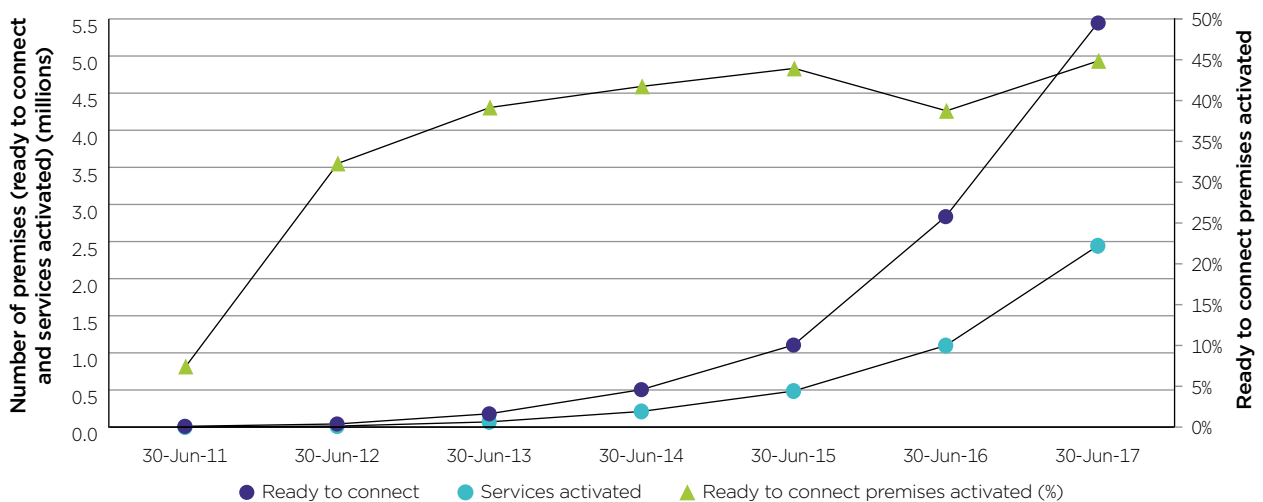
While service providers and NBN Co may have similar incentives to encourage take-up of NBN services, service providers also have incentives to maximise their profits. Consequently, service providers appear to be wary of actively promoting higher speed tiers given the additional costs incurred to provision enough capacity to support these services (which is further discussed in section 5.1.2). Service providers may also be wary of trying to up-sell customers to higher priced, higher speed plans at present in case they risk losing the customer.

In the Draft Report, we discussed the limited take-up of higher speed NBN services, with the most popular speed tiers being 12 and 25 Mbps. As at 30 December 2017, the most popular speed tier was still 25 Mbps, however, there was a slight increase in the take-up of 50 Mbps services as shown in table 5.1, December 2017. However, we note that in mid-December 2017, NBN Co introduced a discount for 50 Mbps services, and we expect that this will influence greater take-up of 50 Mbps services in the near future.

241　NBN Co, Weekly summary rollout progress, for week ending 8 March 2018, viewed on 14 March 2018.
242　ibid.

We will continue to observe the take-up of NBN broadband services to ensure consumers are being offered a full range of speed choices and not being driven towards just one speed tier. We will continue to report on the take-up of NBN services in our annual telecommunications report.

Table 5.1: **Take-up of different (wholesale peak download) speed tiers by service provider, December 2017[243]**

Service provider	12 Mbps	25 Mbps	50 Mbps	100 Mbps
Telstra	19%	70%	3%	8%
TPG Group	44%	37%	4%	14%
Optus	31%	43%	9%	16%
Vocus	54%	34%	4%	7%
Other Access Seekers	19%	45%	7%	28%
Total	**29%**	**54%**	**5%**	**12%**

On the NBN the demand risk faced by service providers from growing consumer data usage is more difficult to manage as they must acquire capacity from an upstream provider (NBN Co). In contrast, on the copper network, service providers acquiring ULLS or LSS are able to better manage demand risk on-net through their own equipment (Digital Subscriber Line Access Multiplexers (DSLAMs)) in the exchange and aggregation links from the exchange, rather than having to throttle customer usage.[244]

In the Draft Report, we discussed observations that some service providers were seeking to mitigate this demand usage risk by promoting lower speed NBN services instead of higher speeds. For example, Vocus publicly expressed concerns that uncertainty around its NBN margins was causing it to actively drive customers towards lower-speed plans, rather than promoting the NBN as an ultrafast broadband network, as there is less risk associated with lower speed plans in terms of consumption growth.[245]

This practice, if continued, may have significant implications for NBN Co's long-term revenue and cost recovery, which relies on an assumption that customers will pay more for their broadband services and there will be substantial take-up of higher speed plans. This practice may also potentially undermine the efficient use of the network.

NBN Co's recent changes to its pricing structure seek to mitigate some of this demand risk by introducing new bundled products for higher speed tiers (50 Mbps and 100 Mbps) with a base level of CVC capacity included. Service providers also benefit from a lower CVC price for additional capacity purchased for these services.

NBN Co's projected revenue growth is heavily reliant on an increase in take-up of these higher speed services in the long-term and may have been a driver of the recent price and product changes.[246] However, we note that NBN Co CEO, Bill Morrow, recently admitted that these price discounts may make it difficult for NBN Co to reach its average revenue target by 2021.[247]

As stated in NBN Co's current Corporate Plan for 2018–2021 and shown in figure 5.2, NBN Co estimates that by 2021 there will be greater take-up of higher speed plans, particularly 50 Mbps services.

243   ACCC, NBN Wholesale Market Indicators Report, 30 December 2017, viewed on 14 March 2018.
244   On the copper network, only service provides acquiring wholesale ADSL services are exposed to this demand risk.
245   Communications Day, *NBN margin uncertainty causing Vocus to drive customers towards lower speeds*, 15 June 2017, p. 3.
246   NBN Co, Corporate plan 2018, p. 53.
247   Jennifer Duke, NBN chief admits it is 'unlikely' to hit revenue per user target, Sydney Morning Herald, 12 February 2018.

Figure 5.2: NBN Co projections of wholesale speed tier mix[248]
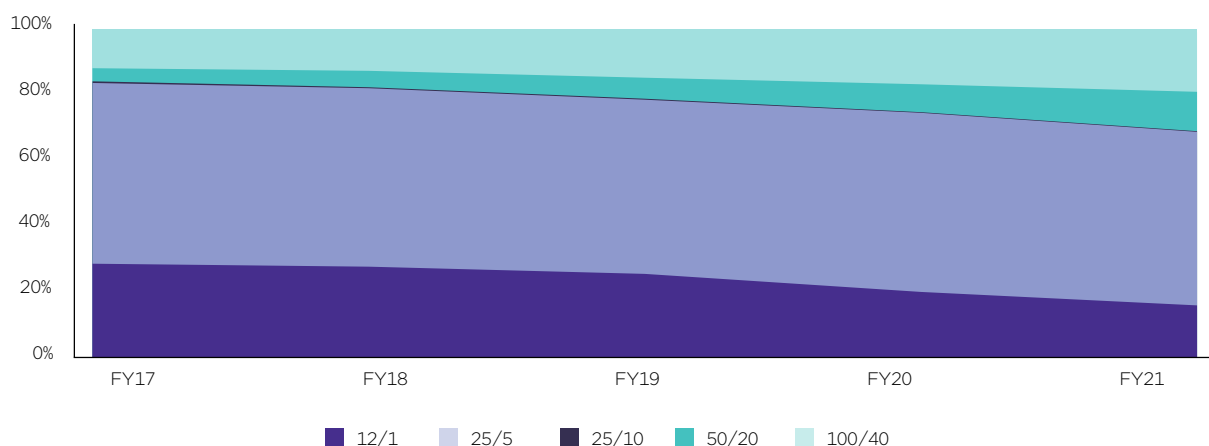
We have seen some early industry response to NBN Co's pricing changes. Several service providers have commenced marketing new products and passing through some of the wholesale price discount to consumers through lower prices or increased speed for no additional charge.

At this stage, it is too early to examine the ongoing impacts of these pricing changes as they were only introduced in mid-December 2017. We will continue to monitor these developments to ensure that the intended outcomes are achieved, in particular that wholesale discounts are being passed through to consumers, and that consumers are benefiting from greater capacity provisioning across all services.

In the Draft Report, we discussed our observations that service providers appeared to be engaging in strong price competition at the expense of service quality and performance across all speed levels.

In submissions to the market study Issues Paper and at the market study stakeholder forum in July 2017, service providers contended that the cost of supplying broadband services on the NBN was too high. Service providers contended that even at lower speed tiers given growing intensity of use, meeting the data usage needs and service quality expectations of consumers, at NBN Co's existing prices, exceeded consumer willingness to pay for the service. While this may be exaggerated in the short-term given the current level of price competition and the principle of 'no price shock'[249] for consumers in the migration period, it is likely that the cost of growing usage on the NBN will continue to put pressure on service providers to make similar price-quality trade-offs in the future.

In summary, the current prevalence of low speed NBN plans may be influenced by a range of factors, including but not limited to:

- service providers not previously competing on speed and service performance
- prices of wholesale NBN services
- consumer reluctance to pay more for speed given perceptions about poor speed and service performance
- a lack of consumer awareness or understanding about their speed needs and the different options available (discussed further in section 5.4)
- a consumer preference for lower speeds at this time given the limited high bandwidth applications (such as 4K TV) available, or
- for some consumer segments, a preference for low speed services (such as low data-users or voice-only consumers).

As discussed, since the Draft Report, NBN Co has sought to address some of the wholesale pricing concerns through its new pricing approaches. There has also been some action taken by the ACCC, industry and the Government to try to address some of the consumer issues.

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248 Jennifer Duke, NBN chief admits it is 'unlikely' to hit revenue per user target, Sydney Morning Herald, 12 February 2018.

249 'no price shock' refers to the objective of ensuring that consumers were not made worse off in migrating to the NBN in terms of higher prices for comparable services.

We are continuing our work in relation to the broadband speed claims guidance and the broadband performance monitoring and reporting program.[250] These initiatives seek to increase consumer awareness and understanding of NBN speeds, as well as increase the incentive for service providers to improve their peak hour speeds and performance. Since the Draft Report, we are encouraged that a number of service providers have updated their websites to provide consumers with information about achievable peak speeds and provided clearer information about different speed tiers. We consider that those service providers who have not yet moved to provide typical busy period speed information to consumer should do so to achieve greater transparency around broadband speeds.

The Government, with the ACMA, is also undertaking initiatives to improve consumer experience on the NBN and address consumers' reluctance to pay for speed given perceptions about poor performance. These initiatives (which are discussed further in section 5.4), in conjunction with our Measuring Broadband Australia program (which released its first report in March 2018), may also encourage greater take-up of higher speed NBN services in the future.

5.1.2   Wholesale prices of NBN services

The wholesale prices of NBN services has attracted significant attention in the market study, as well as more broadly across industry and the media, particularly in the past six months.

The NBN pricing construct was designed as a two-part tariff to balance the competing needs of NBN Co to encourage take-up (AVC charge) and usage (CVC charge) over time to generate sufficient revenue to recover its efficient costs of investment. A key effect of these pricing arrangements is that NBN Co's ability to generate enough revenue to recover its efficient costs over time is highly dependent on future traffic growth and uptake of higher value services. This in turn places the revenue sufficiency risk with NBN Co.[251] Service providers are able to differentiate their service quality and performance from each other by provisioning different levels of CVC. Insufficient CVC leads to network congestion resulting in slow speeds for the consumer.

While there are currently some transitionary issues relating to co-existence with the legacy network services that may be impacting the quality of some NBN broadband services, the level of CVC provisioned by service providers appears to have significantly contributed to poor consumer experience on the NBN. This was evidenced through lower than anticipated actual speeds, particularly at peak times across all speed tiers, which if unresolved in the longer term may have ongoing implications for consumer outcomes and competition on the NBN.

The price level and structure of NBN access service charges is contained in NBN Co's SAU, approved by the ACCC in 2013. In accepting NBN Co's original SAU, we considered that end users should not be made worse off by virtue of their transition to the NBN, in particular that there was no 'price shock' for end users during the migration.[252] We considered that the initial price levels for AVC and CVC were reasonable as they were broadly similar to functionally equivalent copper and HFC based access/wholesale services at the time. However, we noted that there were differences between the copper network and the NBN. For example, service providers acquiring ULLS access services on the copper network were required to install their own equipment (DSLAM) in the exchange, an additional investment not required for NBN access services.

During the market study, service providers expressed concerns that consumer behaviour and demand for data had changed significantly since NBN Co's AVC-CVC price construct was originally developed, with data usage rising faster than anticipated, placing more emphasis on the CVC charge (creating higher costs for them) sooner than expected. This increase in data demand is commonly attributed to the mainstream introduction and substantial uptake of video on demand streaming services such as Netflix and Stan, and is expected to continue to increase rapidly in the future.

As discussed, we consider that NBN Co has responded constructively to address industry concerns with its most recent pricing changes and these have produced some positive results. At this stage, it is too early to assess the full impacts of NBN Co's new pricing approach. We will continue to monitor the outcomes of this new approach to ensure that the underlying issues are resolved in the longer term.

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250 See the ACCC's Broadband performance monitoring and reporting program.
251 Revenue risk is the risk that a potential event or condition that negatively impacts future revenue, it can be internal or external.
252 ACCC, ACCC Draft Decision on the Special Access Undertaking lodged by NBN Co on 18 December 2012, April 2013, p. 104.

In particular, as illustrated in NBN Co's most recent Corporate Plan for 2018–21, the future growth in data demand is forecast to be 20 to 30 per cent year-on-year to 2025.[253] This expected growth is attributed to the evolution of the IoT as well as adoption of more data heavy applications (including artificial intelligence and robotics, 4K and 8K TV, augmented reality and virtual reality technologies).[254] As a result, the costs of supplying data on a broadband service will continue to increase and be borne by service providers or consumers.

NBN Co has also stated its longer term intention to reduce CVC prices as traffic increases across the network over time.[255] We consider it is important to ensure that these price reductions are timely and sufficient to support the significant increase in data download/traffic expected in the near future. As demand for data capacity and intensity of use, and service quality increases, more CVC will be required, which will greatly influence the overall cost of NBN services, despite current discounts available.

In the Draft Report, we discussed the different discount models offered by NBN Co in relation to CVC. We have updated our analysis to reflect recent changes to NBN Co's pricing and product offers.

As shown in figure 5.3, there are several discounts available to service providers. The dimension based discount model for service providers (DBDR) is still available, there is a new 50 Mbps promotion offer, as well as two new bundle products for 50 Mbps and 100 Mbps services. We have estimated the different costs of these services based on CVC of 1 Mbps for 25 Mbps services, 2 Mbps for 50 Mbps services and 2.5 Mbps for 100 Mbps services (for consistency with the new bundled products). The DBDR effective price reflects the price of the industry average CVC per AVC of 1.107 Mbps (as at September 2017 prior to the introduction of the new CVC discount), which corresponds to a price of $14.25 per Mbps. We note these costs are indicative only and may not reflect prices paid by all service providers.

We note for the DBDR prices and the 'Focus on 50' that the CVC included per AVC is 50 per cent greater than the listed price or the bundles due to the promotional CVC boost currently in place.

Figure 5.3: AVC and CVC cost comparison of different NBN wholesale price schemes[256]

We can observe that the new 50 Mbps and 100 Mbps bundles that are expected to be introduced later in 2018, are offered at a similar price point to the next lower speed tier. This enables service providers to offer a better service to customers for a similar price to that currently being paid by the service provider and customer. We note that NBN Co's long-term approach to pricing is still being finalised.

At the time of writing the Draft Report, most service providers were not actively offering a 50 Mbps service to customers.

Since the Draft Report, we have observed new offerings from service providers, with some heavily promoting the 50 Mbps service. TPG, for example, has replaced its 25 Mbps offers with 50 Mbps. Telstra has started to actively market the 50 Mbps product, whereas it previously only promoted 25 Mbps

253 NBN Co, Corporate plan 2018, p. 40.

254 ibid.

255 NBN Co, Corporate Plan 2012–15, p. 67.

256 ACCC estimates based on public information.

offers. In contrast, MyRepublic has moved from only offering 100 Mbps services, to offering both 50 Mbps and 100 Mbps services, most likely in response to NBN Co's new products and price discounts.

For retail prices observed in January 2018, we have examined the proportion of NBN wholesale costs for the new bundle products (50 Mbps and 100 Mbps) compared to retail prices, shown in table 5.2. We have also estimated a wholesale cost for AVC and CVC under the DBDR price scheme as a baseline for comparison.

To estimate the wholesale cost under DBDR, we used the industry average level of CVC per AVC to estimate the DBDR CVC price. As such, we estimate that the wholesale cost of AVC and CVC components for a 50 Mbps product would be $62.50 (including 2 Mbps CVC) and $73.63 for a 100 Mbps product (including 2.5 Mbps CVC).[257]

We find that at the bundle prices, the wholesale (AVC and CVC) NBN costs represent a lower proportion of total retail price than other dimension based discount schemes, such as DBDR.

However, we note that our assumptions, particularly the CVC level and hence cost under DBDR, may not reflect the actual cost for these service providers, given the discount varies depending on the amount of CVC that each service provider purchases.

We will continue to observe the impacts that these new products have on the market to ensure that consumers benefit from these wholesale discounts in terms of lower prices as well as better quality services.

Table 5.2: Analysis of wholesale costs and retail prices on the NBN[258]

Speed tier	Service Provider	Retail price (unlimited data)	Wholesale bundle cost	Bundle cost as proportion of retail price	Wholesale cost for AVC and CVC estimated under DBDR	DBDR estimated wholesale cost as proportion of retail price
50 Mbps	Telstra	$99	$45	45%	$62.50	63%
	Optus	$80	$45	56%	$62.50	78%
	Vodafone	$70	$45	64%	$62.50	89%
	TPG	$69.99	$45	64%	$62.50	89%
	iiNet	$79.99	$45	56%	$62.50	78%
	Dodo	$79.99	$45	56%	$62.50	78%
	MyRepublic	$69.99	$45	64%	$62.50	89%
100 Mbps	Optus	$100	$65	65%	$73.63	74%
	Vodafone	$95	$65	68%	$73.63	78%
	TPG	$89.99	$65	72%	$73.63	82%
	iiNet	$99.99	$65	65%	$73.63	74%
	My Republic	$84.99	$65	76%	$73.63	87%

5.1.3 Consumer expectations and willingness to pay

With respect to communications services such as voice and broadband, experience has taught consumers to expect more for less, particularly when it comes to broadband and technology services in general, such as laptops, mobile phones, etc. As discussed in section 4.1, the price of broadband services has remained relatively stable in recent years, while data inclusions have grown substantially.

On the NBN, consumers have been led to expect higher speeds at similar price points to their legacy broadband service. At present, consumers are seeing limited variation in speed between legacy broadband services (up to 24 Mbps) compared to low speed NBN plans (up to 12 or 25 Mbps). However, consumers are paying similar prices for these services, according to Roy Morgan Research. As shown in figure 5.4, an Australian household's monthly expenditure on fixed broadband services in 2016 was broadly equivalent for ADSL broadband services and broadband services supplied over the NBN.

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257 Using the industry average CVC per AVC for September 2017 of 1.107 Mbps, we estimate the CVC price per Mbps to be $14.25.

258 Estimates based on information from company websites and NBN Co discount notices.

The majority of households appear to spend between $30 and $69.99 a month[259] with 62 per cent of households on ADSL and 57 per cent of households on NBN falling in this range. This aligns with the current retail broadband service offerings, as discussed in section 4.1, with the price of most broadband plans on the NBN observed falling between $40 and $80 per month depending on data quota and speed tier. Higher speed plans (100 Mbps) observed in the market range from around $80 to $120 per month.

Figure 5.4:   Australian households' monthly expenditure on fixed broadband for ADSL and NBN for 2016[260]
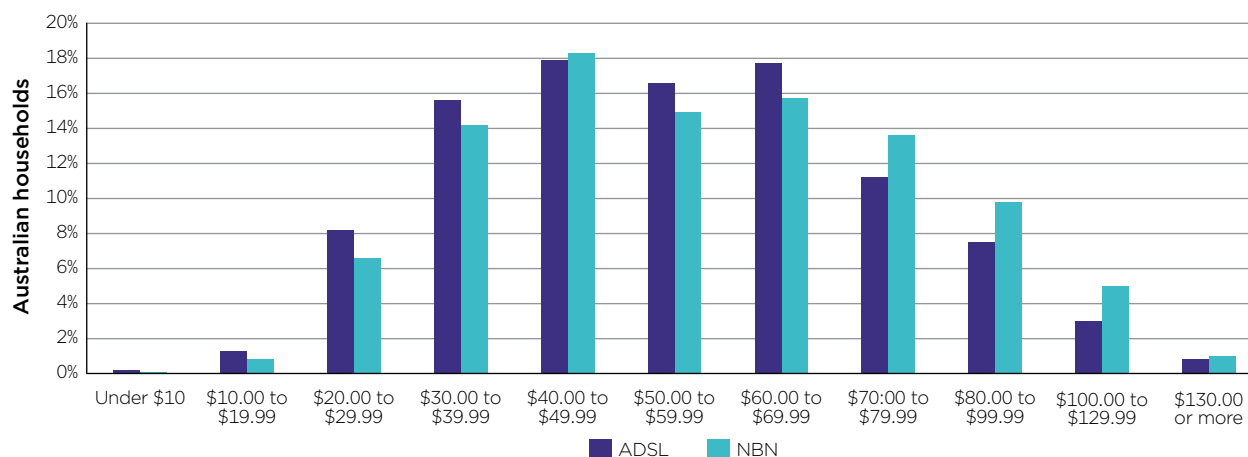
In this context, we note that at present, there does not appear to be significant consumer appetite to pay for higher speed services on the NBN. This is evidenced by the low take-up of higher speed NBN services and as such, consumer willingness to pay for additional speed is unclear.

We have heard from some service providers during the market study that many consumers are unwilling to pay more for broadband services and are expecting an NBN service at the same price point as they have paid for legacy services. NBN Co disagrees with this view and has referred to research it has undertaken that indicates a willingness by consumers to pay more for fast broadband and that service providers could be more pro-active in promoting higher speed services in their marketing.

In contrast, international research about consumer willingness to pay for broadband services has found varied results. One study in the United States estimated that the average willingness to pay for an increase in download speed by 1 Mbps was $2.[261] Other studies found evidence that the willingness to pay decreases rapidly after a certain threshold. For example, a 2017 US study,[262] found that households valuation of bandwidth is highly concave with relatively little added value beyond 100 Mbps.[263] This study found that households on average value increasing bandwidth from 25 to 50 Mbps at $14 ($0.57/ Mbps), from 50 to 75 Mbps at $8 ($0.32/Mbps), from 75 to 100 Mbps at $4 ($0.16 Mbps), and from 100 Mbps to 1 Gbps at $19 ($0.02 Mbps).[264]

It is possible that consumers do not yet have a need for vastly higher speeds given the limited high bandwidth applications currently available. However, we also consider that the question of consumer willingness to pay for higher speed services in Australia is linked to the issue of consumer dissatisfaction with the speed of their NBN service and will become clearer with improved consumer information.

259 Roy Morgan Single Source (Australia), January to December 2016, n=30 875, Australian Households.

260 Roy Morgan Single Source (Australia), January to December 2016, n=30 875, Australian Households.

261 Peterson, Richard, Paying for speed: Measuring Willingness to Pay in the U.S. Broadband Markets, 31 October 2017, p. 6.

262 Liu, Prince and Wallsten, Distinguishing Bandwidth and Latency in Households' Willingness-to-Pay for Broadband Internet Speed, Technology Policy Institute, August 2017.

263 Liu, Prince and Wallsten, Distinguishing Bandwidth and Latency in Households' Willingness-to-Pay for Broadband Internet Speed, p. 1.

264 ibid., p. 5. Note these prices are in USD.

5.1.4   Aligning NBN Co and service provider incentives

In this section, we consider to what extent the incentives of NBN Co and services providers are sufficiently aligned in the immediate and longer-term so that issues surrounding CVC pricing might be commercially resolved or may instead require further regulatory or policy action.

Reflecting the trends affecting CVC usage as discussed above, one of the notable features of the financial performance of the NBN to date is that it has largely met its original revenue target for CVC charges, despite its connections being below target. By contrast, it has earned substantially less revenue than forecast from AVC charges due to the number of connections and the take-up of higher speed plans being much lower than expected.[265] This is shown in table 5.3.

Table 5.3:   AVC and CVC revenue forecasts and estimated actuals for 2016–17*[266]

	2016–17 forecast ($m)	2016–17 estimated actual ($m)	Difference
AVC revenue	1700	640	–62%
CVC revenue	375	346	–8%

* Excluding fixed wireless and satellite services.

We consider that there is alignment of incentives between NBN Co and service providers to resolve the CVC pricing issue to the extent that lower CVC charges may result in increased revenues, and particularly average revenue per user (ARPU) for NBN Co as a result of service providers selling more NBN connections, buying more CVC per AVC to improve performance and moving customers to more expensive higher speed AVC plans.

At this stage, there appears to be considerable scope for NBN Co and service providers to continue to work cooperatively to encourage these outcomes given that NBN Co's connections and its overall revenue and profitability are well behind initial forecasts. Further NBN Co has retained (although reportedly pushed back) its objective of progressively increasing its ARPU to $52 per month from its current level of $44 per month despite its recent pricing changes, so it should be interested in measures to increase the amount of CVC purchased per customer and promote the take-up of higher speed plans.[267]

As discussed above, we consider that there are also likely to be transitional factors that are preventing greater take-up of connections or higher speed plans that will diminish in due course. These include:

- the 18-month period for migration of services from the legacy network infrastructure that slows the need for consumers to transfer and allows service providers to keep consumers on legacy networks where they can earn higher margins
- service providers not wishing to risk losing market share by pricing greater than customers' legacy plans when they move to the NBN, so transitioning people at base-level plans to avoid causing initial bill-shock.

The momentum toward higher speed plans is also expected to occur as more legacy HFC customers move to the NBN given that recent experience suggests these customers are more prepared to pay for these products to retain the speeds they are already receiving.[268]

However, looking further ahead, we would not expect NBN Co and service providers' incentives will be fully aligned, given the tension between upstream and downstream firms in the supply chain and NBN Co's position as a monopoly provider of upstream bottleneck services. Its monopoly position means NBN Co is more likely to maximise profits than to maximise output to serve the interests of service providers (or in the case of a government-owned monopoly possibly, be more prone to cost inefficiency in the absence of strong capital market disciplines or efforts to replicate these via proxy mechanisms). Our regulation of NBN Co under the SAU is designed to help address these issues.

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265 The lower than forecast AVC revenues also reflects that the build schedule in terms of premises passed is behind the 2010 forecast. There is therefore scope for AVC revenues to rise as the number of premises passed rises towards the original target over time.

266 NBN Co, Corporate Plan 2010 and Exhibit 9.5, NBN Wholesale Broadband Agreement Price List and ACCC NBN Wholesale Market Indicators Report December 2016.

267 NBN Co, Corporate Plan 2018–21, p. 53 and Half Year Report for the Six Months ended 31 December 2017, p. 22 and Jennifer Duke, NBN chief admits it is 'unlikely' to hit revenue per user target, The Sydney Morning Herald, 12 February 2018.

268 Based on data in the ACCC's *Wholesale Market Indicators Report*, June 2017, customers supplied on NBN HFC purchase a higher percentage of 50/20 Mbps and 100/40 Mbps services than FTTN customers.

This in turn raises the issue of whether that regulation is sufficient to align incentives. The 30-year period of the maximum revenue constraint means that NBN Co has considerable leeway to earn revenue sooner rather than later if demand exceeds expectations. This may encourage NBN Co to charge significantly above costs in the nearer term. This seems to have been reflected in CVC pricing to date, with substantially higher than anticipated demand for CVC capacity likely to have allowed NBN Co to keep the CVC price well above the level required to recover the costs of supplying the additional capacity.[269]

A more immediate issue is whether the current SAU prices that were set to recover the costs of installing FTTP technology are appropriate for the recovery of the costs of the MTM services. This issue is currently subject to an SAU variation submitted by NBN Co that we are considering, and is discussed further in section 5.1.5.

