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Productivity Commission

Telecommunications Universal Service Obligation

Productivity Commission
Inquiry Report

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The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

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28 April 2017

The Hon Scott Morrison MP
Treasurer
Parliament House
CANBERRA ACT 2600

Dear Treasurer

In accordance with Section 11 of the *Productivity Commission Act 1998*, I have pleasure in submitting to you the Commission's final report into the *Telecommunications Universal Service Obligation*.

Yours sincerely

A handwritten signature in black ink, appearing to read "PL".

Paul Lindwall
Presiding Commissioner

Terms of reference

I, Scott Morrison, Treasurer, pursuant to Parts 2 and 3 of the *Productivity Commission Act 1998*, hereby request that the Productivity Commission undertake an inquiry into the future direction of a universal service obligation in an evolving telecommunications market.

Background

Historically the standard voice telephone service has provided the basis of a ubiquitous telecommunications service which has been a fundamental part of Australian society. To ensure the benefits of this basic service are as widely available as possible, the regulated standard telephone service and payphones Universal Service Obligation (USO) provides for access to a standard telephone service and payphone services to consumers, where provision of those services might otherwise not be commercially viable. The USO is supported by a combination of ongoing funding from the Australian Government and an annual levy on carriers.

The Australian telecommunications sector has undergone significant changes over the last two decades, in market structure and technology, and will continue to evolve. There has been rapid and continuing technological development and innovation across the industry, with significant expansion in the availability, use and sophistication of mobile services, and ever increasing demand for broadband data services (including Voice Over Internet Protocol services). Demand for standard (fixed line) voice services and payphones has reduced and continues to decline.

The Australian Government is rolling out the National Broadband Network (NBN) which will use a range of technologies to provide a capped price wholesale-only broadband platform to all premises. NBN Co will deliver fast broadband to Australian premises as the infrastructure ‘provider of last resort’. The availability of universal broadband will provide a platform for increased competition in the development of retail products and services for consumers.

In the context of these and other changes, the current USO arrangements may not be effective.

Scope of the inquiry

The primary policy question to be addressed in this inquiry is to what extent, in the evolving Australian telecommunications market, Government policies may be required to support universal access to a minimum level of retail telecommunications services.

This will involve a consideration of the nature, scope and objectives of a universal service obligation, whether the retail market for relevant services will deliver appropriate outcomes for consumers without Government intervention and, if not, what options should be considered by Government to deliver universal services and the costs and benefits of these interventions.

In undertaking this inquiry, should the Commission recommend the retention of Government interventions in the market, it should make recommendations on:

- what objectives are appropriate for a universal service obligation arrangement or its equivalent
- what would be the scope of the services needed to be provided to achieve those objectives
- whether particular sections of the Australian community have differing needs to which additional Government intervention should be directed e.g. low income, rural and regional
- who should bear cost or regulatory burdens from those interventions, if any
- the optimal funding model(s)
- transitional arrangements from the current USO model.

The Commission should also have regard to:

- the need for a durable framework that is flexible enough to accommodate technological changes
- the role of, and impact on competition in relevant markets
- contractual commitments that the Government has for the provision of the existing USO
- the significant investments already made by Government, including in the NBN rollout
- the current telecommunications regulatory framework and the Government's response to the 2014 Vertigan NBN Market and Regulation Report
- additional policy reviews being undertaken by Government on a broader range of telecommunications consumer protections
- relevant approaches adopted in other countries, particularly those with similar characteristics to Australia

-
- the report of the 2015 Regional Telecommunications Review and the Government's response to that report.

Process

The Commission is to undertake an appropriate public consultation process, including holding hearings, inviting public submissions from industry, consumer groups and the broader community and releasing a draft report to the public.

The final Report should be provided to the Government within 12 months of the receipt of these Terms of Reference.

**Scott Morrison
Treasurer**

[Received 28 April 2016]

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Abbreviations

ADSL	Asymmetric digital subscriber line
AVC	Access Virtual Circuit
CCO	Copper Continuity Obligation
CSG	Customer Service Guarantee
DNS	Domain Name System
DOCSIS	Data over cable service interface specification
DRCS	Digital radio concentrator system
DSL	Digital subscriber line
FTTB	Fibre to the basement
FTTC	Fibre to the curb
FTTN	Fibre to the node
FTTP	Fibre to the premises
GB	Gigabyte
GDP	Gross domestic product
Gbps	Gigabits per second
GST	Goods and Services Tax
HF	High frequency
HFC	Hybrid fibre coaxial
HILDA	Household, Income and Labour Dynamics in Australia
HTML	Hypertext markup language
ICT	Information and communications technology
ISS	Interim Satellite Service
kbps	Kilobits per second
LIMAC	Low Income Measures Assessment Committee
LTE	Long term evolution
LTSS	Long Term Satellite Service
Mbps	Megabits per second
MHz	Megahertz
MMS	Multimedia messaging service
NBN	National Broadband Network
nbn	NBN Co Limited

NDIS	National Disability Insurance Scheme
NNI	Network to Network Interface
NRS	National Relay Service
NSS Scheme	NBN Co Limited Satellite Support Scheme
OTT	Over-the-Top
POI	Point of interconnection
RBS	Regional Broadband Scheme
RSP	Retail service provider
SIP	Statutory Infrastructure Provider
SMS	Short message service
STEM	Science, technology, engineering and mathematics
TCPC	Telecommunications Consumer Protection Code
TIL	Telecommunications Industry Levy
TTY	Teletypewriter
TUSO	Telecommunications universal service obligation
TUSOP Agreement	Telstra USO Performance Agreement
UFB	Ultra-fast broadband
UHF	Ultra-high frequency
USF	Universal services fund
USO	Universal service obligation
VDSL	Very-high-bit-rate digital subscriber line
VHF	Very high frequency
VoIP	Voice over internet protocol
WBA	Wholesale Broadband Agreement

Glossary

1G	First generation mobile technology. Uses analogue signals to provide voice services over wireless technology.
2G	Second generation mobile technology. Uses digital signals to provide voice services (and data with low transmission rates) over wireless technology.
3G	Third generation mobile technology. Uses broadband to support both a voice channel and internet protocol-based video and data services.
4G	Fourth generation mobile technology. Uses enhanced broadband to support internet protocol-based voice, video and data services. Also known as long term evolution (LTE).
5G	Fifth generation mobile technology. There is currently no agreed definition or standard for 5G technology.
Access network	The ‘last mile’ of a telecommunications network that connects end users.
Access seeker	A generic term that refers to retail service providers or wholesale service providers that are customers of a third party network.
Access Virtual Circuit (AVC) charge	Monthly charge levied on a per-end user basis to access the NBN.
Asymmetric digital subscriber line (ADSL)	A compression technology that supports broadband services over conventional copper telephone lines. It has significantly greater download capacity than upload capacity.
Backhaul	See ‘transmission network’.
Bandwidth	A measurement of how much data can flow through a specific connection at one time. Bandwidth can also refer to the frequency ranges used to transmit a signal.
Base station	A telecommunications station installed at a fixed location and used to transmit wireless signals from mobile devices or fixed wireless broadband services.
Bits per second (bps)	Basic unit of measurement for serial data transmission capacity.
Broadband	Internet access that is always on and transmits data faster than dial-up access. Broadband is delivered through a range of technologies such as fibre-optic cable, DSL, HFC, mobile wireless, fixed wireless and satellite.

Carriage service provider (CSP)	A party which uses its own or someone else's network facilities to supply communications services to the public.
Carrier	An owner of a telecommunications network unit that is licensed by the ACMA to supply carriage services to the public.
Circuit switching	A temporary direct connection of two or more channels between two or more points in order to provide exclusive use of an open channel. A discrete circuit path is set up between the incoming and outgoing lines.
Connectivity Virtual Circuit (CVC) charge	An aggregate bandwidth consumption charge to transmit over NBN infrastructure a specified quantity of data per second over a monthly period.
Core network	Provides services to customers who are connected by the access and transmission networks.
Dial-up internet	A legacy technology allowing connection to the internet at low speeds via the copper access network.
Digital subscriber line (DSL)	A family of technologies which enable broadband services over copper wires.
Fibre	A fibre-optic tube containing strands of glass that transmit data in the form of light. Fibre enables data transmission at the fastest possible rates.
Fibre to the basement (FTTB)	A network technology where fibre is deployed from the point of interconnection to the boundary of the building, such as the basement of a multi-dwelling unit.
Fibre to the curb (FTTC)	A network technology where fibre is deployed from the point of interconnection to the individual junction box in the street outside each property. A short run of copper then carries the signal to the premises.
Fibre to the node (FTTN)	A network technology where fibre is deployed from the point of interconnection to street cabinets (nodes) which are close to end users. Copper lines then carry the signal to the premises.
Fibre to the premises (FTTP)	A network technology where fibre is deployed from the point of interconnection to the individual premises.
Fibre to the x (FTTx)	A generic term for any type of fibre network technology that is used for last mile telecommunications to end users.
Fixed service	A telecommunications service supplied to a fixed location, typically a premises. It can be transmitted via fixed-line or wireless technologies.
Fixed-line service	A fixed telecommunications service supplied via a fixed line.
Fixed wireless	A network technology which uses a radio access network to supply a fixed service.