We consider that there are some further points to be made about NBN Co's status as a government-owned monopoly (as opposed to a privately owned monopoly) reducing its incentive to operate efficiently. The proposition is broadly supported by the absence of the threat of takeover for a government-owned business that exists for a private firm.[270] As a consequence, there may be less discipline over management to contain costs and price dynamically in the interests of profit maximisation than exists in a private monopoly firm. On the other hand, we note that as a new business, NBN Co has been subject to a high level of expenditure scrutiny by the Government. It is also subject to ongoing economic regulation via the SAU.

We also observe that under government ownership, there is potential for policy imperatives to be imposed on NBN Co. These might work against the interests of service providers by adding to their costs (such as by requiring universal supply of services discussed here). Alternatively, policy considerations might be used to favour service provider interests, such as the possibility of the Government directing NBN Co to sacrifice commercial imperatives to drive further take-up of NBN services.

The potential downsides of government ownership suggest that improved cost efficiency could be delivered by privatisation. However, in the absence of significant network competition, improved pricing outcomes for service providers will require ongoing regulation of NBN Co to contain monopoly profits.[271] We would also expect privatisation to be directed at improving efficiency outcomes within the markets in which NBN Co operates, and in downstream markets, rather than in seeking to provide NBN Co with regulatory protections from competition directed at maximising its sale price.

We consider there is a higher level question as to whether all the costs NBN Co has incurred in constructing the NBN can be feasibly recovered from its customers. This particularly concerns NBN Co's requirement to supply non-commercial fixed wireless and satellite services to rural and regional areas of Australia as a consequence, of the requirement imposed on it to provide high-speed broadband services to the entire population of Australia. This is estimated to add $9.8 billion to the net costs of the roll out until 2040, which under NBN Co's original mandate to charge nationally uniform prices, was to be funded by cross-subsidies and is estimated to add around $8 per month to the per customer costs of NBN services in the absence of a contribution by other fixed line providers.[272, 273] This is in the context of Australia's large land mass and low population density particularly outside the capital cities, making delivery of communications more expensive per premises relative to other countries including the United States, UK and New Zealand.[274]

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269 We note NBN Co's entry level AVC prices were not set to be fully cost-reflective to help encourage take-up of NBN services, with at least some of the shortfall to be recovered by the anticipated demand for CVC at prices that would be expected to recover more than the costs of CVC provisioning over time. This only tempers our proposition about cost over-recovery given that demand for CVC has been much higher than originally anticipated. See NBN Co, *Supporting Submission NBN Co Special Access Undertaking*, 28 September 2012, pp. 100, 113–114.

270 J Vickers and G Yarrow, *Privatization—An Economic Analysis*, The MIT Press, p. 7.

271 ACCC, *Privatisation of state and territory assets and new infrastructure*, Submission to the Senate Economics References Committee, 29 January 2015, p. 3.

272 Bureau of Communications Research, *NBN non-commercial services funding options*, Final Report, March 2016, pp. 7, 70 table 11.

273 The prices paid for NBN services may not be sufficient to recover more than long-run incremental costs in commercial areas at present, but as that is the intention over the term of the SAU, which goes to 2040, we expect there will be a cross-subsidy for non-commercial services in total over this time.

274 D Geradin and M Kerf, *Controlling Market Power in Telecommunications*, Oxford University Press, 2003, p. 63.

These coverage and cost factors, and their funding via cross-subsidies, can help explain why retail broadband prices are higher in Australia for equivalent services than many other countries as illustrated by a recent international comparison compiled by the United States Federal Communications Commission using 2017 price data (see table 5.4). These higher prices may undermine the international competitiveness of Australian businesses that are reliant on broadband services. It may also reduce the take-up and use of high-speed NBN fixed line broadband services by residential consumers in metropolitan areas.

Table 5.4: **International comparison of high-speed standalone fixed broadband prices (download speed of at least 25 Mbps and less than 100Mbs)[275]**

Rank	Country	Monthly charge in $USPPP	No. plans
1	Finland	31.85	19
2	Japan	35.21	10
3	Denmark	36.59	10
4	Belgium	37.35	4
5	Germany	41.06	15
6	Estonia	43.43	8
7	Austria	44.44	10
8	Greece	44.71	10
9	Sweden	45.83	10
10	Switzerland	47.15	12
11	Latvia	47.76	1
12	Portugal	47.85	2
13	Netherlands	49.72	6
14	Czech	51	5
15	Chile	54.26	12
16	United Kingdom	55.17	36
17	New Zealand	59.61	20
18	United States	61.78	30
19	Australia	65.22	69
20	Spain	69.65	21
21	Canada	69.65	20
22	Norway	70.18	12
23	Mexico	75.39	4
	Average	**51.52**	**346**

The NBN's structural cost issues outlined above could suggest that in the medium term, part of the answer to addressing concerns about high NBN pricing and aligning incentives of NBN Co and service providers may require Government policy changes. We discuss some potential options in section 5.1.5.

We note that a potential external constraint on the pricing and funding issues discussed above, and which would aid in better aligning incentives between NBN Co and service providers, is the potential for increased substitution of competing fixed wireless and mobile services for NBN services (the prospects of this are discussed in section 6.1). However, we consider this will occur in a timeframe of several years rather than in the immediate future. Furthermore, to the extent that substitution is driven by distortions

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275 FCC, *International Broadband Data Report*, Sixth Report, 2 February 2018, table 1b.

in NBN Co's pricing such as those arising from cross-subsidisation of non-commercial services, it could involve substitution that is economically inefficient.

In addition, we note that our initiatives such as the misleading speed claims enforcement actions, broadband speed claims guidance and Measuring Broadband Australia should also help to better align the incentives of service providers and NBN Co in relation to providing improved service quality. These initiatives are expected to increase consumer awareness of service quality issues and may encourage service providers to supply better quality services, by acquiring more NBN CVC capacity and promoting higher speed plans if consumers become more willing to pay more for better performing retail services.

5.1.5 Actions for addressing pricing issues

In this section we outline an immediate regulatory response and potential longer-term approaches for addressing the pricing concerns identified in the preceding sections.

In our Draft Report, we noted the importance of NBN Co having flexibility in order to set prices that create incentives for the economically efficient use of the investment in the NBN by encouraging uptake of higher speed services and greater CVC provisioning by service providers. We also noted that NBN Co was in the process of engaging with service providers about changes to its wholesale access prices as part of its Pricing Evolution Project. Our view was that NBN Co and service providers should be allowed an opportunity to reach an agreed outcome in regards to wholesale pricing within the existing regulatory framework.

Submissions to the Draft Report

Submissions from several service providers and other industry stakeholders agreed that NBN Co and service providers should be allowed an opportunity to work constructively to address issues raised about NBN wholesale access pricing within the existing regulatory framework.

Since the Draft Report, NBN Co has implemented a temporary pricing initiative under which it offers rebates on AVCs that have a headline speed of 50 Mbps, and boosts contracted CVC to participating access seekers.

NBN Co has also announced longer-term pricing initiatives that may effectively rebalance AVC and CVC prices to some extent, as well as provide access seekers with greater certainty as to their input costs should busy hour demand for network capacity continue to increase.

In response, orders for AVCs with a headline speed of 50 Mbps or more increased by nine percentage points (quarter on quarter) to reach 25 per cent, with most of this growth attributed to end users selecting a higher speed plan at newly introduced retail prices.

Importantly, contracted CVC capacity also increased by 37 per cent (quarter on quarter),[276] with a corresponding drop in network utilisation as a percentage of contracted capacity, and average network capacity (bandwidth) congestion reducing 25 fold (on half yearly basis), from close to five hours to around 12 minutes.[277]

These developments are welcome and have alleviated, for the immediate term at least, long held concerns that NBN Co pricing was leading to inefficient use of its network.

We will continue to watch as NBN Co delivers, in close consultation with its customers, new longer-term product and pricing initiatives and resume consideration of its proposed SAU when that work is sufficiently advanced.

Action 3

We will carefully consider the effectiveness of NBN Co's longer term price changes under its Pricing Evolution initiative in promoting the efficient use of the network and the long-term interests of end users. We will take these matters into account in our consideration of NBN Co's proposed variation to the Special Access Undertaking.

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276 ACCC, NBN retailers acquired 37% more CVC, media release, 8 February 2018.
277 NBN Co, How we're tracking: February 2018, viewed March 2018.

In the Draft Report, we also expressed concern that NBN Co's commercial incentives and regulation may not be sufficient to lead to the efficient pricing of NBN Co's services in the medium to longer-term.

We cited the complex task and multiple objectives that NBN Co has as a government business enterprise that is operating and upgrading the network, while introducing significant industry reform. We also cited the uncertainty NBN Co faces over demand for its services and the level of revenues that it will have to achieve through its business activities in order to provide a return to the Government.

We raised the possibility that in the absence of sufficient demand for its services and revenue growth, there could be a need for Government intervention to enable NBN Co to charge lower prices for services. Possible measures could include direct budget funding arrangements for non-commercial services, debt relief measures or an asset revaluation.

Submissions to the Draft Report

Telstra, Optus, TPG, Vocus, Macquarie Telecom and Regional Development Australia (NT): Support our Draft Report assessment that additional measures could be taken by the Government to enable NBN Co to charge lower prices for its services.

The Department of Communications and the Arts: Argues these measures are inconsistent with Government policy and that a write-down in the value of the NBN assets can only be initiated by NBN Co and would not affect the internal rate of return (IRR) of the Government's investment in the NBN. It further states that as there will be no effect on the Government's IRR, there will be no effect on NBN Co's prices.

We had raised asset revaluation as a possible means by which NBN Co could provide itself with additional pricing flexibility, as well as certainty to access seekers, noting that this is a standard practice of capital intensive private enterprise firms where financial targets are not being realised.

We acknowledge, however, that NBN Co has started down the path of revising its product and pricing offers without the need to revalue its assets, and that it is possible that it has sufficient flexibility to go further without having to pursue such a revaluation, given its financing arrangements and long-term nature of its business.

We also acknowledge the views that the Government has provided, including that the valuation it adopts from time to time of its investment in NBN Co[278] is not directly relevant to the level of discretion that NBN Co has in pursuing product and pricing initiatives. We note in particular that the valuation of NBN Co's assets on its books does not directly affect the internal rate of return (IRR) that the Government expects to realise on its investment[279] nor the IRR separately reported by NBN Co.[280]

However, the response from the Department of Communications and the Arts does not remove the possibility that other actions could be taken by the Government to provide NBN Co with greater price flexibility by adjusting the timing and quantum of costs to be recovered through prices, such as debt relief measures and budget funding of non-commercial services.

We expect that NBN Co will continue to operate in a complex environment over the medium term, and so will need to continue to balance its potentially competing objectives of providing a return on investment and encouraging efficient use of its network. In striking this balance, it is our view that NBN Co should preference product and pricing initiatives that encourage greater uptake and use of its network services, even should these come at a cost to how quickly it can provide a full return to the Government.

We also continue to see considerable benefit in NBN Co adopting financial forecasts or targets in its published business plans and financial reports that are consistent with such a flexible approach to product and pricing. This can provide more certainty to access seekers as to NBN Co's longer-term

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278 DoCA values its net investment in the NBN at $16 billion (see DoCA, *Annual Report 2016/17*, p. 115). NBN Co's most recent gross asset value is $26 billion (see NBN Co, Half-Year Report for the six month ended 31 December 2017, p. 21).

279 The IRR for the Government's investment in NBN Co is determined by the payments between the Government and NBN Co, including equity injections, dividend receipts, debt drawdown and repayment, interest payments and the value realised if the Government sells its interest in NBN Co.

280 NBN Co's IRR reflects its actual and anticipated expense and revenue streams over the calculation period (including the assumed terminal value of its assets at the end of the period which it assumes to be six times forecast EBITDA in 2039–40.

pricing intentions, and reduce potential barriers to NBN retail service providers introducing competitive offers, noting that NBN Co has a history of missing its published financial targets.[281]

We would also encourage Government, in its current capacity as financier of NBN Co, to provide suitable support for NBN Co as it seeks to encourage the efficient use of its network, in terms of providing some form of debt relief (including a deferred debt repayment schedule) or direct budget funding of non-commercial services should these be needed.[282]

Recommendation 1

NBN Co should continue to review and adjust its prices to ensure the economically efficient use of the network and the long-term interests of end users, assisted by Government pricing relief measures if required.

5.2 NBN wholesale services standards

This section examines the concerns noted in section 4.3 about wholesale service levels associated with access networks that are used to supply fixed line broadband services and specifically those services supplied using the NBN. In particular, concerns about:

- the wholesale service levels and their appropriateness
- recourse and compensation where NBN Co does not meet wholesale service levels
- coordination and information flows between NBN Co and service providers.

Wholesale service levels impact the fixed line broadband services that a service provider supplies to downstream customers, including those acquiring NBN wholesale aggregation services and consumers (residential and small business).These include NBN Co's contractual commitments to meeting operational outcomes in the delivery of NBN based services that are important to downstream customers such as timeframes relating to connections, faults and appointments.

We note that service providers are the primary party who own the contractual arrangements and relationships with the consumer. During the NBN migration phase, NBN Co may be involved in directly providing services to consumers, for example, NBN contractors may visit consumers' premises to install equipment (which can cause confusion for customers over who is supplying their service). However, even during this phase, the service provider is responsible for supplying fixed line broadband services to the consumer, not NBN Co. In its supplementary submission to the market study NBN Co notes that it is trying to improve service provider and consumer satisfaction by clarifying the roles and responsibilities between NBN Co and service providers.[283]

As noted in section 4.3, service providers are also responsible for making CSG payments to consumers where they are obliged or choose to do so. To the extent compensation and rebates are limited at the wholesale level, service providers are more likely to seek to require consumers to waive their CSG rights in retail contracts to avoid attracting this liability.

The effective provision of retail fixed line broadband services, as with all supply chains, needs to be supported by coordinated operational arrangements and information flows between NBN Co, service providers and the consumer. The underlying wholesale agreements do not need to be transparent to the consumer, but they do need to reflect the shared responsibility between NBN Co and service providers in supplying fixed line broadband services. While supported by commercial agreements, a partnership is required to provide a good consumer experience.

This was a key issue discussed at the market study stakeholder forum in July 2017 where the evolving nature of the NBN services, the degree of complexity associated with migrating customers nationwide to the multi-technology mix network and the number of different parties involved in the supply chain was recognised, along with the need to work together as an industry.

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281 NBN Co has revised down its expected IRR on a number of occasions. See Parliamentary Budget Office, National Broadband Network—Impact on the Budget, Report no. 04/2016, pp. 3–4.

282 We note that NBN Co's CEO has recently signalled a likely delay in the time when NBN Co expects to achieve its ARPU target of $52 to beyond the time stated in its current Corporate Plan of 2020–21. See The Sydney Morning Herald, 12 February 2018.

283 NBN Co, nbn supplementary submission to the ACCC Communications Sector Market Study, 21 August 2017, pp. 16–17.

5.2.1   NBN Co's Wholesale Broadband Agreement

The NBN service levels are set out in NBN Co's Wholesale Broadband Agreement (WBA), which has undergone a number of revisions since it was first put in place, including the incorporation of terms relating to the supply of services under the multi-technology mix model.

At a high level the service levels in the WBA include a number of service levels, performance objectives and operational targets that apply to the products and services that NBN Co supplies. These include:

- Specific service levels for connections, appointments, activations, fault rectification, modifications, order processing and completion, availability and disconnections service levels. These are generally represented by timeframes such as business days or hours (for example, new FTTP connections in urban areas where a new lead-in is required at the end user premises are to be completed within 14 business days). The service levels typically differ depending on the type of activity, location of premises, extent of the physical infrastructure available at the premises and the network technology used (e.g. FTTP, FTTN, wireless, etc.). There are also various performance objectives, represented as percentages, that NBN Co will aim to achieve in meeting its service levels overall (e.g. for all standard connections, NBN Co will aim to meet its service level at least 90 per cent of the time) operational targets that are aspirational and non-binding.

- Requirements to take corrective action if a service level or performance objective is not met. These are not breaches of the WBA. Rather, if NBN Co does not achieve a performance objective it will:
  - inform the customer for reasons for the failure provide the customer with a corrective action plan that sets out relevant corrective action to be undertaken
  - undertake the relevant corrective action, and notify the customer once corrective action has been taken.

- In limited circumstances, service providers may claim CSG compensation or commercial rebates where NBN Co has failed to meet a service level. However, the ability to claim rebates or CSG compensation is limited to a number of service level standards. Further, a number of conditions attach to a service provider's eligibility to claim compensation. For example:
  - In all cases, the obligation rests on the service provider to initiate the process to claim a rebate or compensation, rather than being an automatic process.
  - A service provider's eligibility to claim a standard connection rebate is not a direct multiplication of the number of times the connection service level is not met. The rebate is linked to a forecast factor such that if a service provider's forecast for connection is inaccurate to a specified extent, the rebate is reduced.
  - CSG compensation is limited to accelerated connections, end user fault rectifications and appointments for end user connections and end user fault rectifications.
  - The service provider must warrant that it has contravened a CSG standard to the consumer and must take all reasonable action to avoid or mitigate its CSG liability. Further, NBN Co may appoint an auditor to audit claims for CSG compensation.

At the market study stakeholder forum in July 2017, service providers raised NBN service levels as an area of concern. Broadly speaking these concerns were:

- The service levels do not represent an appropriate baseline to ensure a positive end user experience particularly around connections, fault rectification, complaint handling.

- There is insufficient recourse to compensation where service levels are not met (several service providers indicated that from their perspective the WBA needed 'more teeth').

- There is inadequate information flows and coordination between NBN Co, service providers and consumers.

It was also noted that without strong measures around recourse and compensation in the WBA, no redress provisions are included in downstream agreements for the provision of NBN wholesale aggregation services to smaller service providers and new entrants.

Practical examples of unsatisfactory information flows and coordination were also raised at the market study stakeholder forum. For example, during the activation phase, service providers indicated that real time information about what is occurring, where issues are arising, what is being done to resolve them and associated timeframes is required. In this regard it was noted that with the increased complexity in the migration phase NBN Co's business to business (B2B) systems do not necessarily provide the

information that will enable service providers to keep customers up to date where there are delays or rescheduling is required.

Since the publication of the Draft Report, NBN Co has implemented a new version of its WBA (WBA 3). This followed a lengthy consultation process with service providers, which had been ongoing since 2015.

Notably, the changes in WBA 3 (which came into effect on 17 November 2017) include a number of new or revised performance objectives and operational targets, a new service fault rebate mechanism, and the ability for service providers to request certain information from NBN Co to assist them in making CSG claims.

NBN Co's supplementary submission to the market study made following the stakeholder forum in July 2017 notes that the service level timeframes contained in WBA 3 for both activation and assurance activities are set by the practical limitations of the rollout (including managing NBN Co's costs appropriately). As a result, NBN Co does not expect material changes to service levels during the rollout period.[284] Instead, NBN Co has noted that it continues to expend significant effort on improving service delivery through several initiatives, for example, the launch in 2017 of its Project Future of Customer Experience, a strategic customer experience program designed to shift service provider and consumer satisfaction.[285]

We consider that NBN service levels should enable a positive customer experience. To achieve this greater transparency is needed around services outcomes, with clear consequences and redress options provided where standards are not met by those best placed to manage the risk so this can flow through to consumers.

We note that since the publication of our Draft Report, NBN Co has published its first customer experience monthly progress report that tracks its performance and includes metrics in relation to installations and fault restoration. The report suggests some recent improvements in NBN Co's service performance.[286]

However, we are still concerned that NBN Co's wholesale service standards do not appear to be supporting a positive consumer experience. In this regard, we note that there are significant numbers of consumers for whom NBN Co is not meeting its service levels, as evidenced by the results of the ACMA's recent NBN consumer experience research.[287]

5.2.2   NBN Wholesale Service Standards Inquiry

As proposed in the Draft Report, on 2 November 2017 we commenced an inquiry into the NBN Wholesale Service Standards to determine whether these standards are appropriate and consider whether regulation is necessary to improve consumer experiences.

We released a discussion paper on 18 December 2017 and sought feedback from industry and other interested parties. The inquiry is ongoing and is expected to conclude in December 2018.[288]

NBN Co's commitments to operational outcomes, while applying at the wholesale level, are a major factor within the NBN supply chain affecting customer experiences and competition in retail markets for NBN services. A key focus of our inquiry will be to consider whether the ACCC should use its powers under Part XIC of the CCA to set regulated terms and conditions of access. In addition, we note that the ACMA is also considering supply chain issues to determine how they affect outcomes at the retail level.

Since the publication of the Draft Report, the Government announced that the ACMA will be implementing new rules that will apply to service providers designed to improve NBN complaint handing, service quality and continuity, and consumer information.[289] This is discussed further in section 5.4.

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284 NBN Co, *nbn supplementary submission to the ACCC Communications Sector Market Study*, 21 August 2017, pp. 16–17.

285 ibid.

286 NBN Co, How we're tracking: February 2018, viewed March 2018.

287 ACMA, NBN consumer experience—residential research snapshot, ACMA, March 2018.

288 Further detail about the NBN wholesale service levels Inquiry is available on the ACCC website.

289 Senator the Hon Mitch Fifield, Boost to broadband consumer protections, 21 December 2017.

We will consider the views from submissions to the Draft Report in the context of the current NBN Wholesale Service l Standards Inquiry.

We have updated the proposed action from the Draft Report to reflect the commencement of our inquiry into NBN Wholesale Service Standards.

Action 4

We will continue our inquiry into NBN Wholesale Service Standards to determine whether current wholesale standards are appropriate, and to consider whether regulation is necessary to improve consumer experiences.

As part of the inquiry, we will examine whether there are appropriate incentives for NBN Co to remedy service failures and consider the adequacy of compensation available to service providers to enable them to provide appropriate consumer redress.

5.3 Critical wholesale inputs for the supply of fixed line broadband services

Beyond access, wholesale aggregation, transmission and dark fibre services are essential components in the communications supply chain enabling (fixed and mobile) broadband services to be provided to consumers. This section discusses the potential competition and efficiency issues raised in sections 4.3 and 4.4 in relation to these services as they are used to supply fixed line services.

Another important component enabling the supply of fixed line and mobile broadband services is internet interconnection services, which is also discussed.

5.3.1 NBN wholesale aggregation services

NBN wholesale aggregation services are replacing wholesale ADSL services and supply of these services is evolving as rollout of the NBN continues and the number of NBN services in operation increases. These services are a key input for particular service providers supplying retail fixed line broadband services, in general representing over 50 per cent of the costs of supplying these services,[290] and as a result potential competition issues have the ability to impact the downstream retail market.

As outlined in section 4.3, there appear to be two models for service providers connecting to the NBN. There are those service providers that intend to directly connect and are using NBN wholesale aggregation services prior to reaching the scale at which this is commercially viable (we have described

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290 Responses to ACCC survey in relation to NBN wholesale aggregation services. Of the 12 service providers surveyed, two said that the costs represented less than 50 per cent of the costs to supply a fixed line broadband service; three said the costs represented 50–75 per cent and six said the costs are greater than 75 per cent of the costs.

these as tier 2 service providers) and those service providers that do not intend to directly connect and will use NBN wholesale aggregation services on an ongoing basis (tier 3 service providers). The supply of NBN wholesale aggregation services has an important role to play in both the 'stepping stone' model (for tier 2's) and reseller model (for tier 3's) (the latter, particularly where a Layer 3 service is acquired, being similar to the MVNO model in the mobile services market).

As at 30 June 2017, around 5 per cent of all NBN fixed line broadband services were provided using NBN wholesale aggregation services.[291] By comparison, around 10 per cent of mobile services are supplied using wholesale MVNO services. We further note that in contrast to the market for mobile services, the large supermarket chains (Woolworths, Coles and Aldi) and other general retailers with a large national presence have not entered the NBN retail market. This may reflect the additional complexity in supplying services over the NBN during the network rollout.

In seeking to understand this difference, we also note the relatively nascent and evolving nature of the market supplying NBN wholesale aggregation services as compared to wholesale MVNO services. With the NBN only recently exceeding the halfway mark of its rollout and around 3.6 million activations as of the start of March 2018,[292] there is opportunity for the market to continue to grow, as has occurred in the supply of wholesale MVNO services, for product innovation to occur and the possibility of new entrants supplying these services.

The extent to which these developments will occur is unclear and the outcome will reflect an interplay of supply and demand factors in the market. For example, on the supply side the commercial and technical challenges with developing a wholesale network (integration, network sharing, and enabling real time information) may limit the number and types of the NBN wholesale aggregation services available. In addition, integrated wholesalers may be slow to bring wholesale aggregation products to market as they may prefer to supply their retail customers over their wholesale customers. On the demand side, the current complexity and cost faced by service providers seeking to supply NBN services may be limiting entry. Alternatively, this could reflect the absence of a genuinely competitive wholesale market in which NBN wholesale aggregation services are supplied that enable differentiation and downstream competition to occur.

From our survey of service providers acquiring NBN wholesale aggregation services over June and July 2017, 11 out of 12 have concerns in relation to the price and non-price terms and conditions for NBN wholesale aggregation services.

Given the potential impacts of these services on downstream retail fixed line broadband services, this section examines the competition concerns raised in section 4.3 including:

- the pricing of these services, including concerns that NBN price discounts are not being universally passed through
- the limited extent of differentiation between NBN aggregation services and the ability to use them to provide differentiated downstream products
- delays in NBN wholesale aggregation products coming to market compared to equivalent retail services.

As a part of this analysis, we have considered potential supply and demand side issues.

Pricing of NBN wholesale aggregation services, including pass through of NBN CVC discounts

As outlined in section 4.3, there is some evidence that NBN Co's pricing discounts are not being universally passed through to downstream service providers. This may lead to service providers that are reliant on aggregation services facing a price squeeze in retail markets, where they compete with aggregation providers' retail services.

As NBN Co's prices represent a significant proportion of the overall NBN wholesale aggregation service costs, if this is occurring it places the tier 2 and 3 service providers at a relative competitive disadvantage and could limit their ability to viably compete in the supply of retail fixed line broadband services. This is because the vertically integrated providers may be passing through the benefits of NBN Co's pricing changes to their retail customers, but not immediately passing them onto their wholesale customers.

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291 ACMA, NBN consumer experience industry information gathering exercise 2017.
292 NBN Co, Weekly network rollout progress report, for the week ending 8 March 2018, viewed on 14 March 2018.

We note that this may be a timing issue, as when these concerns were raised, NBN Co's retail service provider based discount and 'Focus on 50' discount had only been introduced relatively recently. However, it may also reflect the current market structure and incentives in place. In this regard, the vertically integrated providers have incentives to maximise retail rather than wholesale market shares, given retail service margins tend to be larger. Some service providers have indicated that NBN wholesale aggregation services have very little margin.

This is further illustrated by considering a hypothetical where the NBN wholesale aggregation providers are not vertically integrated. In these circumstances we would expect to see providers actively competing for customers and seeking to pass through any NBN price changes. If they did not, and a competitor did, then this could result in them losing market share.

Some responses to our survey indicated the prices for NBN wholesale aggregation services appeared similar to the retail prices that their wholesale provider has in the market, which would be suggestive of a price squeeze. While we are concerned NBN Co's pricing changes are not being passed through, reflecting the anecdotal concerns expressed to us, we do not have firm empirical evidence to demonstrate that this is the case. Wholesale NBN aggregation service pricing information we have informally obtained to date from service providers also does not enable us to make any conclusions in relation to potential price squeezes.

Reflecting the above concerns, we propose to proceed towards collecting NBN wholesale aggregation pricing information via an RKR. The purpose of this is to enable us to understand whether NBN Co's price changes are being passed through and if so to what extent. An outline of the information we propose to seek is set out later in this section.