Geostationary satellite	A satellite used in telecommunications that sits high above the Earth's surface aligned with the equator. It appears stationary as it orbits the Earth at the same speed as the Earth rotates.
GHz (gigahertz)	One billion Hertz.
Gigabits per second (Gbps)	A rate of data transfer. $1 \text{ Gbps} = 1000 \text{ Mbps}$.
Gigabytes (GB)	One billion bytes of information.
Hybrid Fibre Coaxial (HFC) network	A network of fibre-optic cable supplemented by coaxial cable for the connection to the customers' premises. Often originally rolled out to supply subscription television services, but now commonly used to supply broadband services.
Internet protocol	The method by which data packets are exchanged over the internet.
Kilobits per second (kbps)	A rate of data transfer. $1 \text{ kbps} = 1000 \text{ bps}$.
Landline	Copper-based fixed-line infrastructure used to supply a fixed-line voice service.
Latency	The amount of time a signal takes to travel from one point to another.
Low Earth Orbit (LEO) satellite	A satellite system used in telecommunications that is closer to the Earth's surface than a geostationary satellite and can transmit data with lower latency. Multiple LEO satellites are often used to form a constellation.
Megabits per second (Mbps)	A rate of data transfer. $1 \text{ Mbps} = 1000 \text{ kbps}$.
Megabytes (MB)	One million bytes of information.
MHz (megahertz)	One million Hertz.
Microwave	A high frequency form of radio transmission.
Mobile service	A telecommunications service supplied to a mobile point.
NBN fixed-line service	Any NBN service that utilises a physical line running to the end users' premises (FTTB, FTTC, FTTN, FTTP, HFC).
NBN fixed wireless service	A fixed wireless service supplied by NBN.
NBN satellite	A satellite broadband service supplied by NBN. Now supplied over the long-term satellite service (<i>Sky Muster</i> and <i>Sky Muster II</i>).
Over-the-Top (OTT) services	A general term for services delivered over a network that are not provided by that network operator or a retail service provider. Often delivered via internet protocols.

Packet switching	A method of transmitting messages by subdividing them into short packets containing the data and a destination address. Internet protocol-based services are packet switched.
Payphone	A public telephone where calls may be paid for with coins, phone cards, credit cards or reverse charge facilities.
Point of interconnection	The point at which a carrier's network links with telecommunications equipment or facilities not belonging to that network.
Port	A point of access into a communications switch, a computer, a network, or other electronic device.
Public switched telephone network (PSTN)	The infrastructure for basic telecommunications services (including telephones, switches, local and trunk lines and exchanges).
Radio access network	The 'last mile' of a mobile or fixed wireless telecommunications network; connects mobile devices or fixed wireless consumer antennas to the base station.
Retail service provider (RSP)	An entity that provides retail telecommunications services to end users over either its own or a third party's network.
Roaming	A network sharing arrangement that allows end users to move seamlessly from one WiFi or mobile network to another with no loss in connectivity.
Services in operation	The number of subscription services provided at a particular time. The term can be used in the context of both fixed and mobile services.
SIM (subscriber identity module) card	An integrated chip-based module that identifies a mobile subscriber.
Smartphone	A mobile phone built on an advanced mobile operating system, with computing capability and connectivity.
Spectrum	The bandwidth of a communications system, expressed in terms of the frequencies it can carry.
Standard telephone service	Defined under the <i>TCPSS Act 1999</i> (s. 6) as a telephone service fit for the purpose of voice telephony. If voice telephony is impractical for a person with disability, an 'equivalent' form of communication must be provided.
Teletypewriter (TTY)	Telephone typewriter designed for people with a hearing or speech impairment. It allows communication to be typed after a call is connected and calls can be connected to another TTY user or relayed and translated to voice.
Transmission network	The portion of a telecommunications network that comprises the intermediate links between the core network and the access network.

Unconditioned local loop	The copper wire between the end user's network boundary and a local or remote switch.
Virtual network operator	A company that does not own the telecommunications infrastructure but resells services from other telecommunications suppliers directly to consumers.
Voice over internet protocol (VoIP)	A voice service supplied via internet protocols. VoIP calls can be either 'Managed VoIP' provided by a retail service provider (similar to traditional telephony), or 'Over-the-Top VoIP' which is provided on a best efforts basis by third parties (such as Skype and Apple FaceTime).
WiFi	A small-scale wireless network technology. Typically supplied within a premises or in a designated public area.

OVERVIEW

Key points

- In a digital age, the voice-based telecommunications universal service obligation (TUSO) — worth \$3 billion over 20 years (net present value) and consisting of basic telephone and payphone services — is anachronistic and costly. It should be wound up by 2020.
- Rapid developments in telecommunications technology are transforming people's lives. The growing demand for ubiquitous digital connectivity provides a strong case for reform that reflects evolving policy, market and technological realities.
- The sizable public investment in National Broadband Network (NBN) infrastructure will provide high-speed (voice-capable) broadband to all premises (on request) across Australia by 2020 — at a quality that is, for the most part, superior to what has been available. Wholesale prices will also be capped nationally and across its different technology platforms. As such, the NBN has been designed to narrow the city–country digital gap with cross-subsidies from commercial to non-commercial services within a funding envelope.
- Australians are also well served by mobile networks, with over 99 per cent of people having access to mobile telephony (and to a slightly lesser extent, broadband) where they live.
- Leveraging off the NBN and mobile networks means that the objective of universal service can be reframed to provide *baseline* (or minimum) broadband and voice services to all premises in Australia once the NBN has concluded its rollout phase, having regard to the accessibility and affordability of these services. Increasingly, broadband will be the main medium for voice services.
- For the vast majority (more than 99 per cent) of premises, the combination of the NBN and mobile networks is likely to meet or exceed minimum standards for universal service delivery. As such, the TUSO is no longer needed.
- Current market trends and policy settings suggest that telecommunications services will continue to be affordable for most people.
- To the extent that there are any remaining availability, accessibility or affordability gaps, current trends and policy settings suggest that these are likely to be small and concentrated. The TUSO can therefore be terminated once the NBN is fully rolled out and replaced by a set of targeted policy responses for:
 - (up to 90 000) premises in pockets of the NBN satellite footprint without adequate mobile coverage
 - cohorts of users with particular needs.
- Programs to address these gaps should be flexible, allow for community input and facilitate informed consumer choice. Their costings should be transparent and subject to competitive tendering where feasible.
 - The narrow scope and small scale of these programs tip the balance towards funding from general government revenue as opposed to an industry levy.
- While transitioning to this new universal service framework is complex and will take a few years, the transition process needs to start immediately. The fundamental roadblock posed by the opaque contract with Telstra, and the surrounding legislative architecture, should be addressed promptly and systematically.
- The current pattern of disparate and siloed policy reviews and proposed legislative reform raises concerns about the coherence of policies to address universal service objectives and must be carefully managed and coordinated.

Overview

Telecommunications is fundamental to any modern society. It plays an increasingly important role in the delivery of private and public sector services across the economy. Access to telecommunications services is also a key enabler of social inclusion — allowing people to connect with family, friends and communities, and call for assistance in emergencies.

The telecommunications universal service obligation (TUSO) is one of several policy instruments to meet the Australian Government's universal service objectives. It was introduced in the 1990s (when the sector was being deregulated) to ensure 'reasonable access' to a *standard telephone service* and payphones for all Australians on an 'equitable' basis, regardless of where people reside or work. At that time, telecommunications was centred on basic telephones, and the TUSO was enacted to benefit consumers by affording them a 'provider of last resort' for voice telephony.

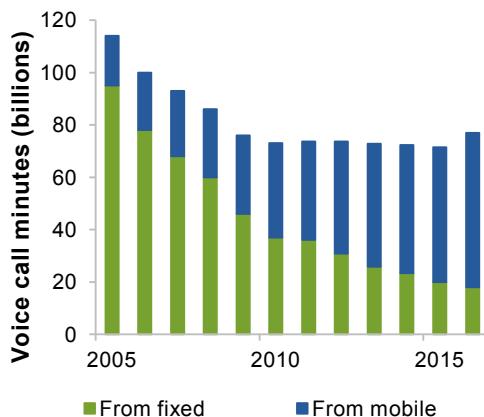
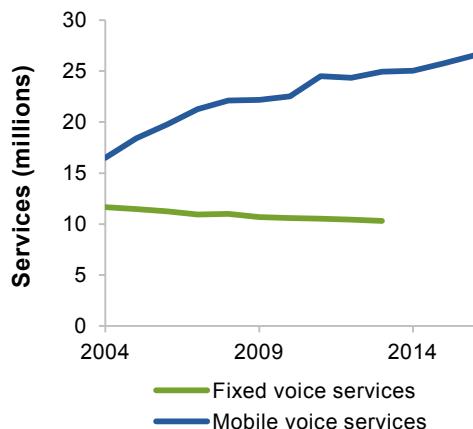
Today, it is nearly impossible for most Australians to imagine life without smartphones, modems and WiFi. Connectivity has pervaded homes and businesses, allowing almost instant access to information, services and people globally. The proliferation of internet protocol-based networks is enabling 'convergence' to take place — with different services now integrated over a single network, accessible through all-in-one devices, and increasingly through common appliances such as smart televisions. In view of the economies of scope and scale on offer, service providers are increasingly in the business of providing telecommunications for all media (data, video and voice) simultaneously.

From the perspective of users, some defining trends are also emerging (figure 1). Australian consumers are revealing a growing preference for mobile devices. One in three Australian adults across both capital cities and regional areas now rely solely on their mobile phones for voice services, with 99.3 per cent of the population covered by at least one mobile network. Notwithstanding some variation across regions, income levels and age groups, Australians are also avid internet users. They send some 190 million emails through Gmail each day and 15 million of them use Google Search each year.

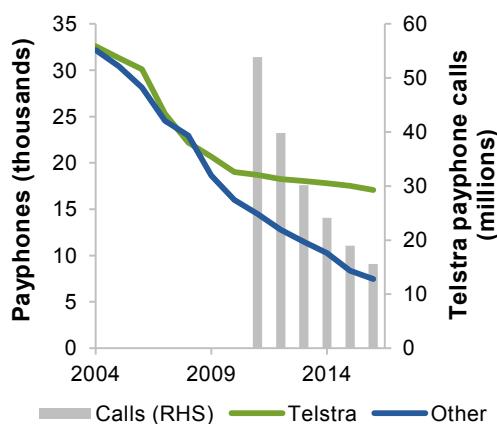
At the same time, telecommunications services are becoming more affordable — thus lowering the cost of economic and social transactions — with large benefits to individuals, businesses and governments. Prices of telecommunications services have fallen substantially over the past decade, in absolute terms and even more so relative to other essential services. Over that time, quality has also continued to improve. Unlimited voice calling and messaging are now standard inclusions in many mobile and home phone plans, while data allowances and speeds continue to increase.

Figure 1 Key trends in the Australian telecommunications sector

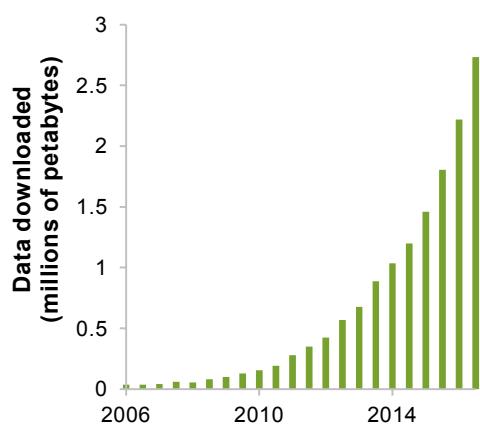
A shift from fixed to mobile services



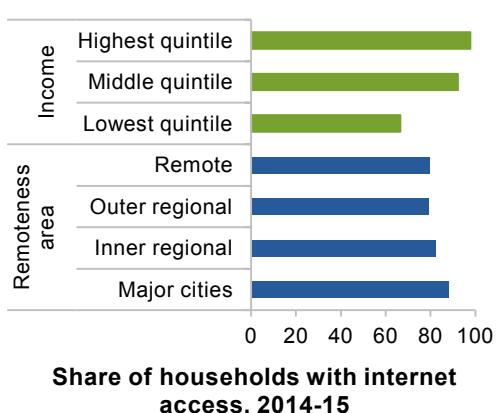
Payphones increasingly redundant



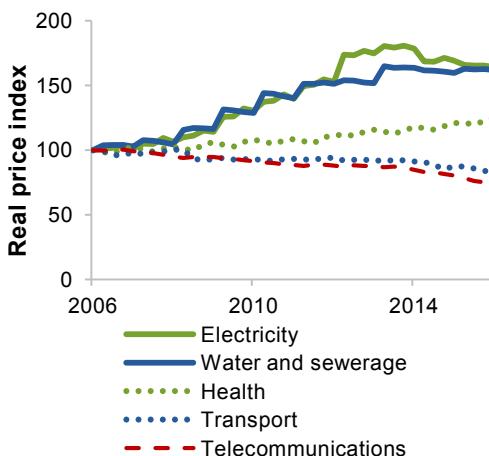
Exponential growth in data usage



Some variation by income and region



Becoming relatively more affordable



In parallel, the Australian Government is making substantial investments in the National Broadband Network (NBN) with an expectation that NBN Co Limited (nbn) will provide high-speed broadband (peak download speeds of at least 25 megabits per second) to all households and businesses on request, as soon as possible (expected to be by 2020). Currently, more than 4.5 million premises can connect to NBN infrastructure. nbn has a capped wholesale price across its fixed-line (92 per cent of its footprint),¹ fixed wireless (5 per cent of its footprint) and satellite (3 per cent of its footprint) networks.

Against this rapidly evolving landscape, this inquiry provides a timely opportunity to review the role of government in supporting universal telecommunications services. That said, there are a number of ongoing disparate government reviews and proposals that intersect with this inquiry (box 1), and if not carefully managed, would potentially disrupt what could be a clear and coherent pathway to reforming universal service arrangements.

Box 1 Ongoing reviews and legislative proposals relevant to this inquiry

- Consultations on communications accessibility (Department of Communications and the Arts)
 - Consultations on spectrum reform legislative proposals (Department of Communications and the Arts)
 - Review of the Australian Communications and Media Authority (Department of Communications and the Arts)
 - Market study of the communications sector (Australian Competition and Consumer Commission)
 - Inquiry into the declaration of mobile roaming (Australian Competition and Consumer Commission)
 - Performance audit of the contract management of *standard telephone service* and payphones universal service obligations (Australian National Audit Office)
 - Exposure draft of the Telecommunications Legislation Amendment (Competition and Consumer) Bill 2017 (which includes the proposed Statutory Infrastructure Provider regime)
 - Exposure draft of the Telecommunications (Regional Broadband Scheme) Charge Bill 2017
-

The Commission's approach

In line with international practice, the Commission has defined universal service to encompass the key distinct, but related, elements of universality:

1. *availability* — the service is available to all premises (on request) and is subject to a minimum quality
-

¹ Fixed-line includes fibre to the premises, to the basement, to the curb, to the node and hybrid fibre-coaxial.

-
2. *accessibility* — the service is accessible by all people irrespective of their personal (physical, cognitive and cultural) attributes
 3. *affordability* — the purchase of the service does not place undue hardship, particularly on people with low incomes.

The framework adopted in this inquiry deliberately recognises that market mechanisms and commercial interests have the primary role in enabling universal access to a *baseline* quality of telecommunications services. This confines any potential role for government to instances where there are *availability*, *accessibility* or *affordability* gaps in service provision, or where there is some form of market failure. However, these ‘market gaps’ or ‘market failures’ do not in themselves provide a case for government intervention, because such interventions typically generate costs as well as benefits to the community — both directly and indirectly. A case can be made for government to intervene only where there is a net benefit to the Australian community. The relative merits of policy options should then be assessed against cost-effectiveness criteria including:

- the cost to the community of achieving a minimum quality of service
- technological neutrality
- impacts on competition and incentive effects on service providers
- administrative costs and regulatory compliance burdens, with regard to flexibility to adjust to future developments.

The inquiry draws on a wide range of evidence but the analysis of several matters has been hampered by a paucity of data and the commercial-in-confidence nature of some of the information provided by participants. Where the Commission received such information, it has carefully considered the information and made necessary judgments.

The TUSO is past its use-by date

Australia has a plethora of policies and programs broadly designed to enable universal access to telecommunications. The Commission’s conservative estimate is that at least \$1 billion is spent on such policies annually (table 1). This does not include the Government’s sizable investment in NBN infrastructure (with a commitment of \$29.5 billion to date),² or the expected ongoing costs of supplying non-commercial services over NBN infrastructure. Fundamentally, these measures are aimed at ensuring that telecommunications services are available, accessible and affordable to geographical areas or cohorts of users that may be high cost and uneconomic to serve. The TUSO is only one of several subsidised telecommunications programs.

² The Australian Government announced in November 2016 that it will loan \$19.5 billion to nbn, with the expectation that this loan will be re-financed on external markets in 2020-21.