Limited differentiation between NBN wholesale aggregation services

As outlined in section 4.3, some tier 2 and 3 service providers have expressed concerns in relation to their ability to use NBN wholesale aggregation services to differentiate their services in the downstream supply of retail fixed line broadband. For example, in our survey, of the eleven service providers with concerns around the price and non-price terms and conditions, seven were concerned that the products did not enable differentiated supply and six had concerns that the products did not meet their needs.[293] At a high level, these concerns related to both the nature of the services provided and the operational information available to support them.

We understand that most NBN wholesale aggregation services are differentiated by headline speed, using NBN Co's speed tiers, e.g. 12/1, 25/5, 50/20 and 100/40 Mbps. However, as noted in section 4.3 it appears many service providers have been unable to acquire services that enable them to supply different levels of CVC provisioning to that which the NBN wholesale aggregation provider supplies to its own retail customers. This means that those service providers that do not have the ability to directly connect to the NBN are unable to supply higher quality retail services than those supplied by the integrated wholesalers.

For example, in our survey of service providers acquiring aggregation services, one service provider noted that while it provides a speed guarantee to its end users, it is experiencing issues delivering that commitment with its NBN wholesale aggregation service.[294] More specifically, the aggregation provider is not supplying sufficient CVC provisioning to the NBN POI, impacting the service its end user customers are receiving. The service provider considers it has provisioned enough capacity to meet its end customers' needs and is being charged for, but is not receiving the service.

In addition to the above concern, the following specific concerns about NBN wholesale aggregation services were noted in our survey:

- inability to manage congestion during peak time and similarly an inability to influence or quickly modify network dimensioning (contention levels)
- limited control and visibility of its customers' experience
- limited reporting and information, including notices from NBN Co which detail planned change activity warnings
- inability to directly interface with NBN ordering and provisioning(B2B) systems

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293 Responses to ACCC survey in relation to NBN wholesale aggregation services.
294 Responses to ACCC survey in relation to NBN wholesale aggregation services.

- inability to utilise all traffic classes available from NBN Co, e.g. TC2 for business services and TC4 peak information rates, e.g. peak information rates greater than 100/40.

There was also concern in relation to the inability to use User Network Interface-Voice (UNI-V), enhanced fault rectification services, multicast and to recover first battery credit, as well as the:

- availability of business centric features including multi-line voice services and enhanced service level agreements
- restrictions in place on the rollout of the service provider's own network directly connected to the NBN and difficulties when time comes to migrate customers onto a service provider's network
- slow activation of services and communication and coordination issues in relation to activation and service assurance stemming from indirect access to the NBN.

Some of these issues may reflect inherent limitations of network services supplied over a shared wholesale network, and others may reflect that we are in a stage of transition with the NBN. However, they could impact the extent to which tier 2 and 3 service providers can effectively compete in the supply of retail fixed line broadband services.

At this stage, we consider that the market may continue to evolve and address some, or all, of the above limitations. This may occur as demand for these services increases, enabling aggregation providers to develop business cases, which support further investment in network infrastructure and related systems and processes. There is also the potential for new entrants to supply these services and compete for customers by offering more differentiated services. This may occur as tier 2 service providers move to a model where they directly connect with the NBN and decide to supply NBN aggregation wholesale services (as Aussie Broadband has done).

While we encourage entry by non-vertically integrated providers of these services, at this stage it does not appear likely. This reflects the significant investment required to develop a presence at all 121 NBN POIs, either via rolling out transmission infrastructure or by entering into long-term agreements with transmission and/or dark fibre providers, as well as the likely low margins and high uncertainty about the future level of demand.

Given the importance of these services, we propose to monitor their development in order to understand whether they evolve to address the limitations noted above. We will also seek to understand any commercial and technical issues that limit the ability of NBN wholesale aggregation service providers to supply more differentiated services that address the above concerns.

Delays in wholesale products coming to market

Concerns have been expressed in relation to how long it has taken for Layer 2 TC2 (business) and TC1 (voice) aggregation services to become available in the market. Similarly, in response to the survey of service providers acquiring NBN wholesale aggregation services, one provider expressed concern about providers not releasing new services at the same time as products are released by NBN Co (e.g. new services like HFC and FTTC). There was also concern expressed that the NBN wholesale aggregation providers decide which NBN capability is passed on to service providers and when.

We acknowledge that although services provided over aggregation services make up only around 5 per cent of the NBN end user market, a number of service providers rely on NBN wholesale aggregation services to supply retail broadband services, making it a critical wholesale input. This is particularly the case in the rollout phase of the NBN when there is active competition for customers as they transition off the legacy networks and onto the NBN.

However, we recognise that there will be a period between when NBN Co makes new services available, and when they are supplied at the retail level, in comparison to when they are made available at the wholesale level. This reflects the fact that providers need to establish the business case supporting the wholesale product, including the business support systems, and then develop and test it before moving into the implementation and delivery phase.

This period, however, should not be so long as to overly disadvantage those service providers that rely on NBN wholesale aggregation services. Further, we would be concerned if wholesale products were being withheld or delayed from release to reduce competition in the supply of retail fixed line broadband services.

While this may be a transitional issue as NBN Co releases new products and services during its rollout phase, we propose to monitor it to understand whether it is creating significant barriers to entry for service providers and diminishing competition in the supply of retail fixed line broadband services.

Finding: NBN wholesale aggregation services currently support a small number of all retail broadband services on the NBN. The market for NBN wholesale aggregation services may not fully mature until after the network is completed but there remains the potential for this market to grow and provide competitive constraint in the provision of downstream services on the large service providers.

In light of the identified concerns and the potential evolution of the market, in the Draft Report we proposed to consult about the need to obtain information from industry as part of an RKR applying to carriers supplying aggregation and other wholesale inputs that will enable us to monitor how the supply of these services develops and whether any regulatory or policy intervention is required. We also detailed the information we proposed to collect under the RKR.

We considered that this information, in combination with information we would continue to collect from demand side participants on a voluntary basis, would enable us to determine the effectiveness of competition in the market and any particular issues that arise, using indicators such as market shares, price competition, pass through of NBN price changes and non-price differentiation.

We indicated in our Draft Report that if concerns about the level of price and service competition were evident, we could (following appropriate consultation) potentially use the information to publish competitive benchmarks. For example, we might publish details of the lowest commercial offers in the market to NBN POIs if there is substantial variation in offers between aggregation providers.

In the Draft Report, we also proposed that in the absence of further evidence of a genuinely competitive wholesale aggregation market, an aggregation service (e.g. a 'CVC trunking' product) could be supplied by NBN Co to provide a further competitive dynamic by enabling smaller service providers and new entrants to create differentiated retail products. We indicated that there were a variety of possibilities that such a model could take. For example, it could include the supply of services back to capital city NBN POIs, it could only apply to certain traffic classes, to certain service providers and it could only be available on a transitional basis (i.e. no longer than the NBN build period).

By way of precedent, we noted that in its initial build phase there were a number of transitional measures introduced by NBN Co to help service providers overcome the costs of connection. These included the centrally located transitional POIs with provision for transit services at no extra cost and the CVC transitional pricing credit equal to up to the first 150 Mbps of CVC purchased at POIs with up to 30 000 serviceable premises.

We also noted that NBN Co had been approached by a number of smaller service providers about offering such a service. We signalled that we would be interested in NBN Co's considerations around offering such a product (on a transitional basis via commercial negotiations with smaller service providers) in order to help promote competition in the retail market for NBN services.

Submissions to the Draft Report

Telstra, Optus, TPG and Vocus (the major existing providers of NBN aggregation services) do not consider that NBN Co should enter the aggregation market and most oppose the prospect of the ACCC imposing an RKR on the basis that the market is already competitive or evolving to become so.

Vodafone, Macquarie Telecom and MNF have counter views on these issues.

NBN Co, while supportive of an RKR on aggregation providers to monitor competition, states that it is reluctant to enter the aggregation market without any consideration of the commercial viability of doing so and highlights that it is developing an NNI Link product to address a number of service provider concerns about the absence of a competitive wholesale aggregation market.

We consider that the use of an RKR to better understand the level of competition in the NBN aggregation market to be a proportionate response given the concerns raised by a number of service providers. This is particularly so, given that the RKR would be subject to consultation with industry prior to finalisation.

In line with our Draft Report proposal, at a high level we consider the following will be required, noting it will be the subject of further consideration and consultation with industry:

- quarterly supply information—to enable us to monitor developments and changes in the supply of NBN wholesale aggregation services
- the ability to remove or add information requests—to provide flexibility in terms of the information collected, and recognise where it is no longer useful or additional information is required reflecting ongoing concerns
- information to be collected up to the expected completion of the NBN rollout in 2020 followed by a review of ongoing information needs.

Other information likely to be sought from each provider supplying NBN wholesale aggregation services, also subject to subsequent consultation, includes:

- the customers being supplied and the number of services in operation for each customer
- the wholesale list prices for plans across the various speeds e.g. 12/1, 25/5, 50/20 and 100/40 Mbps, as well as actual wholesale prices for a representative sample of customers and any subsequent changes
- the terms and conditions for the list/negotiated wholesale prices and any subsequent changes
- the details of the wholesale products supplied, including the traffic class and those aspects which enable the acquiring service provider to manage and differentiate their downstream service (e.g. ability to manage congestion and dimensioning, access to information about NBN changes or operational statistics) and any subsequent changes
- details of technical or commercial issues that limit the ability of the provider to supply differentiated NBN wholesale aggregation services and/or which delay the provision of wholesale services relative to retail services.
- the prices for their retail plans across the various speeds e.g. 12/1, 25/5, 50/20 and 100/40 Mbps and any subsequent changes
- the amount of capacity dimensioned for their own retail plans and the amount of capacity dimensioned for the representative sample of wholesale customers that the wholesale price information is collected for.

Action 5

We will consult with industry on a proposed record keeping rule to monitor the supply of wholesale aggregation services directed at determining whether subsequent regulatory intervention is required. To the extent the market does not evolve, and the information we collect points to a lack of competition, we will consider (following further consultation) the publication of competitive benchmarking information.

We briefly commented on NBN Co's proposed NNI Link product in section 4.3.5. We consider it would be useful to consult further with market participants on this product and consider wider product developments by NBN aggregators. This will assist us to decide whether any other potential measures are needed to aid access to the NBN by service providers that lack scale to provide a further competitive dynamic in the supply of retail broadband services. We are undertaking this consultation as part of our 2018 inquiry into the declaration of the DTCS.[295]

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295 ACCC, Domestic Transmission Capacity Service, An ACCC Discussion Paper reviewing the declaration for the Domestic Transmission Capacity Service, March 2018, pp. 23, 31.

Action 6

We will obtain further views from market participants on NBN Co's NNI Link product and consider wider product developments by NBN aggregators as part of our 2018 inquiry into the declaration of the domestic transmission capacity service prior to deciding whether any other potential measures are needed to aid access to the NBN by service providers that lack scale to provide a further competitive dynamic in the supply of retail broadband services.

5.3.2 Transmission services

As outlined above and in section 4.3, in some cases NBN wholesale aggregation services are being used by tier 2 service providers prior to reaching the scale at which directly connecting to the NBN and acquiring transmission services is commercially viable. For a period, service providers may use a hybrid model of acquiring some NBN wholesale aggregation services and also directly connecting to the NBN. These service providers will generally acquire transmission services in order to reach the NBN POI directly.

From our survey of the twelve service providers, five were using this hybrid approach, all with the intention to move to a full direct connection model.[296] This was primarily because they considered direct connection to be more cost effective than NBN wholesale aggregation services and to provide greater ability to supply a differentiated service.

A key consideration in making this decision is the cost of directly connecting with the NBN (see section 5.1 for discussion of the issues associated with this) and the cost of transmission services. We estimate that the transmission costs are relatively less than NBN access costs in relation to the total wholesale costs of supplying a retail fixed line broadband service. Although we note that the extent of this cost difference depends on the number of access services per transmission service, location of the transmission service and the extent of competition on the route where it is being supplied (this is discussed further).

As outlined in section 4.3, we have estimated a range of scales (in terms of the number of services in operation) over which we consider it is commercially viable for a tier 2 service provider to directly connect to the NBN and acquire transmission services. These differ from upwards of around 300 services in operation for metropolitan NBN POIs to at least around 500 services in operation for regional and rural NBN POIs. This reflects economies of scale, which mean that the unit costs for transmission services decrease with more services in operation (as a result of the large fixed costs involved with supplying transmission services) and that costs are higher for regional and rural transmission services due to greater route distances.

Table 5.5, table 5.6 and table 5.7 illustrate the above. These tables indicate that when the main wholesale costs (AVC, CVC and transmission) of supplying a broadband service are broken down to a cost per service in operation, the absolute transmission service costs are greater in regional and rural areas and make up a larger percentage of the total costs of supplying the service. We have modelled these estimated costs based on averages of the transmission pricing information we have obtained informally, noting that in regional and rural areas there is greater variability in prices that will affect these averages.

Table 5.5:   Estimated transmission costs across all metropolitan areas[297]*

Services in operation at an NBN POI	Assumed capacity (Mbps) required at each NBN POI and for transmission	Transmission costs per service	Total wholesale costs per service	Transmission costs as a percentage of total wholesale costs
200	300	$6.37	$48.62	13%
500	750	$2.87	$44.52	6%
1000	1500	$2.77	$44.42	6%

*   Assuming 1.5 Mbps is provisioned per service for a 25/5 Mbps plan.

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296 Responses to ACCC survey in relation to NBN wholesale aggregation services.

297 These tables are based on the latest NBN pricing information, and transmission information obtained informally from providers.

Table 5.6:   **Estimated transmission costs across all regional and rural areas***

Services in operation at an NBN POI	Assumed capacity (Mbps) required at each NBN POI and for transmission	Transmission costs per service	Total wholesale costs per service	Transmission costs as a percentage of total wholesale costs
200	300	$15.82	$58.07	27%
500	750	$7.55	$49.20	15%
1000	1500	$6.94	$48.59	14%

* Assuming 1.5 Mbps is provisioned per service for a 25/5 Mbps plan.

Table 5.7:   **Estimated transmission costs in least competitive regional and rural areas***#

Services in operation at an NBN POI	Assumed capacity (Mbps) required at each NBN POI and for transmission	Transmission costs per service	Total wholesale costs per service	Transmission costs as a percentage of total wholesale costs
200	300	$42.82	$85.07	50%
500	750	$18.96	$60.61	31%
1000	1500	$18.04	$59.69	30%

* Assuming 1.5 Mbps is provisioned per service for a 25/5 Mbps plan.

\# This reflects the average cost to supply to the following NBN POIs: Darwin, Bundaberg, Cairns, Mackay, Rockhampton, Townsville, Hobart, Launceston, Geraldton, Katanning which from the information we have obtained informally have prices which are higher than those set by the ACCC in the 2016 Final Access Determination.

The potential for transmission services to be a barrier to directly connecting to the NBN was noted in section 4.4, and is often raised as an issue, particularly where service providers intend to supply a national retail fixed line broadband service and therefore must be connected to all NBN POIs. However, the above modelling suggests that while the costs of regional and rural transmission services are greater than those in metropolitan areas, and can represent a sizable percentage of total wholesale costs, particularly on the least competitive routes, these costs and the scale required are not an absolute barrier to entry.

In the Draft Report we noted that, although the extent of countervailing power that tier 2 service providers have in negotiating the prices for transmission services is unclear, particularly for regional routes where there is limited competition in the supply of these services, several commercial arrangements have been established. For example, Aussie Broadband has an agreement with Telstra for the supply of transmission to all NBN POIs. We also noted that as other service providers build scale, they are connecting to a greater number of NBN POIs, supported by commercial agreements to acquire transmission services to those POIs.

We noted that these agreements are likely to be negotiated as a package of prices for transmission services across the metropolitan, regional and rural NBN POIs. As a result, there may be instances where some prices are lower than those established in our 2016 Final Access Determination for transmission services and instances where some prices are higher.

We also noted in the Draft Report that in examining the data collected under the NBN Service in Operation Record Keeping and Reporting Rules, there are instances where tier 2 services providers are directly connecting to metropolitan, regional and rural NBN POIs before reaching the required scale that we have estimated for services to be commercially viable. We noted that this may be occurring for a variety of reasons, but is further evidence that transmission services, and the scale required to acquire those services at an NBN POI, are not acting as an absolute barrier to entry.

In light of the above, we proposed an action in the Draft Report to examine the supply of transmission services to NBN POIs as part of our 2018 inquiry into the declaration of the DTCS.

Submissions to the Draft Report

Macquarie Telecom: Supports the proposed action, but given the current DTCS declaration remains in force until 31 March 2019, the proposed action has limited practical effect to address the current concerns with market failure.

Optus: Welcomes the proposed action and sees potential benefits from disaggregating the DTCS description such that services can be priced more efficiently and better align with the LTIE.

Regional Development Australia (NT): Requests greater clarity as to whether the ACCC will simply work with industry to understand scale issues at regional and remote NBN POIs or specifically consider transmission services in these areas as part of the DTCS declaration.

Telstra: Does not feel there is a need to add a specific NBN POI transmission route classification as there is no evidence that access to transmission services is a barrier to entry into downstream NBN markets.

TPG: States that significant private capital has been invested in transmission to NBN POIs for which investors are entitled to a return and does not want distortions to be introduced that could impact future private investments.

Vodafone: Supports the proposed action but notes the emerging question is whether DTCS will be sufficient for the next generation of fixed and mobile services with exponentially increasing data demands.

At this stage, we do not consider there is a need to immediately intervene in or specifically monitor the supply of transmission services to NBN POIs. However, recognising the NBN is in a transitional phase prior to being fully deployed in 2020, and that the market is continuing to develop, we are considering this issue as part of our inquiry into the declaration of the DTCS, including:

- consideration of transmission services in regional and rural areas in general, particularly those routes where there is not currently significant competition, and the associated pricing on those routes

- the level of demand for transmission services at or near NBN POIs and the nature of any investments in transmission capacity being made, or likely to be made at NBN POIs, whether there is a choice of active suppliers of transmission services at all of the 121 NBN POIs, and the price and availability of different types of transmission services at NBN POIs

- whether transmission services to NBN POIs need to be examined separately from other DTCS services and in particular whether there is a need to add a specific NBN POI transmission route classification

- the potential role of NBN Co's NNI Link product and the supply of aggregation services in aiding access to NBN POIs by smaller service providers.[298]

Action 7

We are examining the supply of transmission services to NBN Points of Interconnection as part of the domestic transmission capacity service declaration.

5.3.3   Dark fibre

In directly connecting to the NBN, some service providers may seek to use dark fibre services as an alternative to transmission services. We note that in the 2014 DTCS declaration decision, we considered dark fibre and transmission services were not direct substitutes, as additional connecting equipment and management systems are required with dark fibre as compared to transmission services.[299]

As outlined in section 4.4, we have limited information about dark fibre services (suppliers, availability and location of services, including at NBN POIs, and price and non-price conditions). However, in the context of its availability at NBN POIs, several service providers have submitted to the market study that dark fibre is a pre-requisite for managing the exponential growth of consumer demand for data.

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298 ACCC, Domestic Transmission Capacity Service, An ACCC Discussion Paper reviewing the declaration for the Domestic Transmission Capacity Service, March 2018.

299 ACCC, Domestic Transmission Capacity Service—An ACCC Final Report on the review of the declaration for the Domestic Transmission Capacity Service, March 2014, p. 29.

They argue that dark fibre is cost effective at scale, provides flexibility to respond to changing customer requirements and allows for better differentiation of services.

Supporting this, in our survey of service providers acquiring transmission and dark fibre services, of 12 providers, seven indicated that they are acquiring dark fibre and four indicated that they would consider purchasing it from NBN POIs as a part of their future business models for supplying fixed line broadband services.[300] Further, of the seven service providers acquiring dark fibre services, five indicated that it comprised less than 10 per cent of the costs to supply a fixed line broadband service[301] (noting that service providers will incur additional costs to enable the dark fibre).

Contrasting this, we also received one view that the economics of dark fibre services need to be right and that the effective cost per customer can be high. In particular, if redundancy/diversity from NBN POIs are required, then at least two dark fibres will be required for each NBN POI and that Ethernet or wavelength (transmission) services would provide superior economics, availability and reliability.[302]

Further, in its submission to the Issues Paper, Vocus was of the view that as a matter of principle, there can be no basis for mandating regulated access to dark fibre in areas where the DTCS is available because there is an effective substitute (i.e. there is no need to regulate the same bottleneck twice).[303] Telstra contended in its submission to the Draft Report that the market for dark fibre services is characterised by increasing competition and the entry of new providers (including smaller service providers and providers from other industries) who have been successful in winning business from larger providers.[304]

We are aware that in some jurisdictions, dark fibre services are regulated for open access by service providers. For example, in the Netherlands and Sweden, dark fibre backhaul services are made available at regulated prices.[305] We note that in March 2016, the UK Office of Communications (Ofcom) mandated that Openreach (BT's functionally separate wholesale arm) provide access to dark fibre services[306] at a specified price in areas where there was seen to be less competition (essentially outside London).[307] While the market review through which this was implemented was successfully appealed, the dark fibre remedy itself was not. [308]

Given all of this, including the potential importance of dark fibre services in promoting competition in the supply of fixed line broadband services, and the contrasting perspectives currently presented to us, we considered in the Draft Report that it was important to better understand the market in which dark fibre is being supplied to NBN POIs. Without this information, we noted it was difficult to determine whether the market is functioning effectively or if there is any potential market failure.

We therefore proposed an action to consult with industry on an RKR to monitor the supply of dark fibre services to determine whether any regulatory intervention is required.

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300 Responses to ACCC survey in relation to transmission and dark fibre services.

301 Responses to ACCC survey in relation to transmission and dark fibre services. Two service providers did not provide a response to this question.

302 Responses to ACCC survey in relation to transmission and dark fibre services.

303 Vocus, *Submission to the ACCC Communications Sector Market Study*, November 2016, p. 8.

304 Telstra, Telstra submission to the ACCC Communication Sector Market Study Draft Report: Public version, December 2017, p. 16.

305 WIK-Consult, *Regulatory approaches to risky bottleneck assets: International case studies*, February 2016 and BEREC, *Annex to the BEREC Report Next Generation Access—Implementation Issues and Wholesale Products*, 2010.

306 It described this as an 'uncontended, unmonitored, unlit optical path over an end to end radial distance of up to 45km and a maximum route distance of 86km between two sites. This will be a passive service and no equipment will be provided to light the fibre provided.'

307 Ofcom, *Business Connectivity Market Review Final Statement—Volume 1*, 28 April 2016, pp. 6–9.

308 While Openreach had decided to make available a national Dark Fibre Access product in both the area regulated by Ofcom and non-regulated areas and routes from 1 October 2017, it also appealed Ofcom's decision to the Competition Appeal Tribunal. The Tribunal found that Ofcom had made errors in its market definitions under its business connectivity market review (BCMR) and that it would need to reconsider the matter (Competition Appeal Tribunal, *Ruling (market definition), British Telecommunications PLC v Office of Communications*, 26 July 2017, p. 4.). Responding to this, Openreach indicated that it would not be supplying a Dark Fibre Access Product on 1 October 2017. Ofcom subsequently published a consultation in November 2017 proposing for Openreach to provide dark fibre on a temporary basis pending the completion of its next BCMR (Ofcom, *Consultation: Dark Fibre*, 23 November 2017).

We note the level of investment that has been made in dark fibre in particular by Vocus and TPG, and we have made no decision regarding regulation of dark fibre. Our action to consult on an RKR is aimed at obtaining information on the market so we can make an informed decision on whether or not regulation is required. We note for example that the use of RKR data in the 2014 review of the declaration for the DTCS enabled us to undertake a more effective assessment of the level of competition in DTCS markets than the previous approach (and resulted in the removal of regulation of certain routes).

In terms of the RKR, we are proposing to adopt a similar approach to that proposed for NBN wholesale aggregation services. This would entail:

- collection of quarterly supply information
- the ability to remove or add information requests
- collection of information up to the expected completion of the NBN rollout in 2020 followed by a review of ongoing information needs.

Further, subject to consultation, we consider that information of the following nature would be required:

- from each provider supplying dark fibre services to NBN POIs:
  - the specific NBN POIs at which dark fibre services are available
  - the customers being supplied, the number of services in operation for each customer and the NBN POIs at which dark fibre services are acquired
  - the wholesale list prices for dark fibre as well as wholesale prices for a representative sample of customers and any subsequent changes
  - the terms and conditions for the list/negotiated wholesale prices and any subsequent changes
  - any details about the dark fibre product supplied, the associated non-price terms and conditions, and any subsequent changes
  - details of any technical limitations associated with dark fibre when it is used over longer distances (e.g. its ability to provide services to regional or rural NBN POIs where the distances are greater than, say 40 km).
- for each provider capable of, but not currently supplying dark fibre services to NBN POIs:[309]
  - the specific NBN POIs at which dark fibre services are available
  - the wholesale list prices for dark fibre and the associated terms and conditions
  - any details about the dark fibre product available and the associated non-price terms and conditions

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309 From our survey in relation to transmission and dark fibre service we know that two providers have provided service providers with quotes but that no supply agreements were subsequently entered into.

- details of any technical limitations associated with dark fibre when it is used over longer distances
- the reasons why no services are being supplied.

Action 8

We will consult with industry on a proposed record keeping rule to monitor the supply of dark fibre services to determine whether any regulatory intervention is required.

5.3.4 Internet interconnection

As described in section 4.5 we consider that competition in the supply of transit (the commercial wholesale interconnection service), which is an essential wholesale input for almost all downstream services, does not appear to be working effectively. Market participants have told us that while declining, transit prices remain higher than overseas and this is impacting on their ability to compete in downstream retail markets. We note that this is a longstanding competition issue in Australia and the peering structure between TTOV has endured for two decades despite significant market and structural developments in the communications sector. In addition, in contrast to many large networks overseas, there is little visibility over what criteria networks would need to satisfy in order to negotiate a peering relationship with each of TTOV.

Submissions to the Draft Report

In the Draft Report, we proposed a recommendation that TTOV should maintain on their websites a comprehensive set of criteria and any other relevant policies to which they have regard when assessing peering requests from other networks.

Macquarie Telecom: Supports the proposed recommendation but considers that the ACCC should be taking much stronger action. Is also concerned there is no discussion about how the ACCC proposes to enforce the proposed recommendation.

MNF: While it would not address the main problem with interconnection for smaller players, the proposed recommendation may lead to increased competition if other CSPs have sufficient capability and volume to obtain peering with TTOV.

Regional Development Australia (NT): Publishing peering criteria is not sufficient to address this long standing competition issue.

Telstra: Telstra is currently considering publishing its peering criteria but this would be contingent on each of TTOV publishing theirs.

TPG: Does not oppose any regulation that may require all CSPs that seek interconnection arrangements to publish criteria under which they will agree to peer.

Vocus: Supports the proposed recommendation. Suggests that the ACCC should consider whether each member of TTOV individually satisfies each of TTOV's own peering criteria.

Vodafone: Considers TTOV should at least be required to publish transparent criteria that allow other networks to understand the factors taken into account in assessing proposals to enter into peering relationships.

We welcome the openness on the part of members of TTOV to publishing their peering criteria, recognising this would enhance transparency. We note that peering criteria are not determinative of whether peering will be offered (or continue to be offered) as peering arrangements are commercially driven. However, we would investigate any substantiated allegations that TTOV's refusal of peering requests (or maintenance of existing bilateral arrangements) amounts to anti-competitive conduct.

Recommendation 2

Telstra, TPG, Optus and Verizon (TTOV) should maintain on their website a comprehensive set of criteria and any other relevant policies to which they have regard when assessing peering requests from other networks. This would provide prospective peering parties some guidance on the criteria they are required to meet with each of the TTOV networks.

We understand that developments such as the growth of independent content providers may have alleviated the adverse impact on costs for smaller networks competing in downstream markets to some extent, particularly in the residential broadband market. However, relatively high transit costs may still adversely impact competition in other downstream markets such as in the supply of broadband internet services to corporate customers. The extent to which competition is affected will depend on a number of factors such as the quantum of transit costs as a proportion of the total costs of supplying downstream services. There may also be other options or strategies that smaller networks can use to reduce transit requirements. As end users' internet use and needs continue to evolve in response to new services and technologies, the level of transit costs and the advantages that TTOV have from their peering agreements may intensify the impact of inefficient transit pricing on competition in downstream markets.

Submissions to the Draft Report

In our Draft Report, we proposed an action to assess and report on whether access to internet interconnection services is available on competitive terms to support effective competition in downstream markets, with a particular focus on the market for the supply of services to corporate customers.

Regional Development Australia (NT), Vocus and Verizon: Support the proposed action.

Macquarie Telecom: Supports the proposed action as it will involve investigating what it considers to be an illegal arrangement.

MNF: Considers it important to progress the proposed action as a matter of importance as there is no substitute service available to that offered by TTOV.

Telstra: Telstra will continue to engage with the ACCC as part of its ongoing assessment, but does not consider regulatory intervention is required.

Since the publication of the Draft Report, we have continued to progress our assessment of access to internet interconnection services, with a particular focus on the market for the supply of broadband internet services to corporate customers. As part of this assessment, we are:

- further assessing the extent of effective competition in the supply of transit services by TTOV
- investigating further the pricing and structure of prices for transit services
- examining key corporate internet markets including assessing changing transit requirements and the component cost of transit in the supply of these services.

Action 9

We will continue to assess and report on whether access to internet interconnection services is available on competitive terms to support effective competition in downstream markets, with a particular focus on the market for the supply of services to corporate customers.

5.4   Consumer choice and information

In section 4.1, we examined competition in communications markets including voice and broadband services in terms of the number of service providers in the market as well as the extent of price and non-price competition.

In this section, we will consider whether consumers are able to take advantage of this competition, through the ability to easily switch service providers and products as well as having sufficient information to make informed purchasing decisions.

Consumers can contribute to, and benefit from, competition in communication markets such as voice, messaging and broadband services, where it delivers positive outcomes in terms of choice of service provider, a range of product offerings that suit different consumer needs and an environment where consumer movement and switching is facilitated. When consumers are able to make good choices, this promotes efficiency and competition within communications markets.

In order to take advantage of the benefits generated by competitive communications markets, consumers must be able to access enough information to assist them to make purchasing decisions that best meet their needs and budget. Consumers also need to be free to take advantage of different product and service offerings as they arise, and as such require a market that facilitates consumer switching between service providers.

5.4.1 Consumer switching

Consumer switching refers to the ability or tendency of consumers to change service providers to a competitor. If consumer switching were observable then this would suggest that consumers are making active choices about products and service providers based on good information. Switching also encourages service providers to compete on price and quality in order to retain and attract customers, which contributes to good outcomes for consumers.

Australian households are not active switchers when it comes to home phone and fixed broadband services.

For example, according to Roy Morgan Research, in 2016 only 3 per cent of Australian households switched home phone service provider in the previous 12 months, slightly less than the 4 per cent in 2013.[310]

For fixed broadband, the level of switching was slightly higher in 2016, with 7 per cent of Australian households changing fixed broadband service provider in the previous 12 months, also a slight increase from 6 per cent in 2013.[311]

When it comes to mobile phones 10 per cent of Australian consumers said they had switched mobile phone service provider in the previous 12 months, compared to 12 per cent in 2013.[312]

Overall consumer attitudes towards switching in the future are slightly more positive than the historical switching behaviour noted above, but still at the lower end of the range when considered against the number of consumers who said they were unlikely to switch. Across home phone, fixed broadband and mobile phone services, consumers' likelihood to switch in 2016 was low, at 10 per cent, 11 per cent and 15 per cent respectively. In contrast, the number of consumers who said they were unlikely to switch service providers was much higher, at 38 per cent, 34 per cent and 49 per cent respectively for home phone, fixed broadband and mobile phone services.[313]

This research indicates that there is limited consumer switching between service providers of voice and broadband services, despite the substantial choice of service providers and product offerings available in these markets. This suggests that competition may not be working as well as it could for consumers.

Consumer attitudes towards switching could be the result of a number of factors. These include inertia (which can diminish the consumer benefits of retail competition) or consumer preference to stay with the same service provider for convenience or satisfaction with their current deal. Alternatively, it may signal underlying issues such as a lack of sufficient information to facilitate switching or high switching costs (such as lock-in contracts, high early termination fees, perceived inconvenience). These factors may be influencing a low incidence of consumer switching.

As discussed in section 4.1, there is a high degree of concentration in the supply of broadband, voice and messaging services, with three to four service providers capturing over 90 per cent of the consumer market in both fixed voice and broadband and mobile phone services.

When consumers did decide to switch, their movement was predominantly between the large service providers, which may explain why there was limited change in overall market shares. For example, Roy Morgan Research finds that in 2016, of those Australian households that switched fixed broadband service providers in the last 12 months, the largest movement was from Telstra (28 per cent of total

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310 Roy Morgan Single Source (Australia), January to December 2013, n=18 576 and January to December 2016, n=14 330, Australian Households.

311 Roy Morgan Single Source (Australia), January to December 2013, n=18 576 and January to December 2016, n=14 330, Australian Households. We note there are also a small percentage of respondents who selected "can't say" when asked whether they had switched service provider in the last 12 months, hence these figures should not add to 100 per cent.

312 Roy Morgan Single Source (Australia), January to December 2013, n=18 576 and January to December 2016, n=14 330, 14+ Australian population.

313 Roy Morgan Single Source (Australia), January to December 2016 n=14 330, Australian Households (home phone and fixed broadband) and 14+ Australian population (mobile phones).

switchers). Of these former Telstra households, over three quarters switched to the other three largest services providers, 22 per cent went to Optus, 21 per cent went to iiNet, 17 per cent went to TPG, 11 per cent went to Dodo and 5 per cent went to Belong (Telstra's budget brand).[314]

5.4.2   Reasons for switching

As shown in table 5.8 according to Roy Morgan Research, of those households that have switched fixed broadband service provider in the last 12 months the most common reasons for choosing their current service provider were in relation to pricing, data allowance and connection/reliability and speed. Interestingly, of those who selected 'have other services with that provider', 43 per cent are with Telstra and 25 per cent are with Optus, and of those who selected 'only provider in my area,' 56 per cent are with Telstra and 16 per cent are with Optus.[315] This illustrates the persistence of Telstra's incumbency advantage (and to a lesser extent Optus') and will need to be carefully monitored in the transition to the NBN, particularly to ensure consumers are aware of the different providers offering services in their area.

Table 5.8:   Reasons for choosing current fixed broadband service provider amongst switchers in last 12 months for 2016[316]

Current service provider	Most common reasons for choosing this service provider
Telstra	Better connection/reliability (44%)
	Faster data connection and download speed (34%)
	Bigger data allowance (23%)
Optus	Cheaper rates (40%)
	Unlimited data allowance (37%)
	Faster data connection and download speed (31%)
TPG	Cheaper rates (60%)
	Unlimited data allowance (36%)
	Clearer pricing of the plan (28%)
iiNet	Cheaper rates (36%)
	Clearer pricing of the plan (33%)
	Better connection/reliability (31%)
Dodo	Cheaper rates (59%)
	Unlimited data allowance (31%)
	Clearer pricing of the plan (25%)
Overall	Cheaper rates (39%)
	Better connection/reliability (29%)
	Faster data connection and download speed (25%)

From this research, we can observe that pricing and data allowance remain a key focus for consumers and points of competition in fixed broadband services. However, 'faster data connection and download speed' and 'better connection/reliability' are increasingly important as consumers migrate to the NBN, better NBN performance information becomes available through Measuring Broadband Australia, and higher bandwidth applications (such as 4K and 8K TV) become more common.

In relation to mobile services, Roy Morgan Research shows that of those who switched mobile phone service provider in the last 12 months in 2016, the most common reasons for choosing their current service provider were related to price, data inclusions and network coverage, as shown in table 5.9.

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314 Roy Morgan Single Source (Australia), January to December 2016, n=683, Australian Households.
315 Roy Morgan Single Source (Australia), January to December 2016, n=744, Australian Households.
316 ibid.

Table 5.9: **Reasons for choosing current mobile phone service provider amongst switchers in last 12 months for 2016**[317]

Current service provider	Most common reasons for choosing this service provider
Telstra	Better network coverage (66%)
	Better connection/reliability (27%)
	Bigger data allowance (25%)
Optus	Cheaper rates (40%)
	Bigger data allowance (36%)
	Clear pricing of the plan (27%)
Vodafone	Cheaper rates (55%)
	Bigger data allowance (46%)
	More calls included in plan (42%)
Amaysim	Cheaper rates (71%)
	Bigger data allowance (42%)
	Not locked into a fixed-term contract (34%)
Overall	Cheaper rates (45%)
	Bigger data allowance (35%)
	Better network coverage (30%)

5.4.3 Available consumer information

We are responsible for administering compliance with the ACL. The ACL establishes economy-wide legal protections for consumers in their dealings with businesses. This includes ensuring consumers are not misled when purchasing goods and services and businesses have reasonable grounds for making representations about future matters.[318] Businesses are responsible for ensuring compliance with the ACL when they provide information to consumers.

The ACL is complemented by the industry-specific Telecommunications Consumer Protections Code (TCP Code). The TCP Code is a co-regulatory mechanism that is designed by industry members in consultation with regulators, consumer bodies and other stakeholders. The TCP Code is administered by the ACMA and provides safeguards for mobile, landline and internet customers.[319] It outlines rules that telecommunications providers must follow when communicating and dealing with customers, including the provision of a Critical Information Summary (CIS) and a requirement for clear unit pricing for national calls, SMS and data in their advertisements.[320]

The TCP Code is currently being reviewed by Communications Alliance and we are part of the Working Committee as an observing (non-voting) member. We have been a strong advocate for maintaining and strengthening the consumer protections in previous reviews of the TCP Code.

The TCP Code also sets out what information is required in the CIS so consumers can easily compare product offers of different service providers to determine which best suits their needs.[321] A CIS provides customers with important information alongside the contract, and can assist consumers to make the most appropriate choice for their circumstances.

However, there are concerns some service providers may include poor information in the CIS and misrepresent some information, such as the performance of services over the NBN. Although we note that there are requirements in the TCP Code prescribing which information should be included in the CIS, not all service providers may fully comply with the CIS obligations under the TCP Code.

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317 Roy Morgan Single Source (Australia), January to December 2016, n=1011, 14+ Australian population.
318 These requirements are contained in sections 4, 18, 29, 34 and part 3-2 of the ACL.
319 ACMA, The TCP Code, 21 November 2017, viewed March 2018.
320 ibid.
321 Communications Alliance Ltd, Industry Code: Telecommunications Consumer Protections Code, p. 25.

The ACMA proactively monitors telecommunications providers' compliance with the TCP Code.[322] We note that the ACMA's 2016–17 audit focused mainly on NBN retail services due to the significant growth in the number of new providers in the market sector and the acceleration of the NBN rollout. The audit reviewed 111 offers from 79 different service providers and found that of these providers, 61 per cent had compliant CISs, 35 per cent had a CIS with some content or formatting deficiencies and 4 per cent had no CIS at all.[323] This compares to 75 per cent who had a compliant CIS in 2015–16.

Submissions to the Draft Report

ACCAN: Agrees that there is a need to improve consumer information particularly on complaints metrics and submits that consumers are currently unable to adequately evaluate complaints handling performance by provider.

ACMA: The TCP Code review provides an opportunity to assess whether the current set of obligations remain well adapted to dealing with current and emerging service types. The ACMA is conducting a comprehensive review of Critical Information Summaries (CISs) and related information for NBN services and will release this information early this year.

Communications Alliance: Notes the role of Communications Compliance, which works with providers on TCP Code compliance, and attributes lower CIS compliance in the ACMA's recent audit to a rising number of small providers entering the market due to the NBN. This period of adjustment is likely to be overcome once new providers become familiar with their obligations.

Telstra: The CIS provisions may require review to ensure the requirements remain relevant and useful.

While NBN services may be relatively new, the CIS provisions in the TCP Code are well established and service providers need to actively ensure that their offers are compliant, in order to reverse this trend. Communications Compliance could assist in this regard by continuing to monitor and promote compliance by industry members, particularly smaller service providers.

At the same time the current review, provides an occasion to review the CIS provisions to ensure the most relevant and meaningful information is captured for the benefit of consumers.

We strongly support the retention of the CIS provisions in the TCP Code (while ensuring the obligations remain as effective as possible) and support the ACMA's regular compliance audits which provide insight into the industry as well as accountability for service providers.

The proposed recommendation in the Draft Report has been revised in response to submissions from stakeholders.

Finding: The Telecommunications Consumer Protections Code review provides a timely opportunity to ensure the obligations it imposes (including the Critical Information Summary (CIS) provisions) remain well suited to services delivered on the NBN and other networks.

The results of the recent CIS audit by the ACMA, which focused on NBN services, highlight the important continuing role for Communications Compliance in educating newer suppliers and actively monitoring and promoting compliance by industry members.

5.4.4   Information issues

Information asymmetries may occur in communications markets when consumers do not have complete or sufficient information about service providers and product offerings to understand and identify what product or service best suits their needs, and facilitate informed purchasing decisions. This can lead to inertia and a lack of switching, and may reduce competition in the relevant markets.

As noted by the Australian Communications Consumer Action Network (ACCAN), communications services are inherently technical and complex for consumers to understand.[324] Further, service providers may structure their products in a complicated manner or provide consumers with large amounts of information to make it difficult for consumers to compare offerings with those of other providers.[325] It

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322 ACMA, iTalkBB warned: Wrong Information, 22 February 2017.
323 ACMA, Part 1: Australian Communications and Media Authority Annual Report 2016–2017, 19 September 2017, pp. 70–71.
324 Australian Communications Consumer Action Network, Competition in evolving communications markets—submission by ACCAN to the ACCC, October 2016, pp. 14, 19, 37.
325 ACCC, The comparator website industry in Australia, November 2014, p. 5.

is important to find a balance between providing sufficient information to enable informed decisions, while ensuring the level of detail is not too overwhelming.[326]

NSW Farmers has raised particular concerns in relation to consumers in rural Australia, who have expressed their frustration in finding communications products and services that meet their individual needs, and are often sold unsuitable, expensive products because they do not have enough information available to easily compare products.[327]

In response to a consumer questionnaire we published as part of our consultation for the market study, some consumers noted that standard presentation of information by service providers with key metrics, such as minimum or average achievable broadband speeds by location and more updates about the arrival of the NBN, would be useful information to help them make more informed purchasing decisions.

More generally, consumers may also have difficulty finding and/or selecting a product or service that meets their needs in terms of usage, particularly as they may be unaware or have limited information about their own past usage.

By comparison, we note that consumers in the UK are able to access and download their own usage data from their service provider and upload it to the Billmonitor website.[328] This service then recommends appropriate plans based on current service offerings in the market based on analysis of their past usage.

The Australian Government has recently announced the implementation of a Consumer Data Right, beginning in the banking sector and to be initially applied to the telecommunications and energy sectors. This important competition and consumer reform is discussed further in section 7.

Case study: Comparator websites—overcoming information issues?

Third-party comparator websites can be an extremely useful tool for consumers to view and compare different product offerings from a range of service providers in a particular market. In Australia, the main comparator websites for telecommunications services are Finder, WhistleOut and iSelect. There are also smaller websites such as Compare Broadband and You Compare.

These comparator websites can help to overcome information issues for consumers by presenting like-for-like comparisons of products and services, and in some cases, providing needs based analysis, allowing consumers to select features most important to them.

Comparator websites can help consumers overcome choice paralysis as well as encourage consumers to shop around by raising their awareness of different service provider options, particularly small and medium service providers. This can help promote greater competition in the market and may create downward pressure on prices.[329]

As noted by ACCAN, despite these benefits, comparator websites should be treated with caution as some may fail to disclose commercial relationships, such as with particular service providers, which may bias the results presented to consumers and potentially breach the ACL.[330]

Comparator websites may also fail to acknowledge the extent of their market coverage, leading consumers to believe that the websites compare all offerings from all service providers in the market, when this is typically not the case. For example, as shown in table 5.10 we have compared the proportion of service providers listed on the various comparator website (as offering NBN-based broadband services) to the total number of service providers listed on NBN Co's website.[331]

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326 Australian Energy Regulator, Customer price information—issues paper, 26 September 2017, p. 9.

327 NSW Farmers, Submission to ACCC Competition in Evolving Markets Issue Paper, October 2016, pp. 11–12.

328 See Billmonitor.

329 ACCC, The comparator website industry in Australia, November 2014, viewed on 27 July 2017.

330 Australian Communications Consumer Action Network, Competition in evolving communications markets—submission by ACCAN to the ACCC, October 2016; Consumer Action Law Centre, Submission to ACCC inquiry into retail electricity supply and pricing Issues Paper, 3 July 2017.

331 We note that some of the NBN Co listed service providers may only provide business services and would not likely be listed on the comparator websites.

Table 5.10: Comparison of comparator website's market coverage for NBN broadband services

Comparator website	Number of service providers compared[331]	Proportion of all service providers listed on NBN Co's website[332]
Finder	58	35%
WhistleOut	38	23%
iSelect	7	4%
You Compare	11	7%
Compare Broadband	8	5%

For the mobile market, Finder compares 40 service providers, WhistleOut compares 32 service providers and You Compare lists 10 service providers. iSelect only shows plans from Optus.

These websites do not offer an option to compare standalone home phone voice services, which can only be viewed as a bundled home phone and broadband product. This further reflects the declining consumer preference for home phone services, as previously discussed in section 4.1.

While comparator websites may present information clearly to consumers, they may be limited by the way information is represented by different service providers and inconsistencies in product descriptions. For example, as noted by Finder the cost of data in mobile phone plans may not be clearly described by some service providers, making it harder for consumers to compare different offerings.[334]

While the TCP Code requires service providers to include particular information in their CIS, such as the cost of data per unit, we consider there is further scope to ensure this information is presented in a standardised way, particularly for price and usage metrics. If information is disclosed by each service provider in a different manner, this makes it difficult for comparator sites to effectively and accurately assist consumers to compare offerings.

Comparator websites can play a role in providing diverse information to consumers in an easily accessible format and, as such, we are interested to ensure that these websites work well for consumers. In 2014, we published a report into the general comparator website industry[335] as well as further industry guidance for website operators and consumer specific guidance the following year.[336] The industry guidance outlines some guiding principles for operators and suppliers to consider when designing their website, including the need to be transparent about commercial relationships and facilitate honest like-for-like comparison of products and services.[337]

In addition, we have taken action against a number of comparator websites including Finder, Compare the Market and iSelect, to ensure that these companies do not mislead consumers about the scope of comparisons when promoting or recommending products and to emphasise the importance of informed purchasing decisions.[338]

Finding: To avoid misleading consumers, comparator websites must fully and prominently disclose their commercial relationships, ranking methods and market coverage. In the absence of full and prominent disclosure, comparator websites can mislead consumers as to the extent of the comparison service, the amount of savings that can be achieved and the impartiality of the comparisons.

In the course of the market study, some stakeholders have called for an accredited price comparison scheme for communications services to overcome the potential information issues associated with existing comparator websites and provide an independent avenue for consumers to research available product offerings based on their individual needs.[339]

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332 Compared using service providers listed on the relevant comparator website as at 15 February 2018.
333 NBN Co, List of phone and internet providers, accessed 15 February 2018.
334 Hive Empire Pty Ltd t/a finder.com.au, finder.com.au submission to ACCC Communications Market Study, 14 October 2016, p. 2.
335 ACCC, The comparator website industry in Australia, November 2014, viewed on 27 July 2017.
336 ACCC, ACCC releases comparator website guidance, media release, 3 August 2015.
337 ACCC, Comparator websites: a guide for comparator website operators and suppliers, August 2015, p. 2.
338 ACCC, Finder.com.au penalised for misleading consumers, media release, 22 November 2017.
339 NSW Farmers, Submission to ACCC Competition in Evolving Markets Issue Paper, October 2016, pp. 11–12.

International regulators have undertaken a range of regulatory approaches to comparator websites. In New Zealand, for example, there are several non-government comparator websites including Telme, a communications specific comparator site run by Consumer NZ[340] with financial assistance from Consumer Protection, the consumer regulator.[341]

In the UK, communications regulator Ofcom oversees an accreditation scheme for price comparator websites, aiming to provide consumers with a level of confidence and reassurance when comparing service offerings.[342] The European Commission has published best practice guidelines for comparator websites, and recognised that while there is value in accreditation schemes for consumers, there are also risks, including that consumers may be unaware of or lack understanding of how the accreditation schemes work, and that websites could use accreditation logos without authorisation.[343]

In addition, we note that the UK Competition and Markets Authority (CMA) has completed its market study into digital comparison tools and how these tools can be maximised.[344] The CMA identified four high-level principles for how digital comparison tools should behave in order to support consumer trust and informed choice. They should be Clear, Accurate, Responsible and Easy to use (CARE):

- **Clear:** Explain the services and how to use them.
- **Accurate:** Provide information that is complete, correct, relevant, up-to-date and not misleading.
- **Responsible:** Protect people's details and be easy to deal with.
- **Easy to use:** Make information easy to find and understand.

Submissions to the Draft Report

ACCAN: It is important that consumers are aware of the providers that are available and can easily compare their offerings. The usefulness of comparator websites may be limited if they only compare providers that pay to be part of this service or do not show all providers and plans.

ACMA: Is interested in collaborating with the ACCC on reviewing the effectiveness of comparator websites. Comparison of competing service offers is facilitated by the requirement for offers to be clearly set out in the CIS, which may alleviate the need for specific interventions on this issue. Given the ACMA's role in monitoring compliance with the CIS requirements, the ACMA also monitor tools made available to consumers to assist them in making comparisons, including comparator websites.

Communications Alliance: Notes the ACCC's concerns but these websites operate independently of its members.

NSW Farmers: Supports the proposed action to review the scope, transparency and ease of use of comparator websites.

Telstra: Supports any review to ensure an appropriate level of transparency and information disclosure is available to consumers making use of comparator websites. Notes its relationship with these sites is on the basis that comparison sites are required to comply with ACCC guidelines.

Optus: Notes it would be concerned if any ACCC intervention would result in increased obligations on service providers to build extra functionality or provide additional information.

Comparator websites can be a useful tool for consumers to compare a range of product offerings, provided they are reliable and consumers can trust them. The CMA's CARE principles noted above highlight the importance of comparison websites behaving in a manner that treats consumers fairly and provides an appropriate level of transparency and information disclosure.

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340 Consumer NZ is an independent organisation funded by membership fees, business programs and government contract work.
341 Scoop Business, Consumer NZ launches telecommunications comparison website, 25 August 2011, viewed 9 August 2017.
342 Ofcom, Accreditation scheme for price calculators: A review of the scheme, 29 May 2013, viewed on 10 August 2017, p. 3.
343 European Commission, Comparison Tools: Report from the Multi-Stakeholder Dialogue—Providing consumers with transparent and reliable information, Report presented at the European Consumer Summit, 18–19 March 2013, viewed on 10 August 2017, p. 32.
344 Competition and Markets Authority (CMA), Digital comparison tools market study, CMA, 21 December 2017, viewed on 14 February 2017.

Action 10

We will review the scope, transparency, and ease of use of comparator websites for communications services and consider the need for further intervention in addition to our existing guidance for comparator websites. We will collaborate with the ACMA in this regard to draw on their experience with comparator websites. We will consult with ACCAN, industry and Government to develop an appropriate course of action if intervention is needed.

Case study: Phone scams—industry should explore preventative measures

Scamwatch is a website run by the ACCC, which provides information to consumers, and small businesses about how to recognise, avoid and report scams. We use the information from these reports to keep Australians informed about and promote awareness of the latest scams through regular media releases, interviews and social media initiatives. Scam reports are also a valuable resource and tell us a lot about the magnitude of financial harm that consumers suffer as a result of scams. For example, Scamwatch received a total of approximately 160 000 scam reports in 2017, with almost $90 million reported lost by consumers.

To put this in context for telecommunications, 65 000 of these scam reports identified that contact was made by phone with resulting losses to Australian consumers of approximately 28 million dollars.[345] However, these are just the numbers reported to Scamwatch and ABS data suggests the actual number is much higher with just over half of the Australian population aged 15 and over being exposed to at least one scam in a given year.[346]

One way we know scammers mislead Australian consumers over the phone is by operating from an overseas location and over stamping their calls to mislead people into thinking the call is coming from an Australian number (this is referred to as spoofing). Spoofing is often used to deceive consumers into revealing personal information and is an inherent part of some scams. However, caller line identification (CLI) over stamping can also be a legitimate practice (e.g. used by Australian businesses with overseas call centres) and the overwhelming majority of incoming-international VoIP calls to Australians are likely to be legitimate.

In overseas jurisdictions, some mobile network operators have taken action to reduce the harm caused by spoofing through measures to block and divert known scam numbers. For example, Vodafone UK has a process in place to block nuisance calls at the network level in an effort to stop scammers from getting through to consumers. We would like to see the Australian industry take greater action in this area, drawing on the experience of overseas network operators, for example.

In addition, the ACMA has indicated that it is liaising with industry and other government agencies to explore approaches to minimise consumer detriment from scam calls using VoIP services with maliciously over stamped CLI. The ACMA is also engaging with other international regulators in the UK, Canada and the US to explore effective regulatory responses to these calls. Longer-term solutions may include application of a new technical standard being developed in the US to ensure calling numbers are not spoofed.

There are obviously other means by which scams are perpetrated. Scamwatch reports show that online methods such as email, the internet, social media and mobile apps are overtaking telephones as scammers' preferred method to contact potential victims. In 2017 the Scamwatch site received more than 68 000 reports of scammers contacting people online and reported losses to online scams totalled approximately $49 million.

We consider that there is considerable scope for the telecommunications industry to do more, at the network level, to protect consumers from the significant harm that flows from spoofing and related scams.

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345 Scamwatch received a total of approximately 160 000 scam reports in 2017, with almost $90 million reported lost.
346 Australian Bureau of Statistics (ABS), 4528.0 Personal Fraud, 2014–15, 20 April 2016.

Recommendation 3

Telecommunications industry members must, as a priority, collaborate with regulators and government agencies to develop and implement technical solutions, at the network level, to protect consumers from the significant harm that flows from spoofing and related scams.

5.4.5   Potential barriers to switching

We have identified a number of potential barriers to switching for consumers that could disadvantage some consumers and potentially inhibit future competition in communications markets.

Contracts

Contracts may limit consumers' ability to easily switch service providers in the short-term as they typically lock-in consumers for 12 or 24 months, and attract a fee for early exit. This may be inhibiting competition in the migration to the NBN, in particular, as service providers can sign consumers up to contracts on legacy broadband services and then transfer them to the NBN when their area is connected (such as by marketing 'NBN-ready' plans).

This means some consumers may be unknowingly unable to take advantage of the price competition currently occurring in the NBN broadband services market, and new service provider entrants on the NBN may have less opportunity to attract customers. We note that in general most service providers now offer both contract and no lock-in contract options to consumers, so in the long-term, lock-in may be less of a barrier to switching. However, this may continue to cause concern where, for example, no lock-in contract options have a higher monthly cost or offer fewer inclusions. This could mean many consumers may opt for a long-term contract on the basis of price and/or inclusions.

Contracts presented by retailers to consumers may also often include terms and conditions such as early termination fees (discussed further) and automatic renewal clauses, which further lock-in consumers. If consumers are unaware of these terms and conditions, or lack a thorough understanding of the contract they are entering into, they may experience negative outcomes and be unable to take advantage of competitive benefits available in the market.

In addition to this, consumers may not be able to easily identify when their contract ends which could further act to lock the consumer in to their current service provider. Service providers generally do not include the contract end date on the bill, and may not notify the customer when their contract is nearing the end date. Consumers may be able to check the end date by logging into an online account associated with their service, or may have to contact customer service to clarify when their contract ends.

Early termination fees

Early termination fees for contracts may act as a deterrent for consumers who wish to switch service providers as fees may be difficult for consumers to estimate, or consumers may be unaware that a fee exists until they want or need to exit the contract.