Table 1 Programs that address telecommunications universal service objectives

Includes GST

<i>Program</i>	<i>Indicative annual funding</i>
	\$m
Telephone Allowance	611
Standard telephone service USO	253
Mobile Black Spot Program	48
Payphones USO	44
Programs to support digital inclusion	29
Emergency Call Service	22
National Relay Service	22
Voice only Customer Migration	17
Remote Indigenous telecommunications programs	5
Total	1 051

As a legislative requirement imposed on Telstra (box 2), the TUSO provides for a *standard telephone service* to all premises in Australia upon request, and payphones that are generally accessible. It remains largely focused on fixed-voice handsets and voice calls over fixed-line copper connections. While these services are still valued by some constituents, particularly those in regional and remote Australia without access to mobile services, the demand for TUSO services is clearly falling. Consumer needs are instead overwhelmingly being met by a wide range of digital technologies and applications. The TUSO does not harness solutions that could be more cost-effective in meeting genuine community needs and expectations.

Further, as a non-contestable obligation upon one provider and partly funded by other providers, it effectively stymies competition. In imposing this obligation, the Australian Government did not demand transparency and accountability of Telstra. The basis for its funding (a total of around \$3 billion in net present value terms over the 20-year contract to 2032) is unclear and disputed.

The Australian National Audit Office recently announced a performance audit of the contract management of selected telephone universal service obligations. That aside, it is evident that Telstra's active fixed retail voice services have declined from over 8 million to under 6 million services in the past decade.³ The proportion of these services that could be considered non-commercial is unknown. Equally, there is no requirement on Telstra to specify which of its payphones are non-commercial. Increasingly, Telstra is using its payphone infrastructure to provide WiFi (Telstra Air) to its customers in metropolitan areas.

³ This overstates the number of actual fixed voice services in use given that around 4 per cent of Australian adults receive a fixed voice service as part of a service bundle but do not actually connect the service to a telephone.

Box 2

The Telstra USO Performance Agreement (TUSOP Agreement)

The TUSOP Agreement between the Australian Government and Telstra, which commenced in 2012, provides the basis upon which Telstra receives payment for performing its regulated obligation as Australia's telecommunications universal service obligation (TUSO) provider. The Agreement is one of a series of separate, yet interrelated, agreements signed by the Government, Telstra and NBN Co Limited to enable the construction and operation of the National Broadband Network (NBN) infrastructure.

Under the Universal Service Regime set out in the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth), Telstra has an obligation to ensure that *standard telephone services* and payphones are accessible to all people in Australia on an equitable basis, wherever they reside or carry on business.

The TUSOP Agreement reflects this regulated obligation, but outlines the terms against which Telstra would receive payment from the Government for fulfilling the TUSO until 2032, being \$253 million and \$44 million per year (including the Goods and Services Tax) for the supply of *standard telephone services* and payphones, respectively. Funding is met through an Australian Government (non-indexed) contribution of \$100 million per year and through the Telecommunications Industry Levy paid by eligible carriers.

The Agreement also includes non-TUSO contractual arrangements with Telstra for the provision of the emergency call service, voice-only customer migration activities, and the migration of public interest services to NBN infrastructure.

With the limited evidence available, Commission estimates suggest that the TUSO could imply an annual *standard telephone service* subsidy ranging anywhere between \$250 and \$2800 per 'TUSO' service, and an annual average subsidy of \$2600 to \$50 000 per payphone.

In an age where basic telephones and payphones are rapidly becoming obsolete, the lack of transparency and accountability makes the continuation of current arrangements difficult to justify from the point of view of those who contribute to its funding. It also raises some intrinsic challenges in attempting to assess the value of the TUSO to the broader community. This is compounded by the exceptionally long-term nature of the contract — a feature that sits oddly against the highly dynamic nature of the sector.

Even though universal access to telecommunications services is viewed as important and some users still value their landline as a trusted technology, the weight of evidence suggests that the costs of the TUSO are likely to outweigh its benefits. Further, these costs can only be expected to increase over time in line with the costs of maintaining the deteriorating copper network.

The Commission's assessment is that the TUSO is a blunt instrument and is not fit for purpose against the evolution of telecommunications needs and solutions. While Telstra may have acted with goodwill in fulfilling its contractual obligations, these arrangements no longer serve the best interests of the Australian community. The TUSO should be

wound up and replaced by a new universal service framework to reflect policy, market and technological realities.

A new universal service objective

The ability to access internet content and services is becoming increasingly integral to the everyday life of most Australians. Access to digital data not only affects individuals by making life simpler, but also businesses and government by enabling decision making, transactions and processes to take place effectively and efficiently. It also underpins the current wave of disruptive digital technologies.

For people located in remote areas or with disability, internet access enables a level of engagement with friends, education, information and government that is otherwise not possible. For instance, *myGov* (providing access to Centrelink, Medicare, the National Disability Insurance Scheme, the Australian Tax Office, and other government services) is now one of the biggest digital services in Australia, with 10 million registrations on its website and an average of 160 000 people using the platform each day. The Government's recent expansion of its digital transformation agenda is intended to reinforce this trend by making access to government services more user-friendly and digital by default. From a community perspective, the potential value of digital data is substantial.

In this context, and given the sizable investment in NBN infrastructure and the extensive coverage of mobile networks, Australia's universal service policy objective can now be reframed to provide *baseline* broadband and voice services to all premises, while having regard to the accessibility and affordability of these services.

Broadband is capable of providing internet *and* voice services. It is increasingly the medium through which voice communication is being delivered. By taking analogue audio signals and turning them into digital data that can be transmitted over the internet, voice over internet protocol (VoIP) technology effectively provides an alternative way of making phone calls (typically at a much lower cost than traditional phone systems and with additional functionality). Notably, 4G technology for mobile phones (and in a few years, next generation 5G) provides voice services entirely through dedicated VoIP.

The universal service policy objective should be defined in terms of a *baseline* (or minimum) quality rather than an aspirational standard. This *baseline* should be set with a realistic imposition on public funding. As such, it should be set to meet the basic needs of most Australians in the majority of circumstances. This recognises that:

- there are material costs to the Australian community in providing these services on a universal basis, particularly where they would not ordinarily be provided by market forces
- it is likely to be more cost-effective to address particular needs through targeted policy rather than through a broader universal service policy
- market pressures will ensure that consumer needs for additional features are met.

Currently, separate standards for broadband and voice-only services apply at the wholesale and retail levels, and a complex and opaque mix of regulatory and contractual arrangements. The Government has proposed legislation outlining the role of statutory infrastructure providers for the provision of broadband at the wholesale level. This will guarantee that end-users continue to have access to underlying telecommunications infrastructure and services after the NBN is rolled out. The Government is also intending to review consumer safeguards at the retail level.

Baseline standards for broadband and voice services need to be established holistically. This is critical to developing a streamlined framework for broadband and voice services that captures both wholesale and retail components. It could also help to address the ‘accountability gap’ between wholesale providers and retail service providers inherent in vertically separated models of service provision. For wholesale providers, these *baseline* standards could be enacted under the proposed Statutory Infrastructure Provider (SIP) regime. Modifying the existing Telecommunications Consumer Protection Code offers one avenue to implement complementary *baseline* standards for retail service providers.

The NBN (and markets) have an important role to play

Leveraging off the NBN and mobile networks

NBN infrastructure will enable the provision of wholesale broadband services (with voice capability) to all premises (on request) within Australia, while mobile networks currently cover the supply of voice services (and to a slightly lesser extent broadband services) to around 99.3 per cent of the population.

The Commission’s assessment is that the service level provided by NBN, combined with existing mobile networks will be more than adequate to meet a *baseline* level of broadband and voice service availability for the vast majority of premises across Australia — particularly for all premises in the NBN fixed-line and fixed wireless footprints, and those in the satellite footprint with adequate mobile coverage.

By design, regulatory settings applied to nbn are conducive to promoting competition among retail service providers to deliver broadband services on NBN infrastructure once premises have been declared ‘ready for service’. All of nbn’s wholesale services have been declared under the *Competition and Consumer Act 2010* (Cth) by way of a Special Access Undertaking and a published Standard Form of Access Agreement. Having thus been declared, nbn’s standard access obligations require it to supply its wholesale broadband services on request to access seekers — wherever it is capable of doing so within the NBN footprint.

Given this regulatory impost and nbn’s uniform wholesale capped pricing model, the Commission considers that there is likely to be a retail presence throughout the NBN footprint that would enable all premises to access (voice capable) services. Indeed, the

evidence to date suggests that there are numerous retailers (around 140) offering services to consumers over the NBN. This includes 10 retailers offering services over nbn's *Sky Muster* satellites, which target remote Australia or the 'last three per cent'.

That said, the Government should monitor retail presence on the NBN with a non-automatic trigger for it to step in and competitively tender for the delivery of retail services to a particular area where retail presence is absent. This would give assurance to communities that retail services will be available.

Legislative backing to nbn's role as a universal service provider is an important prerequisite to nbn being privatised in the future. The Government intends for nbn to be the statutory infrastructure provider of last resort for broadband services. Its proposed SIP regime would assist in providing greater confidence to the community about nbn's role with respect to the provision of wholesale broadband services.

However, even under the proposed SIP regime, there is uncertainty and contention around the role of nbn (or any other designated statutory infrastructure provider) with respect to the provision of voice services, particularly within the NBN fixed wireless and satellite footprints. There is merit in the Government providing greater clarity in its proposed SIP regime about nbn's role (and that of any other designated statutory infrastructure provider) with respect to the provision of voice services.

nbn's impact on the economic efficiency of the telecommunications market once the NBN rollout is complete should also be reviewed, and this planned review should not be conditional — as it currently is now — on the timing of any Government consideration of the privatisation of nbn.

... with targeted intervention to address market gaps

While NBN infrastructure in conjunction with mobile networks is expected to deliver *baseline* broadband and voice services to the vast majority of premises across Australia, further government intervention may be warranted for the provision of voice services in pockets of the NBN satellite footprint without adequate mobile coverage.

Participants to this inquiry raised a number of concerns in relation to the *Sky Muster* satellite service. Many of these concerns stem from the frequency of service drop-outs. While the service has a target availability of 99.7 per cent, nbn has conceded that the service has so far performed below expectations.⁴

Participants also raised the incidence of power blackouts as a major issue. While all NBN technologies are dependent on power for their operation, power blackouts are relatively more common in regional and remote areas. Some were also concerned about latency,

⁴ This target does not include periods of unavailability due to signal attenuation (rain fade), which may be prevalent over parts of Australia that are prone to heavy rain.

particularly in emergency situations. The nature of geostationary satellite communications gives rise to a small but noticeable lag or latency in voice calls when communicating by way of *Sky Muster* to another satellite service.⁵

Commission estimates suggest that up to 90 000 premises, largely in the NBN satellite footprint, are likely to have inadequate mobile coverage. However, more work is needed to assess the feasibility of a targeted competitive tendering arrangement to fill this market ‘gap’ in voice services. The Australian Communications and Media Authority should work with all mobile network operators to identify the number and location of these premises.

The *Sky Muster* service is still relatively new and some teething problems are to be expected. Further, nbn has recently flagged a significant expansion in resources to remediate network failure issues and optimise the lifetime availability and performance of the satellite platform. The possibility that *Sky Muster* may be capable of delivering broadband and voice services of a *baseline* standard by the time the NBN rollout is completed should therefore not be ruled out. Such an assessment can only be made closer to that time based on actual performance data.

Even though the number of complaints as a proportion of active NBN services has fallen in recent years and concerns about the reliability of nbn’s other technology platforms are far less prevalent, their performance should also be monitored. As such, the Australian Communications and Media Authority should require nbn to report on the reliability of its networks, disaggregated to a reasonably granular level (by access technology at a minimum).

The *standard telephone service* USO should be replaced by a competitive tendering arrangement to address any gaps in voice services within the NBN satellite footprint. The new arrangement should be carefully designed and, in particular, be technologically neutral to allow for cost-effective solutions. Over the medium term, these could include Telstra’s existing networks, expanding mobile coverage, introducing alternative satellite services or expanding nbn’s fixed wireless networks. Ultimately, it is clear that most telecommunications services provided to regional and remote areas will need to be wireless.

Mobile services clearly play an important complementary role to NBN infrastructure. Many in the community see mobile services as an effective and preferable alternative to TUSO services, with the Mobile Black Spot Program garnering much support.⁶ However, while the program has increased the reach of mobile phone coverage in Australia, there is scope for improvement, including through a prioritisation of its objectives. The Government should commission an independent evaluation of the program before proceeding to the next funding round.

⁵ The latency of an NBN satellite call to a fixed-line, fixed wireless or mobile service (a ‘single hop’) is around 260 to 300 milliseconds, and around 670 milliseconds to another satellite service (a ‘double hop’).

⁶ There is a strong preference for using mobile phones for raising emergency assistance. The majority of calls to Triple Zero in 2015-16 originated from mobile phones (69 per cent), and less frequently from fixed lines (31 per cent). Public payphones accounted for almost 203 000 emergency calls in 2015-16 (2 per cent).

... and particular user needs

While NBN infrastructure and mobile networks are likely to address universal availability for the vast majority of Australians, there are some user groups whose specific needs are not likely to be addressed in the absence of further government intervention.

These groups include members of the community who governments have traditionally chosen to support on social equity grounds — people with disability⁷ or life-threatening health conditions,⁸ people living in remote Indigenous communities, some older people with limited digital literacy, and people without a permanent fixed address.

Many of the needs of these user groups pertain to the accessibility of telecommunications services. Measures to address these needs should be cost-effective, technologically neutral, targeted, flexible and consumer-focused, while supporting efficient competition and innovation where possible. Accessibility and affordability measures should be more fully considered within the Government's foreshadowed telecommunications consumer safeguards review.

However, the needs of some user groups — people in regional and remote communities with inadequate mobile coverage, and people with no permanent fixed address and no access to a mobile phone — may also relate to the availability of services. The Commission proposes a funding program for some form of community telecommunications (which could involve payphones, mobile charging stations, and public WiFi) to replace the payphones USO. The program should be flexible as to the form of service to be provided. It should target locations outside of mobile coverage, reflect the specific needs or preferences of a user group, and involve competitive tendering where feasible. The Government could consider carving out remote Indigenous communities from the program and meeting their needs through a separate program.

What about affordability?

There are no systemic affordability issues in relation to telecommunications. Real prices of both fixed and mobile services have continued to decline rapidly over time — by some 54 per cent for mobile services and 51 per cent for fixed voice services between 1998 and 2016, and by 21 per cent for digital subscriber line broadband services over the nine years to 2016. This downward trend is in contrast to trends evident across many other key service sectors such as electricity and water (figure 1).

Similarly, while overall spending on telecommunications services has increased (typically because consumers are using more services), household expenditure on telecommunications as a share of disposable income remains relatively small (less than

⁷ The National Relay Service provides a phone solution for people who have a hearing or speech impairment.

⁸ Priority Assistance customers get priority for fault repairs on their home phone line.

3 per cent) and has declined slightly over the past decade. Several household surveys suggest that most respondents view telecommunications services as affordable.

At a wholesale level, nbn has committed to a number of long-term price controls. In addition, nbn provides discounts on the unit cost of network capacity as more capacity is purchased. While these factors will continue to place downward pressure on prices, nbn expects that users will face slightly higher bills because of growing demand for higher capacity broadband services and faster speed tiers.

Some people on low incomes may find it difficult to afford these services. A survey by the South Australian Council of Social Service — involving around 500 low-income Centrelink recipients and Low Income Health Care Card holders — reported that 62 per cent of the respondents experienced either difficulty in paying for, having to cut back, or having to stop using one or more telecommunications services due to financial hardship. Two thirds of respondents also rated telecommunications costs in the top five most important factors in their day-to-day household budgets. Due to their circumstances, some user groups — especially people living in remote Indigenous communities and people who are homeless — rely on pre-paid mobile phones where the unit cost can be well above the contract rates on offer for post-paid mobile phones (the so-called ‘poverty premium’), although pre-paid prices have been falling.

There are currently several measures that directly seek to address affordability, including measures as part of Telstra’s carrier licence conditions, and the Australian Government’s Telephone Allowance (adjusted by the Consumer Price Index). As NBN infrastructure and mobile networks become the primary channel for the delivery of universal broadband and voice services, the effectiveness of these measures should be reassessed and included as part the Government’s planned review of consumer safeguards. In principle, affordability is more effectively addressed through transfer payments under the tax-welfare system than through pricing cross-subsidies.

How much funding and who should pay?

How a universal service policy is costed and funded can affect its overall efficiency. However, determining the level of funding to be directed to a universal service program can be fraught. Service providers typically have better information about the costs of service provision than governments, and, moreover, future costs are unknown and can only be estimated. Having a discovery process that helps to reveal the efficient cost of service provision is therefore essential to ensure that public funds are used judiciously and that any adverse impacts on competition are minimised.

Where service provision can be contested by several providers, carefully designed competitive tenders can emulate the outcomes of competitive markets. Well-designed tenders can incentivise providers to keep their prices close to their best estimate of the efficient cost of delivering the service. However, where markets are thin and not contestable, tendering processes are less likely to deliver efficient outcomes. In these

circumstances, measures that improve transparency and accountability become even more critical to ensuring that taxpayers and consumers get value for money. This calls for independence in determining the level of funding, as well as the use of benchmarking and transparency in reporting.

Determining who should pay is also challenging. The principle that those who benefit should pay does not hold for universal service policies because these policies, by their nature, benefit some people who government has assessed should not or cannot fully pay for the service. This presents a challenge in developing a funding model that is optimal from the community's standpoint.