Early termination fees usually involve the consumer having to pay out the entire contractual period on a pro rata basis. As ACCAN has noted, formulas for calculating these fees may not be well publicised and even when available may not effectively convey early exit charges to consumers.[347]

For example, a Telstra legacy broadband services customer (ADSL or HFC) on a 12 month contract will have to pay a cancellation fee of up to $360 depending on the time left to run on their contract.[348] An iiNet customer who wants to prematurely end their legacy ADSL contract will have to pay fees of up to $300 if they have more than six months left to run on a 24-month contract or $100 if they have six months or less to run on their contract.[349]

High early termination fees for mobile phone services are also a strong potential deterrent for consumers seeking to end their contract early to switch to a new or better service. For example, if a Telstra customer wants to exit their mobile phone plan, they must pay out the remaining cost of the contract phone plan as well as the remaining cost of the mobile device, if this was included in their plan.

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347 ACCAN, Competition in evolving communications markets—submission by ACCAN to the ACCC, October 2016, pp. 9–10.
348 Telstra, ISP Consumer Guidelines, p. 3, viewed March 2018.
349 iiNet, ADSL2+ Broadband Terms, Fees & Guarantees, viewed March 2018.

For a customer on a Telstra $75 per month plan plus device repayments on a 24-month contract who wishes to exit their contract after six months, this would equate to $1699 to terminate the contract or $995 to recontract by upgrading or changing to an eligible plan.

Other service providers may have different conditions, which can make it confusing for consumers when comparing offerings. Early termination fees can include paying the balance owing for a device, and fees that act to lock a customer in, such as a payment for service for each month remaining on the contract.

For example, for some mobile phone plans signed up to before August 2017, Vodafone calculates mobile phone 'early exit fees' at 50 per cent of the consumers' monthly spend multiplied by the number of months left on the contract, plus any device repayment fees.[350] Dodo also notes it can charge early termination fees for its fixed term mobile phone plans, equal to the monthly fixed charge for each month remaining in the term or $400, whichever is less.[351]

Finding: Early termination fees are a key contract term and must not be more than the reasonable costs to the service provider. These fees may be an impediment to switching providers, particularly in relation to post-paid mobile phone services.

In addition, under the ACL, early termination fees may be unfair if the consumer contract is not sufficiently balanced and/or the fee permits or has the effect of permitting the consumer to be penalised.[352] While the TCP code includes some rules about early termination fees, they relate to the disclosure of termination fees in communications offers and advertising, rather than the level of the fee.

Ensuring early termination fees are adequately disclosed to consumers during the advertising and contracting process is important to ensure consumers are aware of and understand the conditions of the contract and how this might restrict future ability to switch providers.

Submissions to the Draft Report

Communications Alliance: While contracts may limit a customer's ability to easily switch providers in the short-term they also involve a benefit to the customer e.g. a supply of equipment at a subsidised rate or at no charge. Further, there are a range of types of plans available to consumers and the TCP Code has a requirement to include information on the minimum period of an offer and early termination charges in the CIS.

Optus: There are a breadth of plans and options available for consumers for both mobile and fixed line products with a range of contract lengths. It is appropriate for companies to have the discretion to set early termination fees as long as there is disclosure to customers.

We note the concerns from industry that there is a legitimate bargain being reached when consumers commit to a fixed contract and receive benefits such as a subsidised mobile phone. However, we consider there is also room for alternative service offerings to grow, such as short-term and no lock-in contract options, which provide consumers with greater control, flexibility and ease of movement between providers.

We also have concerns in cases where contracts are excessively long. For example, Vodafone and some MVNOs including Woolworths are now offering 36-month contracts for mobile phone plans and are marketing them on the basis that you can spread the cost of a phone over a longer period, to reduce your monthly handset repayment. Longer contracts represent a further barrier to switching and have been been banned in the UK and EU for several years. We are concerned about the introduction of 36-month plans in Australia and will monitor these types of plans closely.

350 Vodafone, Plan details, viewed March 2018.
351 Dodo, Standard Form of Agreement, p. 25, viewed March 2018.
352 *Competition and Consumer Act 2010*, schedule 2, section 25.

Action 11

We will monitor consumer complaints about unfair terms in communications contracts and closely examine 36-month plans. We will also work with industry and government stakeholders to ensure consumers are informed about the potential benefits of short-term or no 'lock in' contract options when migrating to the NBN. As part of the TCP Code review, we will submit that the TCP Code should be amended to reflect the requirement that early termination fees must not be more than the reasonable costs to the service provider. In addition we will submit that service providers be obliged to more clearly identify the contract end date to consumers.

Case study: Email portability

Service providers may offer consumers or small businesses a service provider based email address (such as @bigpond.com) when they sign up for a broadband service, which is typically tied to that service provider. If a consumer or small business wishes to change service providers, they may lose this email address or face high fees to retain the email address. Consumers may immediately lose access to their emails or contacts associated with this email account when they end their contract with the service provider. This could act as a barrier to switching for consumers and small businesses who wish to retain their email address. The New Zealand Productivity Commission and European Commission note that the absence of email portability is a barrier to consumer switching.[353] However, consumers' increasing use of email services separate from their service provider may reduce the impact of email portability issues.[354]

For example, Telstra charges $79 per mailbox (email address) per year, while iiNet charges $25 per year to retain an email address and access to a mailbox.[355] In addition to cost, consumers may also experience the closure of their email accounts for a short period during the transition between service providers. When a Telstra customer closes their account and does not pay the fee to continue their email address, their email address is suspended and any stored emails may be deleted after 30 days.[356] Similarly, TPG may terminate email account access immediately upon conclusion of the contracted service.[357] If consumers and/or small businesses are unaware of these conditions, they may face potentially substantial losses from the deletion of their email accounts.

A consumer may have hundreds of online accounts linked to their service provider based email address, such as online banking, insurance, and online billing for services such as electricity. Updating the email address details linked to various online accounts usually requires a consumer to 'confirm' the update of an email address using their previous email address. In addition, a business with a service provider based email address will typically have invested a significant amount of time promoting their contact details to customers and clients. If a business or consumer is not able to easily migrate their contacts and past emails, and is locked out of the account immediately or soon after their contract ends, this may present a significant number of problems which may act as a barrier to switching.[358]

In comparison, when a consumer switches from one mobile phone service provider to another, it is easy for them to retain their mobile number. There are rules and obligations in place, such as the Mobile Number Portability Industry Code[359] and the Telecommunications Numbering Plan 2015,[360] which govern mobile number portability to ensure a customer's mobile number is moved between providers within a reasonable time.[361]

There are similar rules and obligations governing local number portability, which enable consumers to retain their home phone number when changing service provider. This promotes competition by enabling consumers to easily switch service providers as they do not face losing their phone number and encourages any administrative costs of porting to be absorbed by the service provider that gains the customer,[362] so consumers do not face any fees for switching in this regard.

> Service providers may be able to better facilitate forwarding of contacts and archived emails to a customer's nominated new email address if the customer does not wish to retain their service provider based email address beyond the end of their contract.[363]

In our Draft Report, we proposed to consider the potential costs and benefits of introducing an email portability regime.

Submissions to the Draft Report

ACCAN: Supports an examination of the associated charges and potential mechanisms for individuals to port an email service to other providers, similar to phone numbers.

ACMA: We are seeking information about the role of email addresses in consumer and business purchasing decisions. We are considering a consumer's ability to retain email addresses when switching providers and the cost associated with this service. We will share the research findings once complete.

Communications Alliance: The proposed action is flawed and should be removed.

Department of Communications and the Arts: This is not an issue of major concern to stakeholders and would appear amenable to a range of practical solutions.

Optus: Does not support the proposed regime. There are a large range of email service provider alternatives.

Telstra: An email portability regime would be a disproportionate response to a perceived barrier to switching providers. Changing email mailboxes is not a barrier to switching as customers can forward their email while notifying their contacts before it is closed or pay $79 a year to retain it. Mobile number portability is a misleading comparator and if there was a problem with email portability, it is constantly diminishing given non-carrier specific mailboxes.

TPG: Email portability is likely to produce considerable additional cost for minimal benefit and should be a very low order issue for the ACCC.

The views expressed in the submissions are quite polarised, with industry and the Department of Communications and the Arts submitting that this is not an issue of major concern, and one that may be overcome by practical solutions, while ACCAN continues to support further examination of email portability.

We recognise that consumers have the ability to use non-carrier specific webmail. In this regard we note that Roy Morgan Research suggests that 73 per cent of Australians now use web-based email such as Gmail and Hotmail/Live/Outlook.com. This research also shows that Gmail has almost doubled its user base since 2012 and the adoption of Telstra BigPond email has declined over the same period.[364]

On 15 March 2018, the ACMA released the *NBN consumer experience-residential research snapshot*, part of the ACMA's work program focused on the experience of Australian consumers and business before, during and after migration to the NBN.[365] The snapshot contains early research insights from residential households. A full report is expected in June 2018, and is expected to include the research results for small to medium-sized businesses.

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353 New Zealand Productivity Commission, Boosting productivity in the services sector: 2nd Interim Report Competition and ICT Topics, January 2014, p. 4, viewed on 26 July 2017; European Commission, Commission adopts regulatory proposals for a Connected Continent, 11 September 2013, viewed on 27 July 2017.

354 New Zealand Productivity Commission, ibid.

355 Telstra, Critical Information Summary: Paid Email, viewed on14 July 2017, and iiNet, Closing an account or changing account ownership, 2017, viewed 14 July 2017.

356 Telstra, Support: Email, viewed on 14 July 2017.

357 TPG, Service Description and Terms—NBN, clause 13, viewed on 27 March 2018.

358 Axiom Economics, Is it time to introduce email portability? 19 April 2017, p. 2.

359 Communications Alliance Ltd., Industry Code Mobile Number Portability.

360 Telecommunications Numbering Plan 2015.

361 ACMA, Mobile number portability information, 31 July 2017, viewed on 11 September 2017.

362 Axiom Economics, Is it time to introduce email portability? 19 April 2017, p. 1.

363 ibid., p. 3.

364 Roy Morgan (Australia), Google has just pipped Microsoft to be Australia's top email service provider, 11 July 2016.

365 ACMA, NBN consumer experience: residential research snapshot, March 2018.

The residential research indicates that only 5 per cent of households nominated 'keeping my email address' as the most important factor in their decision making when choosing a new NBN provider and plan. In contrast, 29 per cent nominated cost as the single most important factor in their decision making, while 21 per cent nominated speed of internet connection. A further 14 per cent selected keeping my phone number as the most important factor in their decision-making.[366]

Having had regard to submissions, and the residential research snapshot published by the ACMA, we will await the findings of the ACMA's full report before deciding whether to undertake any further review of email retention offerings.

Action 12

We will await the ACMA's full report, including findings, on its NBN consumer experience residential and small and medium-sized business surveys, and take into account any further evidence identified through that research before deciding whether to undertake any further review of email retention offerings.

Bundling of telecommunications and other services

Bundling may provide consumers with a convenient 'one-stop-shop' option or oblige them to purchase services they do not want (such as fixed line phone services). Bundling can offer benefits to consumers, such as discounted services, convenience of a single bill and provider, as well as access to services otherwise unavailable. However, consumers may be disadvantaged by bundling if the inclusions are not transparent or easily comparable, and/or include unwanted or unnecessary services.

For example, a common bundle offering is a home phone and broadband service, with home phone services increasingly unavailable as a standalone service. This bundle offering may benefit some who require both services, but it could be disadvantageous (financially and otherwise) to consumers who only want one of these services. The individual cost of each service may also be unclear and may impede consumers' ability to accurately compare product offerings.

Bundling can allow service providers to spread their fixed costs over a number of different services. This may result in savings for consumers, making it cheaper for them to purchase a bundle as opposed to purchasing each service separately.[367] Research by the Organisation for Economic Cooperation and Development (OECD) in 2011 found across OECD countries including Australia, on average it was 26 per cent cheaper to purchase a bundle compared to purchasing each service individually.[368]

Bundling may also benefit consumers by offering the integration of services and the ability to use one service on multiple devices.[369] For example, Telstra offers a bundle that includes broadband and 'Smart Home' that allows the customer to remotely control their home power and electronic devices using their smartphone.[370] Optus offer bundles that include broadband and Yes TV, which allows the customer to watch streaming services including Netflix and Stan from one device.[371] iiNet also provide similar bundles which combine broadband with entertainment.[372]

However, the integration of products can be a barrier to consumer switching when bundles require consumers to commit to a long-term contract. If a consumer wants to exit all or part of their bundled services, they often need to navigate numerous product specific processes to change their bundle or service provider.[373] This further leads to the consumer potentially being 'locked in' to their bundled contract because they cannot easily switch provider and at a minimal expense.

Bundling may also reduce competition by allowing a service provider to leverage their market power from one market to another, and reduce the ability of competitors to efficiently compete. Smaller service providers may offer bundles but may be unable to offer the same level of services or add-ons as a larger service provider. In this situation bundling may limit competition when service providers cannot

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366 ACMA, NBN consumer experience-residential research snapshot, March 2018, p. 5.
367 Organisation for Economic Cooperation and Development (OECD), Broadband Bundling: Trends and Policy Implications, 21 February 2011, viewed on 20 September 2017.
368 ibid., p. 3.
369 OECD, Triple and Quadruple Play Bundles of Communication Services, 18 June 2015, viewed on 20 September 2017, p. 7.
370 Telstra, Personal—Smart home bundles, viewed March 2018.
371 Optus, Broadband & NBN Plans, viewed March 2018.
372 iiNet, Fetch Plans, viewed March 2018.
373 OECD, Broadband Bundling: Trends and Policy Implications, p. 36.

replicate bundles because they do not have access to certain networks, content, or important inputs such as the rights to offer certain streaming services, sports, or movies.

Where bundling is used for anti-competitive purposes or there is limited competition this can diminish the benefits bundling may offer consumers in terms of price, choice, and service integration. A lack of competition may result in limited incentives for service providers to compete on price and offerings, which is especially relevant in geographic areas where competition may already be limited.

For example, consumers in regional and rural areas may feel constrained in their choice of service provider if they wish to obtain all their communications services as a bundle. As noted by the NSW Farmers, in some areas, Telstra is the only mobile phone service provider with any coverage (or has superior coverage), thus limiting choice for these consumers.[374]

The OECD notes that complex bundles and communications services have made it increasingly difficult for consumers to understand and compare the price and service characteristics of bundles.[375] A number of factors make it difficult for consumers to compare bundled offerings, such as unclear or insufficient information from service providers about the price and characteristics of the individual services in a bundle.[376] Services may also be packaged in different ways, for example, some service providers may only sell their services in a bundle whereas others may offer services individually and in a bundle.[377] In addition to this, service providers rarely offer identical bundled products.

In summary bundling may act as a disincentive for consumers to switch service provider if most service providers are unable to offer a similar package or inclusions, or if consumers are unable to easily compare service offerings. In addition, as noted by Finder, bundles often require consumers to enter into a long-term contract, making it harder for them to take advantage of any competition that drives down prices.[378]

Consumers need clear and easily comparable information about bundled services and inclusions to ensure they are able to identify what product bundle provides the best value for them in terms of price and service inclusions.

In the Draft Report, we proposed to monitor consumer complaints about bundling and take enforcement action where necessary. In addition, we said we would consider issuing guidance to consumers regarding bundled telecommunications products.

Submissions to the Draft Report

Communications Alliance: Submits that CISs under the TCP Code are a response to customer concerns about the comparability of service offerings. The range of offers are a consequence of industry innovation to address a competitive market, offering a greater selection from which customers can choose.

NSW Farmers: Submits that the proposed action to monitor bundling does not go far enough. NSW Farmers suggests the ACCC examine a provision that would prevent MNOs from bundling mobile and NBN services in regional areas. NSW Farmers also strongly encourages the ACCC to issue a guidance to consumers on what bundles offer the best value, initially to rural consumers.

Telstra: Considers the advantages of bundling far outweigh the risk of any detriment. Considers it would be extremely difficult for the ACCC to issue anything other than very high-level guidance to consumers.

We acknowledge the strong views expressed in the submission from NSW Farmers and, in particular, their concerns about the bundling of broadband and mobile services in rural areas. While we are not empowered to prevent MNOs from bundling mobile services with retail NBN services in rural (or other) areas, we will remain alert to any potential anti-competitive bundling behaviour by MNOs in regional areas.

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374 NSW Farmers, Submission to ACCC Competition in Evolving Markets Issue Paper, October 2016, p. 12.
375 OECD, Broadband Bundling: Trends and Policy Implications, p. 4.
376 Hive Empire Pty Ltd t/a finder.com.au, finder.com.au submission to ACCC Communications Market Study, p. 2.
377 OECD, Broadband Bundling: Trends and Policy Implications, 21 February 2011, viewed on 20 September 2017, pp. 5–6.
378 Hive Empire Pty Ltd t/a finder.com.au, finder.com.au submission to ACCC Communications Market Study, p. 2.

Action 13

We will monitor consumer complaints about bundling and take enforcement action where necessary. We will also consider issuing guidance to consumers regarding bundled telecommunications products.

5.4.6 Promoting competition in the supply of broadband services on the NBN

There is significant structural change occurring in the fixed broadband services market driven by the rollout of the NBN, which recently passed its half-way point. In recognition of this key transition period and the increasing speed of consumer migration to the new network, we have given a specific focus to the supply of broadband services on the NBN to ensure that efficient competition evolves.

In particular, we have examined issues that have arisen in relation to consumer migration to the NBN, such as consumer expectations about speed, service quality and performance on the NBN, which could influence negative outcomes for competition and consumers in the long-term.

A key policy objective of the NBN is to promote greater competition in the supply of retail broadband services by creating a level-playing field through the structural separation of Telstra and creating a new wholesale-only service provider to build and operate the new network. As discussed in section 4.1, we have seen many new service providers enter the NBN broadband market, as well as the expansion of existing, smaller service providers. This means there is more choice for consumers in terms of service providers and product offerings.

However, at this stage, it is unclear whether consumers are able to take advantage of this greater choice, as market shares of service providers on the NBN remain similar to those for legacy broadband services. Furthermore, while we are seeing strong price competition in this market at the moment, there has been limited non-price differentiation (apart from the established focus on data quotas) in terms of speed or service quality and performance, which are key features of the new network.

5.4.7 Consumer migration to the NBN

By 8 March 2018, about 3.6 million premises had activated a broadband service on the NBN.[379] This represents more than half of the 6.3 million premises that are currently ready to connect to the NBN. There may be issues that hinder timely migration to the NBN among households that are ready to connect and this could cause future issues with NBN uptake.

Timely migration of services to the NBN may enable smaller service providers to build scale faster, which will help facilitate greater competition as more providers enter the market and compete on price and service offerings, and will also contribute to efficient use of the new network infrastructure.

The key issues for consumers migrating to NBN include:[380]

- delays in installation which appear to result from missed appointments with technicians, complex installations, unexpected repairs and miscommunication about the availability of the NBN
- insufficient or inaccurate information provided to consumers leading to service performance and speeds below consumer expectations, including reports from some consumers that their NBN service is below the speeds advertised by or purchased from service providers
- lack of clarity as to who is responsible for resolving issues including NBN installation and performance problems, and a lack of coordination by NBN Co and service providers to resolve consumer concerns.

It is evident that the NBN consumer experience can be affected by various factors within the control of NBN Co, wholesale service providers, service providers and/or consumers themselves. This makes it difficult to determine the exact cause of any network issues experienced by a consumer, and makes fault attribution and resolution difficult and time-consuming.

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379 NBN Co, Weekly rollout progress report, week ending 8 March 2018, viewed on 14 March 2018.

380 ACCC complaints data and TIO, Six monthly update—July to December 2016.

We consider that the TIO has an important role to play in monitoring and resolving consumer issues in relation to services delivered over the NBN, and in identifying systemic issues and emerging trends within the broader regulatory framework. The TIO is particularly well placed to navigate complex service relationships and help achieve resolutions in response to individual complaints involving multiple parties and achieve cooperative outcomes with industry in circumstances where numerous individual complainants are experiencing a recurring issue.

In October 2017, the TIO amended its terms of reference to address the increasing complexity of the telecommunications supply chain arising from the rollout of the NBN. The amended terms of reference:

- reflect the legislative requirement for carriers and intermediaries in the supply of telecommunications services (such as aggregators) to belong to the TIO
- strengthen the obligation on members to provide information requested by the TIO in order to resolve a complaint, and
- strengthen the obligation on members, including members other than the service provider, to cooperate with TIO decisions.

In addition, the TIO is well placed to collect granular complaints data that is useful in tracking the performance of service providers as well as NBN Co from a consumer's perspective. This information is also important to the ACCC and other regulators in identifying and prioritising NBN consumer issues as they emerge.

Submissions to the Draft Report

ACMA: The ACMA has concerns that the TIO data is increasingly being considered as the proxy for all consumer complaints about NBN migrations issues. The TIO data is collected for quite different and appropriate purposes, but is not easily modified to fit the needs of regulators and policy agencies. The ACMA is taking steps to improve the transparency of complaints made to service providers about NBN-related services. This will provide a more comprehensive, detailed and relevant data set than the TIO is able to collect.

Optus: Supports the collection of data that will allow specific identification of issues (for example, where an issue may be technology specific), as any proposed regulatory or policy should be appropriately targeted.

TIO: We will explore the collection of technology type for reporting of complaints about services delivered over the NBN, however, this needs to be balanced against the practicalities of consumers knowing their technology type as well as the need to prioritise complaints resolution.

Since the Draft Report, the ACMA's new information standards (and other instruments) have been announced, as discussed below. It is expected that once the information standards are implemented, telecommunications providers will be required to manage, monitor, analyse and record consumer complaints, which should greatly increase the complaints information that is available to consumers.

Finding: We support the recent amendments to the Telecommunications Industry Ombudsman's (TIO) terms of reference that empower it to require all relevant parties in the supply chain, including NBN Co, to cooperate with the TIO in order to resolve consumer complaints. We also support the TIO's ongoing efforts to identify and report on the technology type for NBN-related complaints where it is practicable to do so.

While consumer awareness of the NBN and the need to migrate is increasing, there is still some confusion amongst consumers. For example, NBN migration may be hindered by information asymmetries such as a lack of information about the expected processes for connection, fault rectification and complaint handling as well as who are the appropriate parties to approach or avenues of recourse to pursue, when seeking to resolve NBN-related issues, considering the varying responsibilities of the retail and wholesale suppliers.

We note that the ACMA is collecting information to further examine the NBN supply chain and the roles of various parties including NBN Co and service providers.[381] We also note that NBN Co is working on internal measures to improve the consumer experience when migrating to the NBN as well as working with service providers on a number of strategies to address consumer information, migration and complaints issues.

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381 ACMA, ACMA focus on the NBN customer experience, viewed on 13 September 2017.

The announcement of the new NBN consumer experience measures late last year marks a significant development in the NBN migration, as discussed further. We look forward to seeing the implementation of the new measures and continuing to work with the ACMA and all stakeholders to improve information provision to consumers.

Action 14

We will work with the ACMA to achieve the objectives outlined in the Minister's December 2017 announcement regarding protections for consumers of communications services provided over the NBN.

We will also work with ACCAN, the Telecommunications Industry Ombudsman, and other government agencies to improve information provision to consumers, particularly complaints data.

5.4.8   New NBN consumer experience measures

Since the Draft Report, there have been significant developments in response to the NBN consumer experience. In December 2017, the Government issued a direction to the ACMA to determine and implement new industry standards to improve the consumer experience in the transition to the NBN.[382] The industry standards will be developed and implemented relatively quickly, and must be completed by mid-2018 and in operation (wholly or in part) three months later.[383]

The industry standards will:

- impose obligations on carriage service providers to provide consumer information about NBN services.[384] The consumer information standard is intended to be NBN–specific and to assist consumers to understand the NBN product or service being provided

- require carriers and carriage service providers to provide continuity of voice and/or broadband services if consumers experience issues when migrating to the NBN,[385] and

- address persistent flaws in the complaints handling processes for retail services, including a requirement that telecommunications providers manage, monitor, analyse and record consumer complaints and an obligation on all parties in the supply chain to provide reasonable assistance in managing and resolving complaints.[386]

In addition, the ACMA is responsible for implementing:

- A service provider determination on line-testing which will require carriage service providers to undertake a series of tests after a consumer has activated their NBN service to ensure that the NBN service works and the consumer is getting the broadband speed they have paid for.

- An RKR requiring service providers to report to the ACMA on the number of consumer complaints received. The analysis of this will likely be published on the ACMA's website.

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382 Telecommunications (NBN Consumer Experience Industry Standard) Direction 2017, https://www.legislation.gov.au/Details/ F2017L01711.
383 Section 5(1) Telecommunications (NBN Consumer Experience Industry Standard) Direction 2017.
384 Explanatory Statement to the Telecommunications (NBN Consumer Experience Industry Standard) Direction 2017, p. 2.
385 ibid.
386 Explanatory Statement to the Telecommunications (NBN Consumer Experience Industry Standard) Direction 2017, p. 2.

The ACMA has said that industry co-regulatory arrangements are not serving consumers well in a number of important areas. The industry standards will impose mandatory rules that require telecommunications providers to improve their performance in the above areas. The new rules, unlike co-regulatory industry codes, will be immediately and directly enforceable by the ACMA. If a service provider breaches an industry standard the ACMA can commence court proceedings seeking remedies such as injunctions and civil penalties of up to $250 000. For breaching a service provider rule, the maximum civil penalty a court can impose is $10 million. There are no pecuniary penalties for breaching an industry code.[387]

On 15 March 2018, the ACMA released the first of its three industry standards referred to above which deals with new complaints-handling rules.[388] The ACMA is seeking public comment on:

- the new Telecommunications (Consumer Complaints Handling) Industry Standard 2018 (Complaints-handling Standard). The Complaints-handling Standard will establish rules about how complaints must be managed, including timeframes for response and resolution.
- telecommunications (Consumer Complaints) Record-Keeping Rules (RKRs). The RKRs will require retail service providers to report complaints data to the ACMA on a quarterly basis, so that the ACMA can monitor complaints levels and assess industry's responsiveness to complaints and service issues.

Following a public consultation, the ACMA has indicated that the rules will be in place by June 2018. In accordance with the Minister's direction referred to above, the ACMA is also developing three additional legislative instruments on service continuity, line speed-testing and the provision of information to consumers about migrating to and using the network and expects to commence consultation on these instruments in April 2018.[389]

In addition to the above measures, the Government has required NBN Co to establish a consumer experience dashboard to publicly report NBN connection, fault repair and service delivery performance.[390]

On 13 March 2018, NBN Co announced its new monthly report to track service and quality improvements on the NBN network.[391] The first of these reports is available on the NBN website and includes key measures such as network congestion levels, installations completed right the first time, and the average number of faults.

The ACMA's exercise of its new powers to make standards and rules for NBN services promises to bring clearer obligations on service providers, improvements to the information available for consumers as well as clarity for consumers about what they might reasonably expect from a service provider when they purchase an NBN service.

We are very supportive of these new measures and will continue to work with the Department of Communications and the Arts and the ACMA to ensure that NBN consumers have the best possible information to inform their decisions and to enable a smooth transition to the NBN.

In addition, to inform our ongoing inquiry into NBN wholesale service standards, we will continue to liaise closely with the ACMA in relation to its consideration of NBN supply chain issues and how they affect outcomes at the retail level.

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387 ACMA, ACMA imposes new rules to better protect consumers migrating to the NBN, media release, 21 December 2017.
388 ACMA, NBN migration: complaints-handling rules.
389 ACMA, ACMA moves on new telco complaints-handling rules, 16 March 2018.
390 ACMA, ACMA imposes new rules to better protect consumers migrating to the NBN, media release, 21 December 2017.
391 NBN Co, NBN Co to publish customer experience progress report, media release, 13 March 2018.