Two broad funding approaches for addressing market gaps and particular needs in universal service delivery have been considered in this inquiry — an industry levy and funding through general government revenue. Both approaches can distort investment and/or consumption behaviour in the telecommunications sector in ways that do not deliver the greatest possible benefit to the community. The issue is to identify and implement the approach that is likely to distort behaviour less.

Funding targeted programs

The quantum of funding is also relevant. The larger the funding envelope, the larger the potential distortions and costs to the community. The Commission's assessment is that the scale of the proposed government intervention (and hence funding) required across all dimensions of universal service — *availability, accessibility and affordability* — is likely to be smaller following the completion of the NBN rollout than is currently the case under the TUSO. As such, the distortionary impacts of either funding approach can also be expected to be smaller irrespective of the funding model adopted.

This takes the assessment of the relative merits of the two funding approaches largely to matters of implementation and administrative costs.

Budget-funded measures have the advantage of clear parliamentary accountability, administrative simplicity and transparency. They are subject to contestability among agencies for scarce taxpayer dollars. Moreover, applied to programs that have a redistributional objective (such as affordability measures), funding from general government revenue means that the same targeted eligibility criteria used for many other such policies can be applied to telecommunications services.

An industry levy, particularly if broad-based, is likely to be difficult to design well and costly to administer in a sector such as telecommunications where the players and the levy base are constantly changing. The emergence of Over-the-Top services (such as Skype and Netflix) exemplifies this challenge. As a general rule, a levy should treat all providers of substitutable services in the same way. However, the different and often global nature of Over-the-Top providers makes it difficult in practice to subject them to the same rules as those imposed on traditional telecommunications service providers.

While there will always be some level of fiscal and political risk associated with budget-funded measures, the Commission's assessment is that the measures recommended in this inquiry should be funded principally through general government revenue. As with an industry levy, the risks of cost-padding and gold-plating could be managed through competitive tendering, independent and transparent costing processes, and regular reviews.

Funding consequential impacts of the proposed reforms

In response to the draft report, nbn submitted that the Commission had overstated the expectations that the Australian Government had placed on it. In nbn's view, its role is to provide a broadband and/or voice service to premises on request in the fixed-line footprint, and a broadband service to premises on request in the fixed wireless and satellite footprints. Telstra, meanwhile, is responsible for supplying voice service infrastructure in the fixed wireless and satellite footprints until 2032, a role laid out in the TUSOP Agreement. nbn also contended that it has provisioned its networks in anticipation that less than 60 per cent of premises across its fixed wireless and satellite footprints would request an nbn service due to the assumed continued availability of Telstra voice and digital subscriber line broadband infrastructure in these areas. Reforms to universal service policy, nbn argued, would increase take-up rates for nbn's fixed wireless and satellite services (all of which have been assessed by the Bureau of Communications and Arts Research as non-commercial), thus imposing additional net costs on nbn.

The Commission has sought information from nbn on the potential magnitude of this impact. However, nbn has advised that it is not in a position to assess the incremental costs of universal service policy reforms without further information, including on the specifications of *baseline* services and the number and location of TUSO services provided by Telstra. On the basis of its own assessment, the Commission maintains a degree of scepticism about the materiality of these costs. The reasoning behind this view is fully outlined in the inquiry report but essentially revolves around the increasing degree of substitutability between retail services on the NBN and mobile services. For example, current voice-only TUSO customers in the satellite or fixed wireless zones who have adequate mobile phone coverage would most likely take a mobile service rather than a retail NBN service.

Further, the anticipated provisioning by nbn (of less than 60 per cent as above) for fixed wireless and satellite services may be too low. The actual future take-up rate of retail NBN services is unknown, so disentangling the impact of removing the TUSO from that caused by underprovisioning would be difficult.

The funding of nbn's non-commercial services should, moreover, not be considered independently of universal service policy reforms. In this context, the Commission has faced a unique challenge in responding to proposed government policy on the funding of nbn non-commercial services (the Regional Broadband Scheme) before the conclusion of this inquiry.

The Regional Broadband Scheme is proposed to (at least initially) include only a narrow levy base. In principle, the choice of funding model for non-commercial services should seek to minimise distortions in the telecommunications market, the risk of which is heightened with a narrowly-based long-term industry levy. As such, the Government may need to revisit the merits of alternative funding arrangements for nbn's non-commercial services.

Transitional matters

The Commission recognises that implementing a new framework for universal service provision will be complex and will need time. The TUSOP Agreement and the surrounding legislative architecture, as well as the lack of critical evidence to inform a meaningful renegotiation of the contract are key hurdles that will need to be addressed.

Existing mechanisms for negotiating changes within the agreement are highly restricted. They provide few options for review, and mostly centre around finding cost-savings for Telstra. Given this, the Commission considers that, in its current form and with a 20-year term, the TUSOP Agreement presents a fundamental roadblock to the implementation of the Commission's recommendations. Implementing the recommendations put forward in this inquiry will clearly require a major renegotiation of the contract.

The terms of any contract renegotiation are ultimately a matter for the Australian Government and Telstra. While there will be costs to renegotiation (including a possible financial penalty to the Government), an effective transition strategy should be carefully staged against key considerations around timing, stakeholder engagement and legislative requirements.

Payphones

With regard to payphones, there is a strong case for winding back Telstra's contractual obligations as soon as practicable. The evidence of the demise of payphones is clear. Juxtaposed with the extensive coverage of mobile services, the continuation of a blanket payphones USO cannot be justified from a community-wide perspective.

There would be benefits to both the Government and Telstra from such a move — lower levy liabilities, reduced regulatory impost on Telstra, and an opportunity for Telstra's existing payphone services to be repurposed with a more commercial, innovative focus. Importantly, from a community-wide perspective, this would allow for a better targeted allocation of funding to areas of genuine need for some form of community telecommunications service.

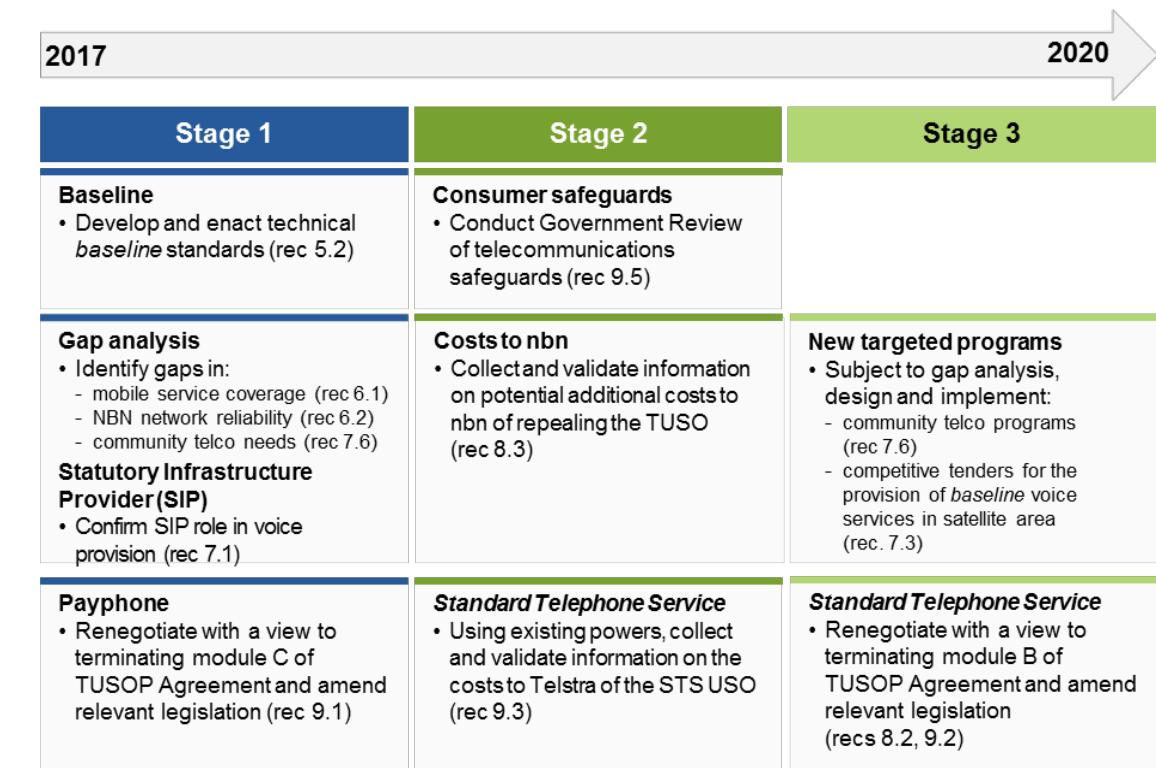
Standard telephone services

In relation to the *standard telephone service* USO, the Commission's view is that this should be wound up once NBN infrastructure is fully rolled out. Prior to this, the groundwork for a renegotiation of the TUSOP Agreement needs to be laid with a clear view to replacing the *standard telephone service* USO in 2020 (or once the network is fully rolled out, if later) with selected targeted assistance. Preparatory work should include two parallel streams of activity:

- **formal information gathering** from Telstra in relation to the provision of *standard telephone services* and payphones, to estimate their costs net of the subsidy. This could be undertaken under existing powers of the Australian Communications and Media Authority and/or the Australian Competition and Consumer Commission to make record keeping rules that would require Telstra to maintain and provide records about the fulfilment of the *standard telephone service* USO
- **a cross-portfolio consumer safeguards review** to ensure that reforms to universal service arrangements are underpinned by a unified framework of consumer safeguards. The Government's planned review of consumer safeguards provides an appropriate vehicle for this.

A staged approach to the implementation of these and other transition activities is proposed in figure 2.

Figure 2 A staged approach to transition



Findings and recommendations

An evolving telecommunications landscape

FINDING 2.1

Technological progress is transforming the way in which people access and use telecommunications services, with benefits for individuals, businesses, governments and the wider community. Prices of telecommunications services are falling, while service quality is improving across both fixed and mobile platforms. Moreover, these services are converging, allowing users to readily choose between fixed and mobile access, and generating additional competitive pressure on service providers.

The TUSO is deficient and should be wound up

FINDING 3.1

Data on the number and location of premises covered by the telecommunications universal service obligation (TUSO) are scant. Tentative Commission estimates suggest that the TUSO could imply an annual subsidy for a *standard telephone service* ranging anywhere between \$250 and \$2800 per ‘TUSO’ service, and an annual subsidy for each payphone of anywhere between \$2600 and \$50 000.

FINDING 3.2

There is unequivocal evidence that the relevance of services covered by the telecommunications universal service obligation — the *standard telephone service* and payphones — is declining. Over the past decade, Telstra’s active retail fixed voice services have fallen by about one quarter (from about 8 million to just under 6 million services), while the number of Telstra payphones has almost halved (from over 30 000 to around 17 000). One third of Australian adults in capital cities and regional areas now rely solely on mobile phones for voice services.

FINDING 3.3

In addition to its declining relevance, the telecommunications universal service obligation (TUSO) has serious deficiencies. It is a blunt instrument with a one-size-fits-all approach to universal service provision. Telstra's contractual obligations under the agreement with the Australian Government lack transparency and accountability. The basis for its funding (a total of around \$3 billion in net present value terms over 20 years to 2032) is unclear and disputed.

While landlines are still highly valued by some, particularly those in regional and remote areas currently with no mobile coverage, the TUSO is based on outdated technology.

Overall, the TUSO is no longer serving the best interests of the Australian community.

RECOMMENDATION 3.1

The Australian Government should wind up the telecommunications universal service obligation by 2020 in line with recommendations 9.1 and 9.2.

A lack of policy coherence

FINDING 4.1

A number of telecommunications consumer safeguards apply only to the provision of the *standard telephone service* and only to some service providers. The declining reliance on the *standard telephone service*, the increasing proportion of consumers agreeing to waive these safeguards (in particular, the Customer Service Guarantee), and the deployment of NBN infrastructure make the relevance of these safeguards questionable.

FINDING 4.2

The telecommunications universal service obligation is only one of several policies and programs that subsidise the provision and use of telecommunications services across Australia and across different cohorts of users. Conservatively (and excluding the NBN), at least \$1 billion per year is spent on such programs. Australians would benefit from a more integrated approach to meeting universal service objectives in telecommunications.

FINDING 9.4

The current pattern of ongoing discrete telecommunications policy reviews and proposed legislative measures raises concerns about the coherence of telecommunications policy development, with implications for the transition to, and the effectiveness of, any new universal service framework.

RECOMMENDATION 4.1

The Australian Government should, in consultation with State and Territory Governments, conduct a stocktake (by mid-2018) of all telecommunications programs that share universal service objectives with a view to rationalising these programs and improving their efficacy and cost-effectiveness.

The Australian Government should also work with State and Territory Governments to audit existing telecommunications infrastructure — including fibre networks — with a view to using and expanding these networks efficiently.

An updated universal service objective and *baseline*

FINDING 5.1

There are divergent quality settings for voice-only and broadband services, and a complex and opaque mix of regulatory instruments and contractual arrangements governing these settings.

RECOMMENDATION 5.1

The Australian Government should reframe the objective for universal telecommunications services to provide *baseline* broadband and voice services to all premises in Australia, having regard to the accessibility and affordability of these services, once NBN infrastructure is fully rolled out.

To contain costs to the broader community, the *baseline* should be set to meet the basic needs of most Australians in the majority of circumstances.

RECOMMENDATION 5.2

The Australian Government should, as a matter of priority:

- adopt a functional *baseline* standard for broadband and voice services at the premises as one that is *reliable and intelligible*, irrespective of the technology used
- establish the commensurate technical *baseline* standards for these services.

These technical *baseline* standards should:

- be developed prior to the Australian Government's foreshadowed review of consumer safeguards
- be used to set both wholesale *baseline* standards in regulation (based on, for example, the proposed Statutory Infrastructure Provider regime) and complementary retail *baseline* standards (based on, for example, the Telecommunications Consumer Protection Code)
- apply once NBN infrastructure is fully rolled out
- be regularly reviewed and adjusted by the Australian Communications and Media Authority in a manner that balances the benefits of a higher *baseline* standard with the costs imposed on the broader Australian community.

Leveraging off the NBN and mobile networks

FINDING 6.1

Irrespective of the telecommunications universal service obligation, current trends and policy settings around NBN Co Limited make it likely that retail NBN services will be universally available on request after the full rollout.

FINDING 6.2

When the NBN is fully rolled out, the combination of the NBN and mobile networks is likely to supply retail broadband and voice services to most premises at a level that meets or exceeds *baseline* standards.

All premises are likely to receive a broadband service at or above a *baseline* standard, but premises in the NBN satellite footprint *and* without adequate mobile coverage are unlikely to receive a voice service that meets *baseline* standards. This is due mostly to the unreliability of the *Sky Muster* service (including the prevalence of power outages), and to a lesser extent to call quality issues.

RECOMMENDATION 6.2

The Australian Government should task the Australian Communications and Media Authority to require NBN Co Limited to report regularly and publicly on the reliability of its networks, delineated to a reasonably granular level (by access technology at a minimum).

RECOMMENDATION 7.1

As a matter of priority, the Australian Government should clearly define the role of NBN Co Limited, and any other designated providers, as statutory infrastructure providers of wholesale broadband *and* voice services in legislation (such as the proposed Statutory Infrastructure Provider regime).

RECOMMENDATION 7.2

The Australian Government should minimise any further intervention with respect to guaranteeing retail service provision over NBN infrastructure. The Australian Government should monitor retail presence on NBN infrastructure and, where this is found lacking, contract one or more retail service providers to service geographic areas following a competitive tender, where feasible.

RECOMMENDATION 7.4

The Australian Government should amend the *National Broadband Network Companies Act 2011* (Cth) (the Act) to ensure that the planned Productivity Commission review of NBN Co Limited (nbn) occurs once the full rollout of NBN infrastructure is completed regardless of whether or not privatisation of nbn is being contemplated. The review should cover the impacts of nbn on the economic efficiency of the telecommunications sector as well as all the matters already specified in section 49 of the Act.

RECOMMENDATION 7.5

Before proceeding to the next funding round, the Australian Government should commission an independent evaluation of the Mobile Black Spot Program. Such an evaluation should consider measures to improve the program's operation, to best ensure that the program's objectives are prioritised and site selection is evidence-based.

RECOMMENDATION 6.1

As a matter of priority, the Australian Government should request that the Australian Communications and Media Authority work with mobile network operators to identify the number and location of premises in the NBN satellite footprint without adequate mobile coverage. This involves:

- developing metrics that give effect to the Commission's functional criterion that all premises with an *available* mobile service have outdoor mobile coverage of adequate strength to engage in voice calling of a *baseline* quality
- collecting data from mobile network operators to map the extent of mobile service availability that meets these metrics.

Addressing market gaps (including particular user needs)

FINDING 6.5

In the absence of the telecommunications universal service obligation — and given current policy settings, the full rollout of NBN infrastructure and the ubiquity of mobile services — the extent of market gaps (including particular user needs) in telecommunications is likely to be small and differ across groups.

FINDING 6.3

Certain groups of people with particular needs may experience gaps in the availability and accessibility of telecommunications services following the full rollout of NBN infrastructure and in the absence of further government intervention.

The groups most likely to experience difficulties include: people with disability and life threatening conditions; people living in remote Indigenous communities; some older people; people who are homeless; and users of telehealth, distance education and emergency services within the NBN satellite footprint who do not have adequate mobile coverage.