5.4.9 Consumer expectations of speed, service quality and performance on the NBN

In 2016–17, the TIO received over 27 000 complaints about services delivered over the NBN. Of these complaints, 16 221 were about services delivered over the NBN and 11 224 were about delays in connection to the NBN.[392]

The top complaint issues about NBN services in 2016–17 were about connection delays, unusable internet services and slow data speeds.[393] In 2015–16 the TIO reported 13 406 overall complaints about NBN services, and an increases in complaints about NBN service faults, such as slow data speeds and unusable services.[394]

While an increase in complaints is somewhat expected, given the increasing number of households connected to the NBN, the TIO considers that the large number of complaints about service and connection issues is cause for concern.[395]

Of complaints that we received about the NBN in the first half of 2017, approximately 69 per cent related to service performance issues. The most common complaint about service delivery issues relate to data throughput speeds being below those advertised by, or purchased from, service providers.

Additionally, we have received significant anecdotal evidence through the market study about service performance issues on the NBN in terms of slow speeds and drop outs, leading to complaints from consumers that they are not receiving what they are paying for.[396]

As discussed in section 5.1, there are a number of issues occurring at the wholesale level that are influencing speed and performance issues at the retail level.

However, consumers may be adversely affected by insufficient information and/or a lack of understanding about different speed tiers available on the NBN, leading to mismatched expectations around speed and performance. The move to the NBN and the introduction of a choice of speeds for broadband means service providers must re-assess how they market their products.

Issues flowing from a lack of consumer awareness about different speed tiers are exacerbated by inconsistent promotion of the available speeds by service providers. Vague speed claims by service providers means consumers do not have accurate or useful information to compare broadband speeds.

Service providers have, until recently, based their advertising on the maximum off peak headline speeds that can be achieved rather than expected speeds. Where this occurs consumers may not realise that the average speeds achievable during typical busy periods may be lower than expected or advertised, as marketing has focused on price and download quotas, and lacked quantified information about what advertised service speeds mean in practice.

We consider that those service providers who have not yet moved to provide typical busy period speed information to consumers should do so to achieve greater transparency around broadband speeds.[397] This will enable consumers to make clearer comparisons between products and further encourage service providers to compete on speed, as well as price and download quotas. This will also encourage service providers to differentiate their services based on non-price factors. For example, Aussie Broadband currently differentiates itself as a premium speed service provider and has recently commenced publishing CVC graphs on its NBN network performance.[398]

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392 TIO, 2016–17 Telecommunications Industry Ombudsman Annual Report, 30 June 2017, p. 28.

393 ibid., p. 29.

394 Telecommunications Industry Ombudsman, Telecommunications Industry Ombudsman 2016 Annual Report, November 2016, p. 15

395 Telecommunications Industry Ombudsman, *Complaints from residential consumers and small businesses about landline phones, mobile phones and internet services increase*, media release, 18 October 2017.

396 TIO, Telecommunications Industry Ombudsman 2016 Annual Report, November 2016.

397 ACCC, Confusion about broadband claims prompts ACCC guidance, 10 February 2017.

398 Aussie Broadband, Get to know our network, viewed on 26 March 2018.

5.4.10   Our role in measuring broadband performance

To enhance consumer awareness and understanding of broadband speeds on the NBN, we are implementing Measuring Broadband Australia, a program to monitor and report on fixed retail broadband performance. Measuring Broadband Australia has been designed to promote competition, better inform consumers and assist us to address misleading broadband 'speed' claims.[399]

The Measuring Broadband Australia rollout commenced in January 2018 and the first public report was released in March 2018.

As well as providing independent information for consumers, Measuring Broadband Australia will give service providers independent performance information to draw on, and will help determine whether any speed issues result from performance of the NBN or service providers not buying sufficient capacity.

It will also highlight whether service providers deliver what is promised in their advertising or at the point of sale, and provide consumers with the information to check that they are getting the speeds that they paid for. This information will also make it easier for consumers to engage with different offerings and make informed purchase decisions based on non-price factors, such as typical speeds and reliability of performance.

Measuring Broadband Australia is similar to established programs in the UK (2008), United States (2010), Singapore (2011), and Canada (2016). Such programs have led to improved transparency of information and increased performance-based competition for broadband services.[400]

The international experience confirms that monitoring programs drive retail competition and differentiation in the broadband market. They also deliver benefits to consumers including lowering barriers to consumer switching, enabling consumers to more easily assess the value of a service, and prompt retailers to compete on performance as well as price and inclusions.

In August 2017, we published guidance for service providers on how to advertise typical busy period speeds for broadband services.[401] We want to ensure the industry is promoting good outcomes for consumers, by publishing accurate information about broadband speeds in their advertising materials.

The guidance is designed to improve information available to consumers and promote competition amongst service providers.[402] There are six guiding principles for service providers to follow when advertising broadband speeds. These include providing accurate information about typical busy period speeds, disclosing any known factors that may affect performance, and presenting performance information in a way that is easily comparable by consumers.

Since the guidance was released, Telstra (including Belong), Optus, the TPG Group (including iiNet and Internode), Aussie Broadband, Foxtel and Exetel have improved their marketing material to provide consumers with information about the typical busy period speeds they should expect. Customers of these providers account for approximately 86 per cent of all services delivered over the NBN. We note that in a review of 131 broadband service provider websites conducted in November and December 2017, the ACMA found 7 per cent had adopted the ACCC guidance on speed labels and 11 per cent included information on typical speed during the busy evening period.[403]

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399 Note: Previously referred to as Broadband Performance Monitoring and Reporting (BPMR) program.
400 ACCC, Confusion about broadband claims prompts ACCC guidance, media release, 10 February 2017.
401 ACCC, Broadband speed claims—Industry Guidance, August 2017.
402 ACCC, ACCC wants NBN plan advertising overhaul, media release, 21 August 2017.
403 ACMA, *Migrating to the National Broadband Network—the consumer experience Review of information retail service providers make available to consumers—key findings*, March 2018, p.4.

Consumer issues in the provision of broadband services, including addressing misleading speed claims and statements made during the transition to the NBN, are a 2018 compliance and enforcement priority for the ACCC, and we will continue to monitor compliance in this area and take action where necessary.[404]

We have already taken action to enforce the ACL in relation to service providers likely misleading consumers about maximum speeds they could achieve on certain NBN services. Between 17 December 2017 and 22 March 2018, we obtained court-enforceable undertakings from Telstra, Optus, TPG, iiNet, Internode, M2 Commander, Dodo and Primus Communications (iPrimus) which each admitted that some of their NBN customers were not receiving the speeds they signed up for and offered compensation to those customers.[405] In response to our concerns, these service providers have also undertaken that, where they advertise or otherwise represent to potential customers that they will receive a particular speed, the service providers will, within four weeks of connecting a new service, check each customer's attainable speed. If it is below the advertised speed, they will notify the customer and offer remedies.

Submissions to the Draft Report

ACCAN: The first results from Measuring Broadband Australia should provide consumers with a clearer idea of how retail service providers design their services to offer different levels of speeds during peak hours and help stimulate greater competition for quality services.

Telstra: Supports the broadband advertising guidance that has been implemented. With regard to Measuring Broadband Australia, Telstra considers there should be sufficient probes to cover the different technologies, geographic diversity and include all service providers, and that each technology type and speed tier should be sampled separately to avoid bias against any service providers who offer different services.

Optus: Supports the review of the guidance in 12 months.

We will continue to implement our Measuring Broadband Australia program and monitor compliance with the speed claims guidance in an effort to improve the quality and accuracy of information for consumers about broadband speeds on the NBN.

Action 15

We will address concerns about the performance of broadband services on the NBN through our Measuring Broadband Australia program, the broadband speed claims guidance, and enforcement action in response to practices that contravene the Australian Consumer Law. We propose to review the broadband speed claims guidance in August 2018 to determine whether it has been effective in addressing consumer concerns about fixed line broadband speed claims.

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404 ACCC, 2018 ACCC Compliance and Enforcement Policy and Priorities, February 2018.

405 s.87B Undertaking to the ACCC by Telstra, 7 November 2017, s. 87B Undertaking to the ACCC by Optus, 11 December 2017, s. 87B Undertaking to ACCC by TPG, 20 December 2017, s. 87B Undertaking to the ACCC by iiNet, 19 March 2018, s. 87B Undertaking to the ACCC by Internode, 19 March 2018, s.87B Undertaking to the ACCC by M2 Commander, 22 March 2018; s. 87B Undertaking to the ACCC by Dodo, 22 March 2018; s.87B Undertaking to the ACCC by Primus, 22 March 2018.

6. Issues requiring monitoring and potential future action

6.1 Competition between network technologies

Voice and broadband services can now be delivered by several different network technologies, such as fixed line and wireless (mobile and fixed wireless), on a variety of devices. Consumers are increasingly indifferent to the underlying network technology, and we have observed rising levels of substitution, particularly for voice services, in recent years.

In the Draft Report, we discussed several potential future scenarios that described how the Australian communications sector might evolve over the next five years based on emerging global trends. The scenarios were developed to facilitate a hypothetical discussion about how potential competition could develop given the present uncertainty about future industry developments. We have provided an outline of these scenarios in Appendix B.

In this section, we explore the trend of substitution from fixed line to wireless services and the demand and supply factors that are determining this trend. We also consider the potential impacts of greater competition between network technologies on the future structure of the communications sector at a high level.

In our consideration of fixed to mobile substitution for broadband services, we have focused on substitution between fixed broadband services, such as those on the NBN, to broadband services supplied by mobile networks, such as mobile broadband (accessed via a mobile phone, tablet with a SIM, dongles or fixed modem).

We have considered factors influencing decisions by network operators about which network technology to use to supply a customer premises, as well as consumer preferences and use of different network technologies.

6.1.1 Supply side substitution between fixed and mobile networks

There is significant change occurring in the communications sector, with the rollout of a new fixed network (the NBN) and the deployment of 5G mobile networks in the near future.

Service providers are undertaking substantial investment to strengthen and broaden their service offerings across different technologies in a bid to stay competitive during this period.

Although 5G networks are yet to be deployed, we consider there is potential for this new technology to disrupt fixed broadband services, as they have the capacity to provide comparable speeds to fixed networks with the added advantage of portability.

The competitive pricing of mobile services with increased data quotas and other inclusions, as discussed in section 4.1, reflects that many service providers, especially the MNOs, may be looking to compete directly with fixed broadband services, particularly for low data users. However, we note the data inclusions for mobile broadband services are still significantly smaller than fixed broadband services and there is uncertainty around the amount of data that will be included for 5G services.

As discussed in section 4.1, we have observed Vodafone expand horizontally into fixed line and TPG deploying its own wireless network, as well as substantial investment in mobile networks from Optus and Telstra in recent years. TPG also owns and operates its own fibre network in some metropolitan areas in direct competition with the NBN.

The ability to provide services on both mobile and fixed networks appears to enhance the competitiveness of service providers (as discussed in section 4.1) by generating more opportunities for product differentiation.

Service providers offering both fixed and mobile services will likely face important investment choices in the next few years, such as whether or not to offer services across all networks, or to focus on one network only. These investment decisions, along with the development of further network capability

and the availability of key supply inputs such as spectrum, small cell infrastructure and transmission, will be important in influencing potential network substitution or convergence in the future.

The most important factors for future growth of wireless broadband services will be availability of, and access to, spectrum and transmission networks to support these services.

Mobile network capability

The capability and capacity of mobile networks has evolved rapidly in recent years. As shown in table 6.1, this evolution has allowed adoption of progressively more sophisticated services, starting with analogue phone calls and now supporting all-IP services with fast broadband data.

Table 6.1: Evolution of mobile network technology[406]

Generation	Primary services	Key differentiator	Weakness (addressed by subsequent generation)
1G	Analogue phone calls	Mobility	Poor spectral efficiency, major security issues
2G	Digital phone calls and messaging	Secure, mass adoption	Limited data rates—difficult to support demand for internet/e-mail
3G	Phone calls, messaging, data	Better internet experience	Real performance failed to match hype, failure of WAP for internet access
3.5G	Phone calls, messaging, broadband data	Broadband internet, applications	Tied to legacy, mobile specific architecture and protocols
4G	All-IP services (including voice, messaging)	Faster broadband internet, lower latency	

As shown in figure 6.1, although 4G and 4G LTE Advanced mobile networks are capable of delivering high broadband speeds, they are unable to support large amounts of data at a comparable cost to fixed line networks.

The deployment of 5G networks will open up the possibility for more direct competition with fixed line networks given that this technology will be able to support theoretical speeds of up to 10 Gbps. However, access to key inputs such as spectrum, small cell infrastructure and transmission networks will influence how future competition evolves.

Figure 6.1:   Maximum theoretical downlink speed by technology generation[407]

* 10 Gbps is the maximum theoretical upper limit speed specified for 5G

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406 GSMA Intelligence, *Understanding 5G: Perspectives on future technological advancements in mobile*, December 2014, p. 5.
407 GSMA Intelligence, *Understanding 5G: Perspectives on future technological advancements in mobile*, December 2014, p. 11.

Spectrum

Spectrum is a key input to the provision of mobile services, and spectrum acquisition and allocation will be significant in determining how future competition and substitution between fixed and mobile networks evolves.

The ACMA has a strong focus on making more spectrum available for 4G and 5G technologies (which have comparable speeds to fixed line networks) and recently commenced a process to re-allocate the 3.6 GHz band for 5G. The ACMA has also indicated that it will fast track the allocation of spectrum in the 26 GHz (mm wave) band. Although the international standard and spectrum bands for 5G are yet to be finalised, both the 3.6 and 26 GHz bands have been identified internationally as particularly suited for 5G applications.

In general, spectrum allocation can have important implications for downstream markets as it influences where service providers are able to offer retail services. At present, competition limits are imposed on the amount of spectrum that can be held by a service provider for each individual spectrum band to help promote competition.

Industry participants at the market study stakeholder forum expressed divergent views on whether spectrum allocated in the 3.6 GHz band should be reallocated for mobile broadband use or remain allocated for use by wireless ISPs. Some stakeholders suggested using dynamic spectrum management and sharing to make better use of limited spectrum allocations. In its submission to the Draft Report, Optus raised concerns about the ability of modern technology to use multiple spectrum bands to offer mobile services and that there are not currently limits on spectrum holdings across bands. We explore this issue further in section 7.3.

Small cell infrastructure

An important characteristic of 5G networks that differs from previous generations of mobile technology is the need for small cell infrastructure to support high frequency spectrum, as well as to improve the capacity of networks to support higher data use, particularly in densely populated urban areas and in rural areas where macro cells might not be commercially viable.

Small cells also help deliver the ultra-low latency supported by 5G. Densification of cells is also a common practice to enhance network capacity. Small cell densification has already been occurring in recent years, particularly in metropolitan centres, as MNOs seek to improve capacity in response to growing demand for data.

A very dense small cell network may exhibit natural monopoly characteristics, given the extensive fibre transmission network needed to support it and associated large up-front costs. At the market study stakeholder forum, some industry participants suggested that given the importance of small cell infrastructure for 5G services, open access to this infrastructure may be important for competition to ensure a level playing field for service providers.

In the Draft Report, we sought views from stakeholders about whether we should assess the merits of open access to dense small cell infrastructure. As detailed, most stakeholders do not believe consideration of open access is needed at this time given the market is still developing.

Submissions to the Draft Report

In the Draft Report, we proposed an action seeking stakeholder views as to whether we should assess the merits of open access to dense small cell infrastructure assets**.**

ACCAN: Supports the proposed action. Dense small cell networks are likely to be critical infrastructure and it would be beneficial to examine the access regime immediately.

Department of Communications and the Arts: Considers intervention of this kind is premature and that regulation could discourage investment.

Optus: The ACCC should keep a watching brief to identify any potential barriers to deployment of small cell infrastructure and look to address any problems through existing regulation.

Telstra: Disagrees with potential open access to small cell infrastructure as it could deter investment.

TPG: The small cell business is nascent and the ACCC should allow the market to develop.

We recognise the importance of ongoing investment in small cell infrastructure to support 5G networks and understand the concerns raised about discouraging investment, given that these networks are at a relatively early stage of development.

In this regard, we have begun to observe a number of MNOs investing in separate small cell infrastructure in close proximity, which suggests there are currently no significant impediments to the deployment of these networks.

We therefore propose to keep a watching brief on how the market develops to ensure that we are in a position to respond should any future competition concerns arise.

Action 16

We will observe the deployment of dense small cell infrastructure and keep a watching brief to identify any potential barriers impeding access to critical infrastructure.

Transmission

Fibre is the preferred technology for backhaul to support the bandwidth requirements of 5G and access to fibre backhaul will be critical for supplying 5G services.

Each of the MNOs currently own and operate fibre transmission networks of varying sizes and reach. NBN Co also has a far-reaching fibre transmission network that could be used to support 5G services.

We discussed the state of competition for transmission networks and potential issues in sections 4.4 and 5.3.

Investment costs

Service providers, particularly existing MNOs, have financial decisions to make about where to direct future investment—to mobile networks, fixed networks, or both.

In Australia, MNOs are already investing in their mobile networks ahead of 5G deployment, anticipated to be from 2019, with Optus recently announcing that it will be 5G capable by early 2019 and Telstra soon after.[408]

In the United States, Verizon has indicated it plans to expand its broadband footprint using 5G to directly connect to premises as it considers this will dramatically change its cost structure.[409] Verizon has stated that revenue generated from fixed wireless services alone justifies the investment required for a 5G network.[410]

However, in contrast, Analysys Mason predicts that 5G will not replace existing fixed next generation access, suggesting it will remain more expensive than fixed line connections.[411]

In Australia, the costs of providing fixed broadband services on the NBN is an additional factor in this investment decision. As discussed in section 5.1, many service providers offering services on the NBN continue to have concerns about NBN Co's long-term wholesale pricing. We acknowledge that since the publication of the Draft Report, NBN Co has made changes to its current wholesale pricing structure, as also outlined in section 5.1, but uncertainty remains around its long-term wholesale pricing.

Service providers were concerned about the cost of supplying competitively priced fixed broadband services on the NBN and some were making a loss on retail NBN broadband services. A potential consequence of sustained low margins is that service providers (who are able) may seek to pursue lower cost alternatives, such as promoting their own mobile wireless broadband services over NBN fixed services.

Service providers with access to both fixed line and mobile networks may also have the option to supply combined service offerings. For example, hybrid modems could allow service providers to provide additional bandwidth at peak evening times using 5G networks rather than purchasing additional CVC on the NBN.

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408 P Smith, Optus promises '15 times faster' wireless internet with 2019 5G rollout, *Australian Financial Review*, 2 February 2018.

409 Verizon, 'Verizon's CEO: Our strategy to deliver the promise of the digital world', media release, July 2016.

410 R Wood *The investment case for 5G mobile is more distant without fixed wireless*, article, Analysys Mason, 19 August 2016.

411 R Wood *5G fixed-wireless: the investment case for operators*, Research Strategy Report, Analysys Mason, 2017.

The deployment of hybrid modems enables greater non-price differentiation and provides a number of potential consumer benefits. These include reducing congestion issues, increasing speeds, enabling internet connectivity prior to fixed line activation, and providing a back-up service when a fixed connection is unavailable due to network outages. At this stage, both Vodafone and Telstra have introduced hybrid modems that deliver some of these benefits.

While NBN Co currently supplies fixed wireless services as part of its multi-technology mix to regional areas it is not active in the provision of mobile services.

In order to make efficient use of the substantial investment in the NBN fibre and fixed wireless networks and capture some revenue from the mobile services market, NBN Co has developed new products that enable mobile service providers to connect to the NBN.

For example, NBN Co offers a Cell Site Access Service product that allows mobile service providers to connect mobile sites using the NBN. At some sites, mobile service providers can install their antennas on NBN fixed wireless towers and use this product to carry mobile voice and data traffic back to the nearest NBN POI. This allows mobile service providers to use the NBN to expand their mobile coverage through tower sharing. This product may also assist service providers to deploy other wireless applications such as Wi-Fi or small cell coverage.[412]

Finding: For NBN Co there will be the threat from increasing substitution to wireless technologies but also the opportunity to use the new technology in its service provision.

While NBN Co's mandate does not extend to the provision of mobile broadband services, we consider that NBN Co should not be constrained from offering supplementary products that make efficient use of its network infrastructure. For example, we note that New Zealand's largest fibre provider Chorus has recently indicated that it intends to provide wholesale fibre to use as backhaul and links between base stations to support future 5G networks.

Following positive feedback from submissions in response to our proposed recommendation that regulation should not constrain competition with the NBN, we have not made any changes to the recommendation proposed in the Draft Report. We will continue to monitor developments in fixed and mobile networks to ensure competition can develop effectively and consider potential changes to regulation as needed.

Submissions to the Draft Report

NBN Co: Recent developments in the supply of fixed wireless and 5G services should be acknowledged and more consideration given to the implications on competition and efficient investment of imposing asymmetric regulation on fixed line services.

Telstra: Regulation should not constrain competition with NBN and the impact on it may be mitigated by providing them with the scope to respond competitively.

TPG: Private capital should be free to compete with NBN on an unconstrained basis. NBN has a distorting impact on the market and should be constrained from entering markets that are or can be serviced by private companies.

We acknowledge NBN Co's comments and will consider these as part of future processes as relevant.

Recommendation 4

Regulation should not constrain competition with the NBN. Instead, NBN Co will require both greater pricing flexibility and continued technology flexibility to respond to market developments.

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412 NBN Co, nbn network to connect first wholesale mobile site, media release, 3 February 2017.

6.1.2　Consumer substitution between fixed and mobile networks

There is a growing preference for mobile voice services and a resultant decline in fixed voice services, as discussed in section 4.1, with 33 per cent of Australian's mobile-only for voice services in 2016.

Many more consumers are considering disconnection of home voice services, as reflected in a Venture Consulting survey (co-funded by the ACCC). Over half of the respondents who were considering disconnecting their fixed line phone said this was because they did not use it enough.[413]

In contrast, a smaller proportion of the Australian population was mobile-only for broadband services in 2016, roughly 20 per cent.[414]

The drivers of substitution from fixed to mobile voice services typically differ to those driving the decision to substitute between broadband services. One key difference is the price structure of the service.

For voice services, mobile offerings typically include unlimited calls, whereas many fixed voice services are pay-as-you-go or offer included calls for an additional fee. In contrast, many fixed broadband services offer unlimited data, whereas mobile services continue to have data caps and include additional charges for more data.

The use of voice and broadband services on the different networks also reflects the consumer preference for mobile voice and fixed broadband services. As shown in figure 6.2, for voice services, mobile services call minutes are increasing, as fixed line call minutes continue to decline.

Figure 6.2:　Voice services (mobile and fixed line originating) call minutes[415]
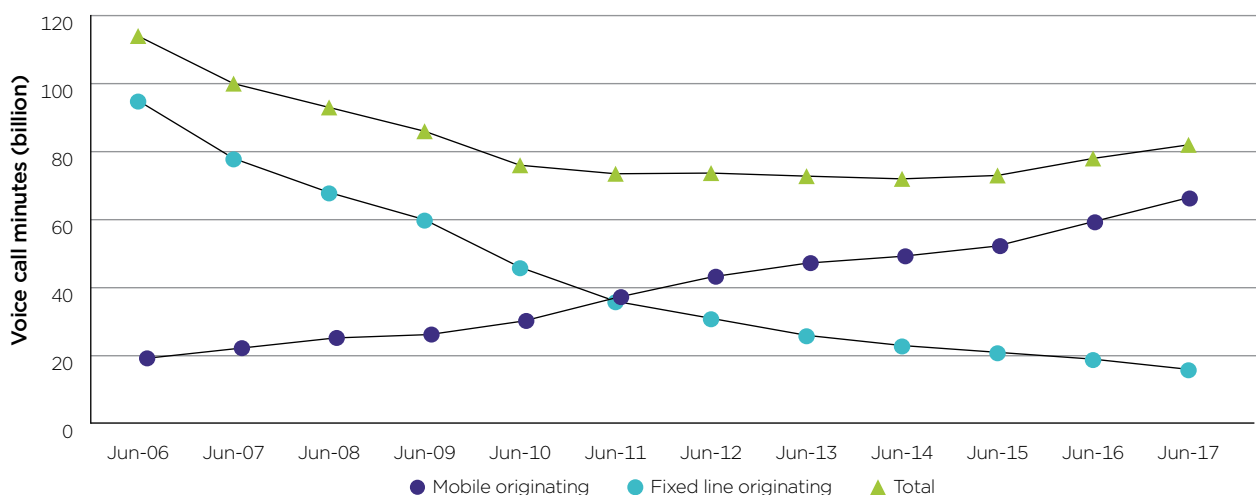

For broadband services, as shown in figure 6.3, the volume of data downloaded on fixed line networks continues to be significantly greater than data downloaded over mobile networks. This is due to fixed line networks typically being able to support higher volumes of traffic across many users and sustain higher download speeds than mobile networks.

413　Venture Consulting, Consumer Survey, December 2017.
414　ACCC calculations based on Roy Morgan Single Source. Roy Morgan Single Source (Australia), January to December 2016, n=14 966, 14+ Australian population.
415　ACCC Telecommunications Reports.

Figure 6.3:   Volume of data downloaded by connection type, percentage of total downloads[416]
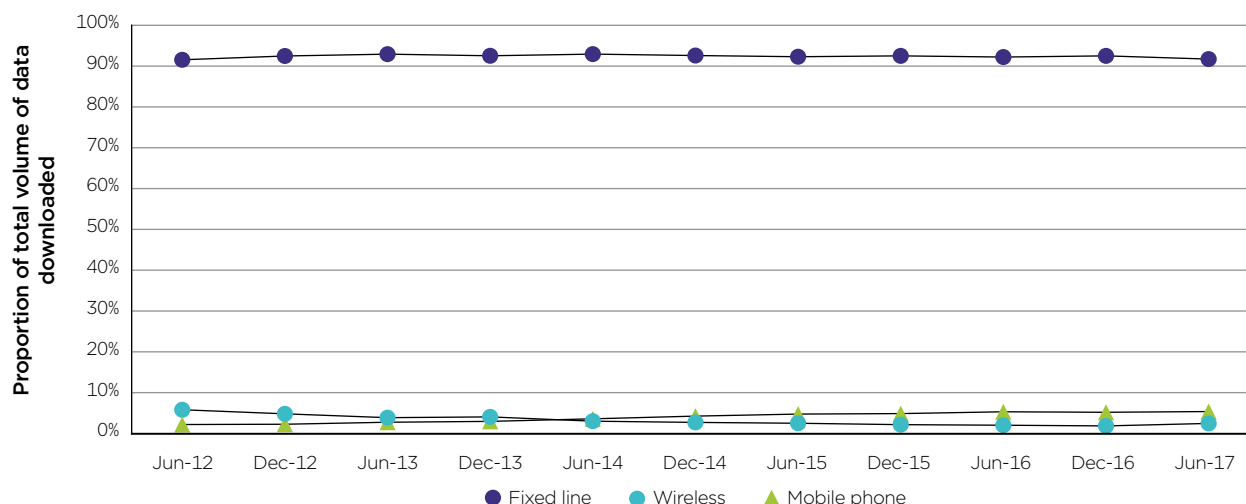
However, while previous generations of mobile technology lagged behind fixed broadband services in terms of speed, the deployment of later versions of 4G has begun to match fixed broadband speeds. The deployment of 5G in the near future will see mobile services capable of achieving greater speeds than many fixed line networks.

This may influence greater substitution by consumers who value speed. For example, of respondents to the Venture survey who were considering switching to a wireless or mobile broadband service, around 30 per cent said this was because wireless options were faster than their fixed line connection.[417]

Another key driver of future observed substitution will be how well the available products and services meet consumers' needs and preferences. For example, when asked why households continued to retain a fixed voice service, 71 per cent of respondents noted it was because it was bundled with their fixed broadband service.[418]

The prevalence of bundled home phone and broadband services offered by many service providers (as discussed in section 4.1) may be artificially inflating the number of fixed voice services in operation, and overstating consumer demand for fixed voice services.

As fixed voice services are typically attached to a fixed broadband service for little or no marginal cost to the consumer, consumers may take up these services with no intention of using them. While there are many service providers who now offer standalone fixed broadband services, some service providers, such as Telstra, only offer bundled products. This bundling may limit further substitution from fixed voice in the future, given Telstra's large market share.

There may also be some barriers to increased substitution between fixed and wireless broadband services, such as the smaller data quotas offered on wireless services, as discussed in section 4.1.

Although mobile phone devices are now the most popular way for consumers to access the internet, the majority of data downloaded continues to be over fixed line broadband services (92 per cent as at June 2017), as shown in figure 6.3.

Respondents to the Venture survey were asked to estimate their average monthly household data usage, as shown in figure 6.4. The majority of those with wireless broadband services (56 per cent of respondents with wireless broadband services, including mobile broadband, fixed wireless and satellite, (both NBN and non-NBN)), estimated they downloaded less than 50 GB a month, compared to fixed line broadband households, who estimated usage of more than 200 GB a month.

416   ABS, 8153.0 Internet Activity, June 2017, viewed on 29 September 2017.
417   Venture Consulting, Consumer Survey, December 2017.
418   ibid.
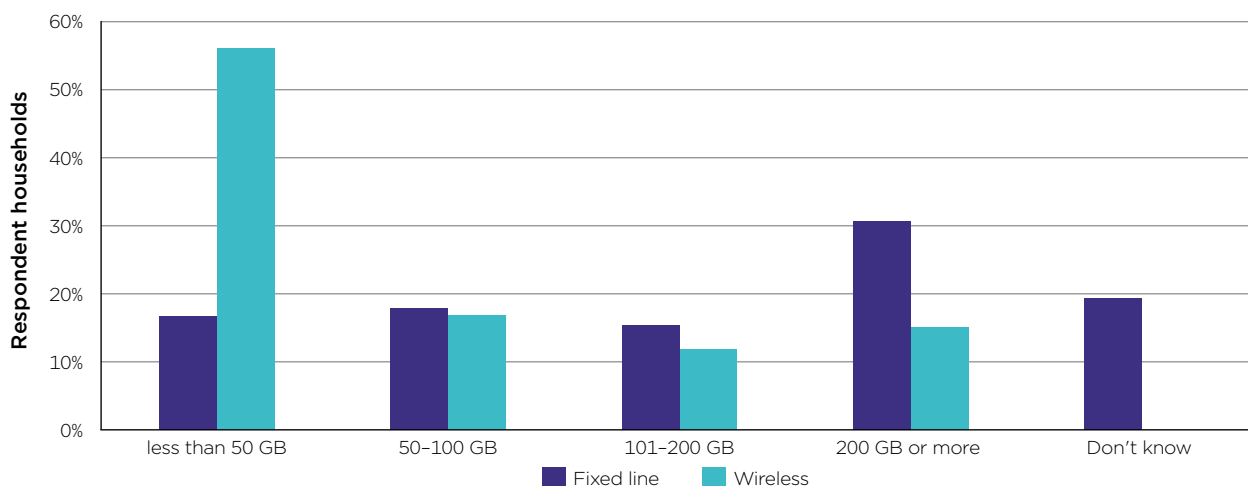
Data downloaded is expected to continue its rapid growth as higher bandwidth applications are introduced and adopted. For example, NBN Co forecasts that data demands will grow at 20 to 30 per cent a year until 2025.[420] Based on this assumption, we estimate that the median data demands will range from 236 to 353 GB in five years.

As shown in figure 6.5, for consumers who currently want more than 200 GB of data each month, fixed line services (such as the NBN) continues to be the main option. Most service providers now offer unlimited data for fixed line broadband services, whereas only one wireless provider, Vividwireless (owned by Optus), now offers unlimited data.[421]

Figure 6.5:   Example of broadband plans on the NBN and mobile networks and median data downloaded per household[422]

At this stage, it is unclear whether or not wireless services will be able to support the ever increasing data demands of users. Although the average mobile data inclusions have grown by about 60 per cent between 2012–13 and 2015–16,[423] they are still significantly lower than those offered by fixed line services on the NBN for example, as shown in figure 6.5.

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419 Venture Consulting, Consumer Survey, December 2017.

420 NBN Co, Corporate plan 2018, August 2017.

421 We note that this service is advertised as up to 12/1 Mbps (the same as the lowest NBN speed tier) and is only available on the Optus 4G plus network using a Vividwireless supplied modem. See Vividwireless, Critical Information Summary—Vividwireless Unlimited Data, viewed on 6 February 2018.

422 Home wireless services included fixed wireless services using the mobile network with a modem inside the customer's premises.

423 We note that if you use 2011–12 as the base year then this figure is 35 per cent.

NBN Co estimates that the average amount of data downloaded each month on the NBN was around 200 GB, however, this is inflated by a small number of very high users. A more informative estimate of data usage is the median amount of data downloaded, which NBN Co estimates to be around 100 GB per month.[424] As shown in figure 6.5, there are a few mobile options that could accommodate this data usage, but the majority of larger data quotas are still provided by fixed broadband services (represented as NBN services).

However, we have seen significant increases in mobile data quotas in recent years, and continued growth along with the deployment of 5G networks, may see more comparable data offerings in the near future.

For example, in the United States, the use of fixed broadband services has largely plateaued, only increasing 3 per cent from 2013 to 2016. In contrast, a growing number of Americans now report using their smartphones as their primary means of online access at home, with 12 per cent of American adults estimated to be smartphone-only internet users in 2016.[425]

Another factor that may influence future substitution is consumer preference for greater download speeds and constant connectivity. According to the Venture Survey, consumers' reasons for considering switching from fixed to wireless broadband are focused on service quality and portability, with those considering switching to mobile broadband typically residing in metropolitan areas.

The deployment of 5G networks is anticipated to have a substantial impact on future fixed and mobile services markets, with its ability to deliver broadband services at a higher speed than some fixed technologies. We consider the potential for substitution to be greater for consumers in metropolitan areas, as they may have better access to 5G networks and are more likely to already be mobile-only for voice services.

Another factor influencing consumer decisions to substitute away from fixed broadband services in Australia specifically, may be the consumer experience with the NBN.

For example, nearly half of respondents to the Venture Survey noted concerns about the NBN as contributing to their consideration to switch to a mobile or wireless broadband service. Furthermore, around 15 per cent of users are estimated to be dissatisfied with the NBN,[426] and these consumers may seek to explore different technologies to see which best suits their needs.

Finding: At this time we do not consider wireless broadband to be a complete substitute for fixed broadband services. However, the degree of future substitution to wireless technologies will in part depend on the consumer experience on the NBN, in addition to technical factors such as wireless capacity.

It will be important to ensure there is sufficient choice for consumers in terms of service provider, product and price differentiation and the underlying technology (for those who want to choose), as the line between network technologies becomes increasingly blurred.

We will continue to monitor how industry developments and competition impact consumer outcomes and the extent to which consumers have a choice of broadband services to best meet their needs.

6.1.3   Implications for competition

As discussed, the above suggests that those service providers who are already offering fixed and mobile services will likely have an even greater competitive advantage over single-service providers, as long as they can avoid cannibalising their existing subscription base.

This aligns with some international communications markets, such as the United States, where the large telecom companies provide wired and wireless services. However, in the UK, horizontal integration is less common with only the incumbent BT integrated across fixed and mobile broadband markets. In the UK, there are four main fixed (BT, Sky, TalkTalk and Virgin Media) and mobile (BT/EE, Vodafone, O2 and 3) network operators.

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424 New Street Research, February 2018.

425 Pew Research Center (Internet and Technology), Mobile Fact Sheet, 5 February 2018.

426 Jennifer Dudley-Nicholson, News Corp Australian Network, *NBN Co admits more users 'than ever' are suffering slow downloads as consumer groups call for reform,* viewed on 11 October 2017.

To date in ACCC regulatory processes, wireless/mobile and fixed line services are generally treated as separate markets given the limited substitutability.[427] However, as substitution increases and the underlying network technologies converge, distinct market definitions may no longer be appropriate.

At this stage, we do not have strong concerns about the extent of horizontal integration given the limited substitution between fixed and mobile broadband services, and the presence of four large service providers across these markets. However, we will continue to observe market developments, and ensure that we have the appropriate market definitions to determine regulatory settings that support economically efficient outcomes.

Action 17

We will observe the take-up of different broadband technologies and continue to assess relevant market definitions in the communications sector as we undertake our regulatory functions.

6.2   Potential competition concerns in relation to newer communications services

6.2.1   Content delivery networks, cloud computing and data centres

We have not identified any current competition concerns in relation to the CDN, cloud computing and data centre markets. As discussed in sections 4.6, and 4.9, we observe that the markets for the supply of data centres, CDN and cloud computing services are growing rapidly to meet the demands of the digital economy, and are characterised by entry and innovation. As discussed in section 4.10, emerging applications such as IoT and artificial intelligence are likely to influence how these service markets develop (for example, driving shifts to edge computing and distributed data centres versus trends for more centrally located cloud service models and data centres).

While there are local suppliers of these services, well-resourced international firms with expertise and strong brand recognition have been able to overcome the high sunk costs and risks associated with entry. As these markets mature and demand growth moderates, the relatively high level of entry and innovation may also slow.

While there are no immediate competition concerns, as with many of the markets examined, there are features and characteristics, which may lead to low level risks of competition and consumer issues emerging over the medium to longer-term. Broadly, these relate to:

- Network effects—particularly for cloud computing and data centre markets, which, as the markets mature, encourage concentration and the potential for market power issues to emerge.
- Consumer (and business customer) issues arising from the collection, storage and use of data—for example, cloud computing service providers may be able to inhibit consumer switching through their control of their customers' data.
- Bundling (in conjunction with broadband service providers) and other lock-in strategies through the use of proprietary standards may also be employed by cloud service providers.

Submissions to the Draft Report

In our Draft Report we proposed to follow developments in these markets to ensure that competition is not undermined over time and take appropriate competition enforcement action if necessary (proposed action 26).

Telstra: Agrees with the ACCC's proposed action. However, it considers that formal monitoring is not required, rather the ACCC should rely on ex-post powers if competition issues are identified.

Action 18

We will follow developments in the markets for Content Delivery Networks, cloud computing and data centre services to ensure that competition is not undermined over time and take appropriate action if necessary through use of our general competition law powers.

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427 See, for example: ACCC, Superfast Broadband Access Service declaration inquiry final decision, July 2016.

6.2.2   Over-the-top services

As described in section 4.8, OTT services cover a varied and dynamic range of services available to consumers and business. The emergence of OTT services has largely been a positive development for consumers. The availability of OTT services provides consumers with new services (such as entertainment, social media, ride-sharing, shopping, etc.) and innovative alternatives to traditional communications services (such as voice and text messaging) which are disrupting service delivery models.

In general, we consider these developments have a strong pro-competitive impact on a variety of markets. OTT services have taken advantage of the lower barriers to entry created by broadband connectivity and technology to exert a new and innovative constraint on traditional service providers. In many cases, OTT services have circumvented longstanding bottlenecks (such as the pay TV content market) to challenge incumbents.

We have observed that the current state of competition for OTT services is vigorous and dynamic, with continued new entry to the market, often from international firms, providing greater choice for consumers. Broadband and mobile service providers impacted by this new wave of competition appear to be reacting in a pro-competitive manner. While we consider that the conditions and prospects for competition both within OTT services and between OTT services and traditional services are likely to remain strong, there are a number of low-level risks including:

- the emergence of net neutrality issues, including arbitrary and undisclosed traffic management
- the potential for broadband service providers to defer or reduce network investment as OTT services capture an increasing proportion of consumers' spend
- OTT markets becoming concentrated due to network effects with the potential for individual players to acquire market power and potentially leverage into adjacent markets
- regulatory settings not keeping pace with the changing market and leading to distortions in competition.

While we consider that the risk of net neutrality issues emerging in Australia remains relatively low due to the level of retail broadband competition and countervailing power of many OTT services, there is the potential for isolated instances of broadband and mobile service providers being able to foreclose innovative services in an opportunistic manner. The potential for broadband service providers to implement traffic management without fully disclosing this to consumers is also an ongoing concern to which we remain vigilant.

Despite the potential for tensions to emerge, the growing popularity of OTT services does not appear to have had a significant detrimental impact on network investment or the business models of broadband service providers who, to some extent, benefit from additional demand for connectivity.

We note that many of the concerns that may arise in relation to the growing platform dominance of some OTT service providers have an international dimension. While we are not considering these issues as part of the market study, we note that fast-changing technology and rapidly evolving digital markets can result in dominant players being challenged or displaced by rivals with technological or other innovations in a short space of time. Consequently, we consider that an evidence-based approach should be adopted in assessing any potential competition concerns in relation to digital markets and that (where necessary) ex-post intervention is likely to be better adapted to address such concerns than ex-ante regulation.

While consumers are increasingly using OTT services to replace traditional services, particularly for content and communications, their use can often be complementary as well. As noted at the market study stakeholder forum, there are often quality and service standard differences between OTT and traditional services arising from the fact that OTT service providers do not control the access network and cannot make assurances about quality.

Submissions to the Draft Report

In our Draft Report, we proposed to explicitly examine competitive constraints posed by OTT services on traditional communications services as part of future access regulation inquiries. We also proposed to pay close attention to issues including traffic or price discrimination and disclosure of traffic management practices by broadband service providers, as well as developments in key OTT service markets including the ability of some platforms to amass market power (proposed action 24).

ACMA: OTT services do not always match the services they replicate. Relationships between consumers and the providers of OTT services are different to those with communications service providers and this must be taken into account in regulatory approaches.

The growth of OTT services is affecting regulatory arrangements across the communications and media environment and creating complex supply chains. The Government's proposed review of communications consumer safeguards will be a suitable forum for consideration of the treatment of OTT services in regulatory frameworks.

Telstra: The competitive dynamism exerted by OTT services opens up opportunities for decreased regulation.

Traffic management is necessary for network performance but broadband service providers should be clear about what their customers can expect from their services.

Telstra agrees that OTT services continue to grow in popularity and are necessitating continued investment in capacity by network providers. It supports principles of net neutrality and agrees that current conditions in Australia are favourable for an open internet without the need for regulation. It also supports ex-post rather than ex-ante regulation as it is more appropriate for the rapidly changing environment.

We agree that the Government's proposed review of communications consumer safeguards will provide an opportunity to examine the regulatory treatment of OTT services. We also agree in principle that the role of ex-ante regulation may recede if communications markets continue to evolve competitively.

Finding: The competitive relationship between OTT services and the traditional communications services they replicate is likely to be different for each type of service. To the extent that competition from OTT services acts as a constraint on pricing, there may be a case for reducing or removing existing economic regulation of traditional communications services. For example, consumers' use of OTT messaging services may have diminished the need for ongoing SMS regulation.

Action 19

We will explicitly examine competitive constraints posed by over-the-top (OTT) services on traditional communication services as part of future access regulation inquiries. In addition, we will pay close attention to:

- any traffic and price discrimination of OTT services by broadband service providers (through blocking, throttling, prioritising and un-metering)
- the impact of traffic management practices by broadband service providers (in response to increasing traffic volumes), whether this is performed in a competitively neutral manner, and the adequacy of disclosure to their consumers. Should broadband service providers fail to fully disclose to new and existing customers how their traffic management policies may impact their services, we will consider the need to develop appropriate principles and industry guidance as well as consider enforcement action where appropriate
- the development of key OTT service markets, which we propose to report on as part of our annual telecommunications report
- potential harm arising from the ability of OTT platforms to amass market power (which we have excluded from this market study). We note that the ACCC (pursuant to a Government direction) is currently undertaking an inquiry into the impact of digital platforms (including search engines and social media platforms) on competition in media and advertising services markets.

6.2.3   Internet of Things

As discussed in section 4.10, the IoT rubric captures a heterogeneous range of services of varying levels of development and competitive dynamics. While connectivity is a key element of IoT supply chains, connectivity requirements vary according to the needs of the IoT application. The current key unfolding development is the rollout of new specialised IoT networks (taking advantage of relatively low barriers to entry offered by the use of class licensed spectrum). In response, mobile service providers are making modifications to their networks to target these growing service markets.

We are currently observing entry from local and international IoT providers and strong demand from consumers, businesses and the public sector for productivity enhancing IoT applications. Given the relative immaturity of IoT services, compounded by the broad and growing range of applications, it is difficult to assess the current state of competition. However, participants at the market study stakeholder forum noted that issues with accessing international roaming in Australia and resistance to the implementation of e-SIMs (as a replacement for physical SIM cards) posed a potential barrier to Australia keeping pace with IoT adoption overseas.

Case study: e-SIMS

Physical removable SIM cards are being replaced by dynamic reprogrammable e-SIMs embedded in wireless devices. e-SIMs enable the miniaturisation of connected devices to provide new services to consumers as well as expand the range of IoT applications.

We consider that e-SIMs have the potential to greatly promote competition in the IoT sector (and the broader mobile sector) by facilitating consumer switching. However, we are concerned that restrictions associated with the e-SIM model are impeding the ability of some mobile service providers, who have not reached agreement with device manufacturers to offer these devices, to compete with the mobile service providers who have, thereby reducing consumer choice.

As ACCAN noted in its first submission to the market study:

> 'There are clear competition issues, with the e-SIM and Apple SIM models. In Australia, consumers can only select a plan with Optus, Vodafone and Telstra. Consumers cannot sign up for a service with any MVNOs.' [428]

By way of example, we understand that the Apple Watch 3 LTE is currently only available in Australia through the MNOs. Offering devices containing e-SIMs requires agreement between the network operator and device manufacturer. Currently, no Australian MVNO has an agreement with Apple to offer the Apple Watch. In contrast, physical SIMs can be used by any MNO or MVNO to supply wireless services to mobile devices without the involvement of the device manufacturer.

The large number of potential IoT applications that can be adopted across wide sections of the economy and latent demand for these solutions suggests that as a whole IoT services will continue to grow rapidly. We note that processes and strategies are in place to address many of the potential risks and inhibitors to the development of IoT identified in section 4.10.[429] These tend to relate to policy, regulatory and standards matters (such as spectrum availability, interoperability, standards, resilience and consumer issues relating to data, security and privacy) largely associated with the novel nature of these services and their interaction with legacy frameworks. We consider that these matters will continue require focus over the short- to medium-term until the sector matures. At which point, any IoT-related competition and consumer issues are likely to more closely resemble those of other digital and communications markets.

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428 ACCAN, Competition in evolving communications markets—submission by ACCAN to the ACCC, October 2016.

429 For example, the Australian Government's Digital Economy Strategy will seek to develop Australia's digital economy including the adoption of IoT services by identifying the opportunities, risks and challenges (see https://industry.gov.au/innovation/Digital-Economy/Pages/default.aspx).

Submissions to the Draft Report

In our Draft Report, we proposed to continue our involvement in relevant external processes which seek to address key impediments and competition and consumer issues to foster a vibrant IoT sector in Australia. We also proposed to explore concerns regarding restrictions associated with the e-SIM model that we considered may impede the ability of MVNOs to compete with MNOs (proposed action 25).

ACMA: Notes the critical role of spectrum in the development of IoT technologies. The ACMA explains the steps it has taken as part of its spectrum management role to meet the increasingly complex demand for spectrum as IoT develops. These include taking action to expand the spectrum available for Low Interference Potential Devices as well as bringing forward a work program to support 5G adoption that is likely to facilitate further IoT growth.

Notes that the integration of communications services with other industry sectors where IoT services emerge, introduces complexity into supply chains and will test current regulatory arrangements. The ACMA recognises this and will continue to engage and support the initiatives of the IoTAA in identifying and mitigating the risks of consumer harms from IoT.

Telstra: Submits that issues such as the lack of interoperability between networks and service layers are not a concern, as this reflects the different technical attributes of IoT solutions, which are used in different applications.

Optus: Submits that it is the device manufacturers, which may hold market power in relation to e-SIMs. Device manufacturers decide which (mobile network operator or mobile virtual network operator) network their device can operate on and the terms.

Action 20

We will:

- continue our involvement in relevant external processes in relation to Internet of Things (IoT) spectrum, NBN and consumer/data issues run by the ACMA, the Internet of Things Alliance Australia (IoTAA) and other government departments
- continue to work with IoTAA in its various work streams
- explore concerns regarding restrictions associated with e-SIMs (and Apple SIM) adopted by device manufacturers which may restrict competition between service providers in the offering and use of e-SIM devices and how this issue develops as e-SIM based devices become more prevalent
- more generally, periodically examine the development of competition in key IoT sectors for signs of concentration or conduct of concern. This will involve monitoring features of the market including the number of market participants and their market shares; the degree of interoperability at the network and service layers; and availability of suitable wholesale access products. We will consider the value of incorporating this monitoring activity as part of our annual telecommunications report.

7.   Policy implications and priorities

This section sets out our views in relation to communications sector policy issues, which have interdependencies with competition, efficiency and consumer issues. We first consider policy implications for the current regulatory and competition arrangements, which we administer. We then consider policy priorities more broadly. These relate to reviews either currently being undertaken, or that have recently been finalised. They have either immediate or longer term implications.

7.1   Current regulatory and competition arrangements

To a large extent, the regulatory regime for communications has to date been one of up-front economic regulation. We have set up-front terms and conditions of access to monopoly services to promote competition in related markets, and to set a price for the monopoly service that encourages efficiency and investment

However, we may also have recourse to the specific set of anti-competitive conduct rules applying to the communications sector, and the general competition law provisions in the CCA to ensure that markets are competitive and delivering good outcomes for consumers.

We have noted a number of issues within the communications sector in the preceding sections that may require regulatory responses. However, consistent with our Draft Report findings, we have not found any major deficiencies in the current communications regulatory arrangements that we administer which require redress. On the contrary, our view is that the current arrangements have remained largely fit for purpose as communications markets have continued to evolve, and appear to be well suited to deal with the immediate and longer term issues we have identified.

Importantly, we have a range of regulatory tools available, if required, to deal with the issues identified with respect to NBN pricing and service standards, access to aggregation and other critical wholesale inputs, information gathering, market reporting and monitoring and consumer protection.

We consider that there is far less need for us to step in and set terms and conditions up-front for newer communications services. Looking further ahead, should competition concerns arise in relation to the provision of these services, we will address these concerns in the first instance through use of the specific communications and general competition law provisions in the CCA.

Keeping ourselves informed of market developments will remain critical. Communications markets can develop rapidly, which means that sometimes, problems can emerge very quickly. As a regulator, we need to be informed so that we can engage effectively, whether that means responding to problems when they arise or advocating for competitive outcomes before then. To this end, we have proposed that we undertake a number of additional information gathering and monitoring tasks within the communications sector.

Submissions to the Draft Report

Communications Alliance, Telstra and the Department of Communications and the Arts agree to varying degrees with our draft finding that the competition and regulatory arrangements we administer remain fit for purpose.

Department of Communications and the Arts: Notes the recent changes proposed by the Government, such as provision for functional separation. It also considers that there is a need for continual review of the appropriateness of regulation, including examination of the need to apply consistent vertical separation regulation to fixed wireless and fixed line services if the former were to become substitutes to the NBN.

NBN Co: Notes concerns about asymmetric regulation applying to NBN Co and other providers, particularly in the supply of fixed wireless and business services.

Telstra: Notes RKRs can be a burdensome form of regulation that often signal future regulation.

We acknowledge that changes to regulation proposed by the Government, to allow functional separation as an alternative to structural separation, could relieve some of the regulatory burden on NBN competitors.

We consider that the asymmetric regulation of NBN Co and other providers remains appropriate while NBN Co maintains its level of dominance in the particular markets in which it operates. We note that the level playing field protections afforded to NBN Co enable it to maintain its cross-subsidisation of non-economic services to regional and remote areas of Australia.

Should fixed wireless become a recognised substitute for high-speed fixed line broadband services, the need to apply consistent vertical separation regulation is likely to depend on the relative market power of firms within the sector (possibly within particular geographic areas rather than nationally), in addition to the technological substitution possibilities. However, given that fixed wireless substitution would represent an increase in competition; this would more likely signal a need to remove separation requirements on fixed line services.

We recognise that RKRs and other forms of compulsory information disclosure can be burdensome on industry, and we take into consideration the value of the information in assisting us fulfil our functions under the CCA and the burden on the recipient(s). We consider that information obtained pursuant to an RKR may be indicative of the need for either increased or decreased regulation depending on what it reveals about the functioning of markets.

> **Finding:** The current communications regulatory and competition arrangements that we administer have remained largely fit for purpose as communications market have continued to evolve, and appear to be well suited to deal with the immediate and longer-term issues we have identified in the market study. We acknowledge that changes to regulation proposed by the Government to allow functional separation as an alternative to structural separation could relieve some of the regulatory burden on NBN Co's fixed line competitors. We consider that given its dominant market position, greater regulation of NBN Co than its competitors remains appropriate.

7.2 Market structure evolution—NBN disaggregation

The expected evolution of wireless technologies as major substitutes to fixed line networks and the privatisation of the NBN will present an important opportunity to examine whether competition within the sector can be enhanced by disaggregating parts of the NBN that might be able to compete with each other. This was raised in a submission to the Draft Report.

> ### Submissions to the Draft Report
>
> **Gary McLaren** (former Chief Technology Officer of NBN Co): The monopoly wholesale infrastructure model of the NBN is flawed. Future reform should include disaggregation of NBN technologies to enable them to compete with each other and removal of level playing field provisions that restrict other fixed line providers from competing with the NBN, to promote technologically neutral infrastructure competition. NBN Co should be required to implement changes to its systems and reporting in anticipation of this disaggregation, to be monitored by the ACCC. Telstra should also undergo horizontal separation to address its ongoing dominance, which is likely to be further embedded with the emergence of 5G.

In our submission to the Vertigan review we stated that:

> *...while natural monopoly characteristics [in telecommunications] may be present in many circumstances, there may be other instances in which it will be economically efficient for there to be multiple operators of particular network infrastructure. In particular, areas with lower cost of deployment and relatively dense customer distributions may be more efficiently served by competing infrastructure.[430]*

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430 ACCC, ACCC submission to the Independent Cost Benefit Analysis Review of Regulation first issues framing paper, 14 March 2014, p. 4.

The Vertigan review recommended that NBN Co's transit, satellite, fixed wireless and HFC networks be disaggregated and divested with a view to delivering greater infrastructure competition.[431]

After the release of the Vertigan report findings proposing NBN disaggregation, we indicated that we agreed that the opportunity offered though disaggregation of the NBN to provide for infrastructure based competition should be embraced. We further stated that this should be done prior to privatisation, and that early systems, accounting and reporting arrangements should be put in place to ensure that separation is able to proceed in the future.[432]

In responding to the Vertigan recommendation on this matter, the Government has stated that priority be given to completing the rollout of the NBN, but that it would be prepared to consider disaggregation after this and in the process leading up to its privatisation (including examination by the Productivity Commission). The Government also proposed that NBN Co introduce separate accounts for the FTTx, HFC, fixed wireless, satellite and transit business and proposed an examination of the feasibility of having readily separable operating and business support systems (OSS/BSS) by an independent party.[433]

We understand that NBN Co has introduced separate accounts for the different lines of its business, which it provides to the Government. In addition, we understand a report was commissioned by NBN Co on OSS and BSS separation and provided to the Government, but neither the report itself nor its findings have been released publicly.

We consider that privatisation of the NBN following completion of the network rollout should not be undertaken in a way that limits competition in order to maximise the sale proceeds. Rather, privatisation of the NBN will provide a unique opportunity to put in place a market structure with the potential to deliver effective infrastructure-based competition, such as through the horizontal disaggregation of NBN Co by different network technologies or areas of coverage. To achieve the competition objectives, the disaggregated parts would need to be able to contest each other's customer base. In our view, this form of infrastructure-based competition would encourage ongoing investment in network upgrades and deliver price benefits and improved services to consumers over time.

We note that the Government does have a policy objective of disaggregation of the NBN once the rollout is complete. In our view, it is imperative that actions be taken to provide further detail and planning for this. We are concerned that if measures to help facilitate separation are not put in place at an early stage, such as separate OSS and BSS, it will become more costly to implement later on, which could be used as a basis for not proceeding with the separation of NBN Co. We acknowledge that it is current Government policy for the form of disaggregation to be part of the Productivity Commission's remit in examining the NBN prior to privatisation. We are keen to see that this remains the case, but also consider that anticipatory actions should continue to be taken prior to this inquiry commencing.

Recommendation 5

The Government should continue planning for the future disaggregation of the NBN and ensure that measures are in place to enable the NBN to be split into competing networks, to provide a market structure that will facilitate greater infrastructure-based competition. The form of any disaggregation and privatisation should also be part of the terms of reference for the Productivity Commission's future inquiry into regulatory, budgetary, consumer and competition matters relating to the NBN.

Finally we note the concern raised about the possibility of Telstra using its dominant position in infrastructure necessary for 5G (such as ducts, fibre and exchanges) to leverage dominance to 5G.

We consider that there are existing or potential access arrangements that might be used to address any such dominance by Telstra, and it is not clear to us that any pre-emptive action is required given the evolution of 5G services still remains largely speculative.

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431 M Vertigan (Chair), Independent cost-benefit analysis of broadband and review of regulation—NBN market and regulatory report, June 2014, p. 73.

432 R Sims, 'Solving the multi-technology puzzle: The ACCC's perspective', NBN Rebooted Conference, Sydney, 17 November 2014.

433 Australian Government, Telecommunications regulatory and structural reform, December 2014, pp. 6–9.

7.3 Spectrum management

Spectrum is an essential input into wireless markets and services. Without access to adequate spectrum, industry participants cannot offer competitive services. In this environment, ensuring that the impact of spectrum allocation on downstream retail markets is given equal weight to upstream wholesale spectrum markets is vitally important.

A spectrum reform and legislation package is currently being progressed by the Department of Communications and the Arts. This package outlines how new legislative arrangements and proposals for spectrum pricing and the management of Commonwealth spectrum might operate together.

The spectrum reform package is occurring at a time when changes in the market structure and the rollout of new mobile networks are dependent on the availability of spectrum. For example, TPG's recent acquisition of spectrum and forthcoming entry into the provision of its own mobile services, as well as more broadly the increasing use of fixed wireless services.

As set out in our submission to the process considering the exposure draft for the Radiocommunications Bill 2017, we are encouraged by the proposed intent of the new spectrum management framework to simplify the licensing and allocation processes, to establish a more flexible and efficient regime, and to create the conditions to promote secondary trading.[434]

However, we consider it is essential that the proposed reforms take into account the impact on competition in the downstream markets for which spectrum is an input. In particular, there is a need to strengthen the proposed regime in relation to competition assessments in the allocation of spectrum that will, or is likely to, impact downstream retail markets.

We therefore welcome the Department of Communications and the Arts' recent advice to us that s. 50 of the CCA, which prohibits acquisitions that would result in a substantial lessening of competition, will be reinstated in the Radiocommunications Bill to apply to allocations where licence issue limits have been imposed. In a market that is changing rapidly, and in which spectrum scarcity could result in adverse outcomes for end users, this application of s. 50 will help to create a disincentive for anticompetitive conduct and a means for us to intervene if necessary.

We consider it highly desirable that we are consulted regarding spectrum allocations where there are competing demands and interests for that spectrum. These are typically spectrum auctions ('market based allocations') that are likely to impact downstream mobile markets. In the context of the Radiocommunications Bill's requirement that the ACMA promote the long-term public interest derived from the use of the spectrum, we consider it desirable that the ACMA has a positive obligation to consult with us when it is proposing to allocate spectrum where there are competing demands and interests for that spectrum.

We note that in practice the consultation requirement would generally be invoked in respect of major allocations, primarily though not limited to, spectrum auctions. Accordingly, we think the risk of gaming in such situations is small as auctions are typically conducted when there is a clearly established demand for spectrum from multiple players. Furthermore, such processes typically take time to plan, design and conduct, and thus we do not consider that consultation would affect these timeframes. Indeed, in such important spectrum allocations, it is critical that the proper consultation process be conducted in an open and transparent way, including consultation with industry and publication of our advice in full.

We note that regulatory measures such as spectrum set-asides and reduced fees are used by regulators internationally to promote competition in relevant wireless and mobiles markets by assisting new entrants and smaller incumbents. While we welcome ACMA's clarification in its submission to the Draft Report that the Radiocommunications Bill provides a set of flexible powers that could allow for similar such mechanisms, we consider it would be optimal to be more specific in the legislation to avoid the risk and uncertainty of legal challenge if they were used. At the least, if the radiocommunications regime explicitly recognises the need to promote competition in relevant markets, then it will be clearer that such mechanisms specifically designed to promote competition are permitted.

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434 ACCC, Submission in response to the Exposure Draft—Radiocommunications Bill 2017, 31 July 2017.

With regard to the proposed benefits of the regime, we strongly support spectrum sharing and secondary trading, noting these have the potential to improve efficiency. For example, secondary trading could enable smaller wireless operators to gain access to the spectrum they need on the secondary market rather than compete with larger players for large geographic licences. Secondary trading may be assisted by licences issued for fixed terms and with clear renewal terms, although we recommend that the ACMA consult with us if such measures were going to be put in place. Optimally, for significant licences with clear demand, auctions rather than renewal should be undertaken to ensure that the spectrum is allocated to the highest value user, as this may have changed over the period of the licence.

We will continue to engage with the Department of Communications and the Arts and the ACMA on these matters.

Submissions to the Draft Report

In the Draft Report, we proposed to strongly recommend that the radiocommunications regime explicitly recognise, and do more to promote, competition in relevant markets.

ACCAN: Supports the proposed recommendation.

ACMA: Not supportive of the proposed recommendation on the basis that the objects under the Radiocommunications Bill already require the promotion of the long-term public interest, which is broad enough to encompass competition issues.

Disagrees with a requirement for mandatory consultation with the ACCC, and that putting this in primary legislation would be inconsistent with the intention of a flexible and responsive framework. It could also cause time delays in allocations, procedural risk and gaming.

Disagrees that s. 50 should apply when competition limits apply, as this would increase uncertainty about regulatory treatment of the allocated spectrum, which could deter confidence in the predictability of spectrum management arrangements.

ASTRA: Supports the proposed recommendation. Notes its submissions to the Radiocommunications Bill process regarding concerns about FTA spectrum.

Communications Alliance: Seeks more information on the ACCC's suggested methods for the explicit recognition of competition in the radiocommunications regime.

Department of Communication and the Arts: Notes there needs to be a balance between certainty for potential and current spectrum holders and flexibility for industry and regulators to respond to spectrum needs. Noted the exposure draft of the Radiocommunications Bill requires the ACMA to consult the ACCC where appropriate and practicable.

Macquarie Telecom: Agrees with the finding and the proposed recommendation. It considers that Australia's position of international leadership in spectrum management has been eroded partly due to the institutional structure of regulation and calls for greater collaboration between the ACCC and the ACMA. It considers a portion of spectrum should be reserved in future allocations for use by MVNOs or via a requirement to provide MVNO services based on network slicing.

Optus: Supports the continued use of competition limits, but considers the ACCC should extend its focus for assessing competition caps from single bands to spectrum ranges. In particular, to ensure spectrum ownership does not become a bottleneck, the ACCC should focus its competition assessment on licences across all sub-1GHz LTE bands.

Telstra: Considers the proposal that the ACMA consult with the ACCC on all spectrum matters where there are competing demands or an impact on downstream markets may create a risk of litigation where ACMA decides these factors don't apply. Argues that to consult on all allocations would be unworkable given the sheer volume.

Supports mandatory consultation with industry on spectrum limits and a requirement for detailed reasons for the decisions to be published. Also supports the proposed exclusion of s. 50 where licence limits are issued, with mandatory reviews of licence limits after a set period. Considers that the tests for determining licence limits should be more clearly identified and applied consistently and that consideration should be given to how limits will apply when multiple licences are issued for the same spectrum.

TPG: Strongly supports better regulation to facilitate competition for mobile and wireless services. Considers it critical that the ACCC and the ACMA ensure that operators with an incentive and ability to limit or hamper competition are not permitted to do so.

Vodafone: Supports the proposed recommendation. Considers the ACMA should be required to proactively consider whether a licence limit may be appropriate and to consult with the ACCC. Considers it may not be appropriate to entirely exclude the ACCC from s. 50.

Argues the proposed spectrum allocation of 125 Mhz in 2018 is insufficient for 5G and that the ACCC should work with the ACMA and the Government to ensure a clear roadmap for larger quantities of spectrum.

Considers smaller firms and new entrants are at a substantial disadvantage where only large spectrum lot sizes are offered. Highlighted concerns with timing of auctions and previous reserve prices and expressed a preference for staggered payments.

The high level of attention the issue of spectrum allocation received in submissions to the Draft Report reflects its very important role both in the future of wireless technologies in Australia and more specifically in promoting competition and economic efficiency in downstream markets.

In light of this role, it remains our view that promotion of competition should be an explicit objective in the Radiocommunications Bill and that the ACMA should be required to consult the ACCC on auctions for spectrum suitable for mobile and wireless broadband communications services.

We agree with comments that licence issue limits should not necessarily be limited to single bands, noting this reflects recent comments by ACCC Chairman Rod Sims that the ACCC wants to consider spectrum holdings holistically rather than in particular bands.[435]

We strongly consider that s. 50 should still apply where licence issue limits have been imposed given the dynamic nature of the market where competition may be impacted even after licence issue limits have been imposed, including in ways not envisaged by the licence issue limits themselves.

Section 50 is an important economy-wide competition safeguard, well understood by the market. While the ACMA argues that investment certainty will be achieved by the carve-out of s. 50, we consider that the loss of certainty afforded to all market participants by disallowing a key component of competition law, is a greater risk to the competitive functioning of the market.

We therefore welcome the Department's advice that under the Radiocommunications Bill s. 50 will continue to be applied to allocations where licence issue limits have been imposed.

Regarding spectrum allocations for particular technologies and entities identified in submissions, as well as auction design, we look forward to working closely with the ACMA in future to address these demands and requirements.

Finding: Spectrum allocation and management is increasingly important for communications markets. The value of spectrum lies in the economic and social benefits it supports, rather than in any revenue return to the Budget. The Government's proposed new radiocommunications regulatory framework does not explicitly recognise the impact of spectrum allocation and assignment on competition and efficiency in downstream retail markets.

Recommendation 6

We recommend that the Radiocommunications Bill explicitly recognise the promotion of competition in its objects and require the ACMA to consult the ACCC on potential competition issues in relevant markets.

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435 ACCC, ACCC welcomes 5G but flags competition issues, media release, 1 November 2017.

7.4   Data availability and use: a new Consumer Data Right

The Productivity Commission (PC) recommended that the Government introduce a general right for consumers to access their data in the report of its inquiry into Data Availability and Use, released in March 2017.

Since the Draft Report was released there have been some significant developments in this area.

The Assistant Minister for Cities and Digital Transformation announced in November 2017 that the Government would introduce a Consumer Data Right, first in banking, and then in the energy and telecommunications sectors.[436] The announcement is part of the Government's response to the PC's report, and the remainder of that response is expected in due course.

The Government separately committed in the 2017–18 Budget to an 'Open Banking' framework, allowing customers greater access to their banking data, and in the second half of 2017 undertook a review to consider how Open Banking could be implemented. The Treasurer released the report of this review on 9 February 2018. The report makes it clear that Open Banking would result in the implementation of a general consumer data right in the banking sector. The report also sets out the overarching framework for a consumer data right that could apply in other sectors of the economy, as well as outlining how the right would be implemented in banking.

The report makes 50 recommendations on a range of matters relevant to the implementation of a consumer data right. These include the proposed regulatory framework, the data that should be within the scope of the right, necessary privacy and security safeguards to ensure trust and integrity in the system, and the technical standards that should underpin data transfer. The report also proposes a multi-regulator model for the right, with the ACCC as the lead regulator, recognising the competition and consumer implications of the proposal. The Office for the Australian Information Commissioner would have responsibility for privacy protection.

The Treasury undertook further consultation on the Open Banking report, and submissions were due by 23 March 2018, prior to the Government making final implementation decisions.

7.4.1   Support for a Consumer Data Right

As outlined in section 5.4.1, we consider that information plays an important role in facilitating competition and enabling consumers to make more informed choices and decisions. We continue to strongly support the implementation of a consumer data right, including in the telecommunications sector.

Giving consumers greater access to and control over the data that is held about them by business, including the ability to direct that such data be copied and provided to a third party, is a significant competition and consumer reform. Consumer-directed data portability enhances consumer participation and assists consumers to make better purchasing decisions. It assists consumers to compare competing offers, and to make more informed decisions about which products and services best suit their needs. It should also make the act of switching from one service provider to another easier for consumers, particularly for more complex products and services where there can be a reluctance to change. This in turn should contribute to greater competition between service providers.

A consumer data right should also generate wider benefits in terms of innovation, both within and outside the communications sector. For instance, consumer-directed data portability could give service providers more information to make more tailored offerings to consumers, and to innovate and market new or different products and services that better meet consumer preferences. This could also include new entrants, as directing data to start-ups could assist in lowering barriers to entry.

There has been and continues to be a shift in data use. The way data is used is changing rapidly, and the ways in which businesses collect and use data derived from consumers is radically different to even ten years ago. Business is extracting value from this data but consumers may not be, hence a consumer data right that seeks to enable consumers to share in the benefits is an important and positive step.

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436 Angus Taylor (Assistant Minister for Cities and Digital Transformation), Australians to own their own banking, energy, phone and internet data, media release, 26 November 2017.

We agree with the Open Banking final report that trust and confidence in a consumer data right are essential to its success in delivering competition and consumer benefits, safeguards to protect privacy and security, and to ensure accountability, will therefore need to be important features of the regime.

Submissions to the Draft Report

ACMA: Supports the Productivity Commission's recommendations, but considers provision of raw information by itself is unlikely to achieve its intended purpose. Data should be in an easy-to-use format and align with standardised publications such as the CIS.

Communications Alliance: Supports the top line objectives of the Productivity Commission recommendations but further clarity and discussions are needed before moving forward.

Telstra: Supports the proposed direction for data reforms in Australia and supports consumers and businesses having data related to their use of products and services but would prefer a narrower and clearer definition of consumer data. Consumers today have access to more information than ever before which has empowered them to make informed purchasing decisions.

We continue to support the implementation of the Consumer Data Right in telecommunications and other sectors.

Finding: We support the implementation of the Consumer Data Right in the telecommunications and other sectors.

Recommendation 7

The Government's implementation of the Consumer Data Right should be extended to the telecommunications sector, as planned. This will allow consumers to have access to relevant data about themselves, and to provide this data to nominated third parties, enabling them to make better purchasing decisions as well as encourage service providers to make more tailored offerings to consumers.

7.5   Mobile Black Spot Program

Both Commonwealth and state governments have used mobile coverage subsidy programs to improve mobile coverage in areas of low demand. These programs include various past projects under the Commonwealth Government's 'Networking the Nation' program and the Western Australian Government's 'Royalties for Regions' initiative. Recent or current programs include the Victorian Government's 'Regional Rail Connectivity Project' and the Commonwealth's Mobile Black Spot Program (MBSP).

The MBSP aims to improve mobile coverage and competition in regional Australia by providing funds for MNOs to build or upgrade mobile base stations in regional, rural and remote areas of Australia which currently have poor, or no, mobile coverage. The Government has so far allocated $160 million under two rounds of the program, with an additional $430 million contributed by state and local governments, mobile operators, and local organisations. The Government has announced it will conduct a third round under which it will allocate a further $60 million.

We consider that funding programs of this nature have the potential to promote investment in mobile infrastructure in areas where there is no mobile coverage. However, the MBSP appears to have been implemented with insufficient weight given to competition when allocating funding.

We note that the co-subsidy nature of the program results in sites that are of marginal commercial value becoming commercially viable once capital costs are subsidised. This means that governments are subsidising individual commercial concerns and may be limiting the potential for these programs to promote competition for mobile services by providing an MNO with a competitive advantage in competing for customers in certain areas. We consider that requirements that ensure effective co-location or co-building of sites under these types of programs will deliver more benefits to those regional consumers who are seeking improved coverage and a better return for the public money expended.

Department of Communications and the Arts: The MBSP has sought to effectively balance competing objectives of coverage and competition. This has been done through robust and measurable coverage criteria, and by providing incentives for co-location. Currently, co-location appears to be working effectively under the program, and occurs or is planned for around 87 base stations.

Regional Development Australia (NT): The ACCC should include a strong recommendation that future infrastructure funding through MBSP be tied to open access requirements, given it appears to have been implemented with insufficient weight being given to competition. The co-location arrangements under the MBSP are unsuccessful with less than 4 per cent of Telstra's round one towers shared.

Telstra: Does not consider that it would be appropriate to mandate roaming on MBSP sites although it is not clear as to the form of open access that the ACCC is advocating. However, it supports some forms of open access such as co-location. Telstra welcomes further engagement with the ACCC and other stakeholders on the future of the MBSP with the objective of ensuring positive outcomes for consumers in regional areas.

Vodafone: There are a number of measures the ACCC could consider if it is serious in its intent to ensure that subsidy schemes do not harm competition. These include, using its information gathering powers to publish the extent of co-location, and/or requiring access and setting prices for co-location.

Feedback from our recent Regional Mobile Issues Forum on 28 February 2018 was that improvements regarding co-location could potentially be addressed in the ACCC's forthcoming review of the Facilities Access Code. In particular, participants raised issues that co-location requirements work well for brownfield sites, but do not work so well for greenfield sites, including those built under the MBSP. These issues will be explored in the Facilities Access Code review.

Since we published our Draft Report, the Department of Communications and the Arts has announced the third round of funding for the MBSP, the Priority Locations round. It is expected that the outcome of the Priority Locations round will be announced early this year.[437]

We recognise the tension between promoting competition, which may take time to deliver benefits to consumers, and programs that may provide immediate benefits to consumers in the form of improved coverage and network quality. Nevertheless, we consider that improvements in program design that take competition issues into account need not be at the expense of a subsidy program's main objectives.

Finding: We consider that Commonwealth, state and territory government mobile coverage programs are important in promoting investment in areas where there is no mobile coverage. However, ensuring that competition issues are taken into account when designing such programs will deliver greater benefits to competition and consumers and need not be at the expense of the program's main objectives.

7.6   Regional Broadband Scheme

The Regional Broadband Scheme (RBS) aims to establish funding arrangements to provide broadband services to regional, rural and remote Australians. Modelling by the Bureau of Communications Research (BCR) has estimated that NBN Co fixed wireless and satellite networks will incur a net cost of around $9.8 billion over 30 years. These costs are currently cross subsidised by NBN Co's profitable fixed line connections. Under the proposed RBS, carriers that provide active high-speed, fixed line broadband services to premises on their network would contribute to subsidising these services, through a charge of around $7.10 per premises per month. The charge will not be imposed on fixed wireless or mobile broadband operators.

When we originally commented on this proposal, we accepted the BCR's view that only imposing the charge on NBN equivalent services (as opposed to introducing a broader industry levy) would better encourage NBN Co to contain costs to efficient levels because it would continue to bear most of the

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437 Department of Communications and the Arts, Priority locations round opens, 22 November 2017.

funding responsibility for the non-commercial services in question.[438] Our comments were directed mainly at addressing the merits of the funding principles and proposals put forward as alternatives by the BCR, rather than articulating our own.

We accept that increased substitution towards fixed wireless and mobile broadband services raises questions about the funding base of this scheme. Attendees at the market study stakeholder forum in July 2017 also suggested the scheme could distort market outcomes in favour of service providers (such as those using fixed wireless and mobile networks) that the charge did not apply to. NBN Co's CEO has even suggested that NBN Co may need further protection from wireless competitors to sustain its financial viability.[439]

In its final consultation paper on NBN non-commercial services, the BCR acknowledged that the introduction of 5G technology may see an increase in the level of substitution.[440] It therefore indicated that future consideration will be required on how funding arrangements adjust over time.

As the substitutability of wireless and mobile broadband services increases, the fact that the RBS is not applied to these services may indeed further help to underpin this substitution and distort market outcomes. However, our view is that direct budget funding of noncommercial services rather than an extension of the RBS charge to other types of services would be preferable given that direct budget funding would be the least distortionary alternative and not serve as a means of protecting the NBN from network competition.

The Telecommunications Legislation Amendment (Competition and Consumer) Bill 2017, currently before Parliament, requires that a review is undertaken in the first four years to ensure the funding base for the scheme remains appropriate.[441] This review is separate to those we undertake to assess the charge amount every five years. The four-year review will provide an opportunity for the Government to consider whether increased substitution across technologies brings into question the suitability of the RBS charge as a mechanism to fund non-commercial NBN services.

Submissions to the Draft Report

Several submissions to the Draft Report comment on the RBS charge, and the majority (including submissions by **McLaren, Telstra, Optus, TPG, Vodafone and ACCAN**) support our recommendation that direct budget funding of regional and remote communications services is preferable to extending RBS contributions to other technologies, such as fixed wireless.

Regional Development Australia (NT) and the Department of Communications and the Arts take an opposing view, with the latter noting that an arrangement where NBN Co is required to fund the majority of the costs of the RBS means that it has an incentive to constrain the costs of supplying regional and remote communications services.

We continue to have concerns about the impact of the RBS and the prospect that it is extended to other services as a means of protecting the NBN from competition. Our view is that direct budget funding of regional and remote communications services is preferable. We note that there are means of providing the incentives to contain the costs of providing services with direct budget funding, such as the use of competitive tendering (if there are potential alternative providers) and cost reduction incentive schemes.

Recommendation 8

The Regional Broadband Scheme (RBS) should not be extended to wireless services. The extent to which wireless services constrain fixed line broadband services is evolving and should not be inhibited by policy or regulatory changes to assist NBN Co. Greater substitution across technologies would also bring into question the suitability of the RBS charge as a mechanism to fund non-commercial NBN services. We propose direct budget funding as it would be the least distortionary alternative and not serve as a means of protecting the NBN from network competition.

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438 ACCC, Submission to final consultation: nbn non-commercial services funding options, November 2015.

439 P Martin, NBN needs protection if it is to make a profit: CEO Bill Morrow, Sydney Morning Herald, 23 October 2017.

440 Department of Communications and the Arts, Final consultation: nbn non-commercial services funding options, 13 October 2015.

441 Telecommunications Legislation Amendment (Competition and Consumer) Bill 2017, Explanatory Memorandum, p. 10.

Appendix A

List of submissions to the Draft Report

Australian Communications Consumer Action Network

Australian Communications and Media Authority

Australian Subscription Television and Radio Association

Communications Alliance

David May

Department of Communications and the Arts

Gary McLaren

Macquarie Telecom

MessageMedia

MNF Group

NBN Co

NSW Business Chamber

NSW Farmers

Optus

Regional Development Australia (NT)

Telecommunications Industry Ombudsman

Telstra

TPG

Vocus

Vodafone Hutchison Australia

Appendix B

Potential future scenarios for the Australian communications sector

In the Draft Report, we discussed several potential scenarios setting out what the Australian communications sector might look like in the near future, developed for the ACCC by iMediate Consulting.[442]

These scenarios were based on current trends in fixed and mobile technologies, and were intended to help us better understand the potential opportunities and barriers to competition between these technologies. The scenarios were not intended to be exhaustive, and were developed in light of the challenges of forecasting future developments in the sector given the large number of unpredictable variables.

These scenarios rely on assumptions made by iMediate Consulting and do not represent the ACCC's views on whether or not they will occur.

Four scenarios were developed, as depicted in figure 8.1, and are outlined in more detail.

The main differentiating features of these four scenarios are plotted on the horizontal and vertical axes. Overall market growth, on the vertical axis, identifies whether there is an expansionary economic environment in terms of revenue, costs, profits and margins for those in the telecommunications market. Infrastructure investment, on the horizontal axis, identifies the possible separate or converged infrastructure models the market can develop, partly in response to market growth on the vertical axis.

Figure 8.1:   Communications market scenarios[443]

Fixed and mobile infrastructure investment

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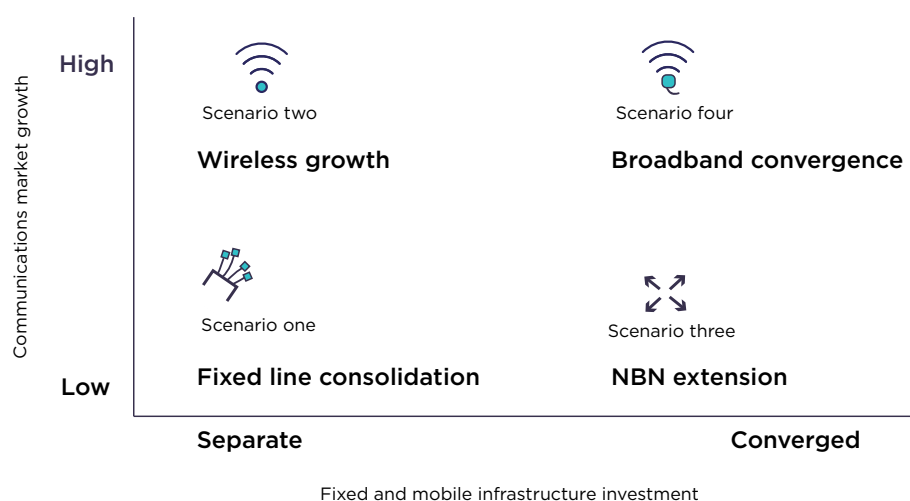
442   These scenarios are based on those originally discussed by Robert James in *How NBN will be shaped by wireless competition and opportunity*, Communications Day, 18 April 2017. The scenario names and discussion have been summarised and adjusted for the purposes of this report.

443   Scenario analysis by iMediate Consulting, prepared for the ACCC.

Scenario one: fixed line consolidation

Scenario one, 'fixed line consolidation', describes a market that experiences low communications earnings growth across both the fixed line and mobile sectors. NBN Co delivers broadband services largely as expected in its recent corporate plans, and meets forecast revenue growth. Non-NBN fixed wireless and other alternatives to the NBN capture a small market share only. The Government places a priority on managing the returns from the NBN to recover costs.

Mobile wireless does not make major inroads into the residential or business sector and there is limited technological substitution. MNOs do not develop a dense small cell layer and convergence between fixed line and mobile networks is not realised. NBN Co does not look to expand its wireless products further than the existing fixed wireless footprint. As a result, fixed line technologies continue to connect the majority of premises.

Scenario two: wireless growth

Scenario two, 'wireless growth', describes a market with higher growth than scenario one. Adoption of NBN services and mobile broadband are both robust and 5G shows considerable promise. The availability of spectrum suitable for 5G (including the 3.6 and the 26 GHz bands), international agreement on standards, and strong consumer demand all enable strong 5G infrastructure investment. The MNOs commence developing a fibre backhaul network to support dense small cell infrastructure, which supports both mobile devices—tablets, phones and dongles—as well as 5G modems dedicated for fixed home internet usage.

These small cell networks begin overbuilding the NBN in high revenue areas. NBN Co does not directly respond to the growing competition and significant technological substitution occurs. Customers move from the fixed line NBN networks to wireless networks that are able to offer better value. 5G fixed wireless slowly becomes the favoured option of broadband retailers to reduce their costs of delivering broadband to the home.

Scenario three: NBN extension

Scenario three, 'NBN extension', considers a low market growth environment and how NBN Co could potentially respond to support investment in wireless technologies. The MNOs are unable to efficiently invest in small cell infrastructure. Instead, NBN Co upgrades its fibre network to include 5G small cells and wholesales to MNOs. MNOs continue to own their macro-cell infrastructure. This scenario would see NBN Co providing wholesale access to both fixed line and small cell mobile networks.

Scenario four: broadband convergence

Scenario four, 'broadband convergence', considers an environment where commercial operators build the next generation of fixed wireless broadband at an accelerated rate to scenario two. This is dubbed 'wireless fibre' by some international operators due to the high penetration of wireless small cells being enabled by large-scale fibre backhaul networks. The Government decides to accelerate the sale of NBN Co ahead of schedule to support this investment, and maximise profits from the sale of the assets. Following the sale of NBN Co, the commercial operators incorporate NBN assets into 'wireless fibre' and add their own small cell wireless equipment. However, not all of the NBN assets are sold to commercial operators, and some are used to provide broadband services in economically unviable areas such as regional and remote Australia.