The costs of providing specialised services to meet the needs of these groups are likely to result in providers not offering the services, or providing them at a high price. Notwithstanding that technological advances could reduce these costs, the particular needs of some people in these groups warrant targeted government intervention.

FINDING 6.4

The affordability of telecommunications services has improved for most Australians although some people on low incomes may face financial hardship in accessing these services.

RECOMMENDATION 8.1

The Australian Government should use competitive tendering wherever feasible to deliver targeted telecommunications universal service programs. As a first step, the Government should test the depth of relevant market segments.

Where market depth is lacking and a competitive tendering process is not feasible, the Government should establish benchmarks against which to assess whether costs are acceptable. At a minimum, the Government should subject all proposed program costings to an independent and transparent validation process.

RECOMMENDATION 7.3

As a replacement for the *standard telephone service* USO, the Australian Government should introduce a competitive tendering arrangement for the delivery of *baseline* voice services where, within the NBN satellite footprint there is inadequate mobile coverage, and it is feasible to do so. This should only occur once the extent of any market gaps is fully determined (recommendations 6.1 and 6.2).

RECOMMENDATION 7.6

As a replacement for the payphones USO, the Australian Government should establish a funding program for a form of community telecommunications (that may involve payphones) that targets communities in areas where there is a market gap (including a particular user need). The program should be flexible in the form of services provided to communities, involve extensive local community input, and involve a competitive tendering arrangement, where feasible, to allocate funding.

How much funding and who should pay?

FINDING 8.1

Given the narrower scope of government intervention required following the full rollout of NBN infrastructure, the funding required for universal service programs is likely to be smaller than currently provided for the telecommunications universal service obligation.

FINDING 8.2

Small programs to meet telecommunications universal service objectives do not justify incurring the administrative costs and design challenges inherent to a broad-based industry levy. Funding these programs through general government revenue is likely to be simpler and less costly to administer.

RECOMMENDATION 8.2

The Australian Government should fund targeted measures to meet telecommunications universal service objectives principally through general government revenue rather than an industry levy. This would imply the ultimate removal of the Telecommunications Industry Levy.

RECOMMENDATION 8.3

The Australian Government should seek information from NBN Co Limited (nbn) on the potential incremental costs to nbn of the proposed reforms to telecommunications universal service policy. This should occur after *baseline* standards have been specified (recommendations 5.1 and 5.2) and nbn's role in providing *baseline* services is clearly defined (recommendation 7.1).

This information should be independently and transparently validated and exclude factors that nbn would be required to consider as part of its normal business operations.

Transitional matters

FINDING 9.1

The Commission's proposed reforms to universal service arrangements are incompatible with the current Telstra USO Performance Agreement.

The Agreement's review and payment mechanisms offer limited capacity for the parties to amend the contract in a way that aligns with these reforms. A significant renegotiation of the terms of the Agreement is likely to provide the most effective transition path to a fully overhauled universal service arrangement.

FINDING 9.2

To be effective, any renegotiation of the Telstra USO Performance Agreement needs to be informed by robust evidence on the net costs of services provided under that Agreement.

FINDING 9.3

A transition path away from the current telecommunications universal service obligation would need to be supported by necessary adjustments to the surrounding regulatory framework. Such adjustments include changes to consumer safeguards, Telstra's carrier licence conditions, and other policy measures. This would ensure that consumer safeguards are adequately considered, while removing inefficiencies and outdated mechanisms.

RECOMMENDATION 9.1

The Australian Government should:

- commence negotiations with Telstra with a view to terminate module C (payphones USO) of the Telstra USO Performance Agreement as soon as practicable
- amend the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth) and subordinate legislation to ensure Telstra's statutory obligation for the provision of payphones is terminated in line with its contractual obligation.

RECOMMENDATION 9.2

The Australian Government should:

- commence negotiations with Telstra with a view to terminate module B (*standard telephone service* USO) of the Telstra USO Performance Agreement shortly after the NBN is fully rolled out
- amend the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth) and subordinate legislation to ensure Telstra's statutory obligation for the provision of the *standard telephone service* is terminated in line with its contractual obligation.

RECOMMENDATION 9.3

The Australian Government should, as a matter of priority, undertake a detailed assessment of its data requirements for engaging in a future renegotiation of the *standard telephone service* and the payphones universal service obligations.

The Government should then direct the Australian Communications and Media Authority, and the Australian Competition and Consumer Commission, to utilise their existing information-gathering powers, where appropriate, to require the necessary information from Telstra.

RECOMMENDATION 9.4

The Australian Government should proceed with its foreshadowed review of the telecommunications consumer safeguards framework once technical *baseline* standards are defined (recommendation 5.2). The review should be undertaken from a whole-of-government perspective, and expanded to include an assessment of:

- what, if any, future retail safeguards are necessary
- what changes should be made to Telstra's carrier licence conditions
- the future role of accessibility and affordability measures, including the Telephone Allowance, the National Relay Service and relevant elements of the National Disability Insurance Scheme
- the consumer protection roles of various bodies including: the Australian Competition and Consumer Commission; the Australian Communications and Media Authority; and the Telecommunications Industry Ombudsman
- the need to clarify responsibilities for service quality (including fault repair) on the NBN.

RECOMMENDATION 9.5

The Australian Government should defer the next Regional Telecommunications Review, next scheduled for 2018. Any future reviews required under relevant legislation should only be conducted after the NBN is fully rolled out.

1 Introduction

1.1 Background

Telecommunications is essential to any modern society. It plays an increasingly important role in the delivery of private and public sector services across the economy. Access to telecommunications services is also a key enabler of social inclusion — allowing people to connect with family, friends and communities, and call for assistance in emergency situations.

For these reasons, many countries, including Australia, have policies designed to ensure that telecommunications services considered to be essential are available, accessible and affordable on a universal basis. These policies range from market-based approaches — that support universal access objectives through competitive service provision — to more interventionist approaches such as establishing a government-owned business to provide these services, or directly funding providers for a service provision ‘obligation’.

The telecommunications universal service obligation (TUSO) is one of several key policy instruments used in Australia to meet universal access or service objectives. Introduced in the 1990s when the sector was being deregulated, it was designed to ensure ‘reasonable access’ to a *standard telephone service* and payphones to all Australians on an ‘equitable’ basis, regardless of where people live or work. The TUSO is co-funded by the Australian Government and an industry levy that together amount to around \$300 million per year, with a total of around \$3 billion (in net present value terms in 2012) over the life of the 20-year contract (to 2032) between Telstra and the Australian Government.

The TUSO was conceived in an era when the delivery of telecommunications services was highly dependent on the ‘plain old telephone’, and payphones provided an essential service. It was enacted to benefit consumers by affording them a ‘provider of last resort’ for voice telephony services.

Technology has evolved substantially over the past two decades and this momentum is likely to continue, if not accelerate, in the foreseeable future. Telecommunications has shifted from basic fixed telephony to the almost instant global transmission of large amounts of data. These developments have been accompanied by a lowering of technological barriers to entry for the provision of telecommunications services and increased contestability in these markets. Moreover, the proliferation of internet protocols is leading to ‘convergence’ within the telecommunications sector — with different services now offered over a common platform and all-in-one devices becoming more accessible. In practice, and especially in the near future, voice communication will effectively be data communication.

Consumers are broadly benefiting from these developments through greater choice of service providers and products, better experiences and lower prices. Increasingly, they are revealing a preference for mobile devices. Australia ranks highly in terms of mobile connectivity with 99.3 per cent of the population covered by Telstra's mobile network and at least 96 per cent of the population jointly covered by all three mobile networks (Telstra, Optus and Vodafone Hutchison Australia).⁹ One third of Australia's adult population now rely solely on mobile phones for a voice service. Recent data show that there is no significant difference between regional and capital cities in terms of the proportion of adults who own or use a mobile phone, and who are solely dependent on their mobile for voice communications, although the way in which they use mobile phones may vary according to geography. Smartphone use and internet access through mobile phones are more prevalent in capital cities compared to regional areas.

In parallel with these developments, the Australian Government is making significant investments in a national broadband network (NBN) with expectations for NBN Co Limited (nbn) to ensure that all Australians have access to very fast broadband as soon as possible (by 2020), at affordable prices, and at least cost to taxpayers. nbn will have a capped wholesale price Australia-wide, across its fixed-line (92 per cent of all premises),¹⁰ fixed wireless (5 per cent of all premises) and satellite (3 per cent of all premises) networks.

Further developments are forthcoming with the introduction of 5G technology (also expected by 2020), which will deliver increased mobile broadband connection speeds and data volumes for consumers, and improved reliability and ultra-low latency connections (which could potentially enable life-critical medical functions, such as remote surgery).

1.2 What has the Commission been asked to do?

The overarching policy question to be addressed in this inquiry is to what extent, in an evolving Australian telecommunications market, government policies may be required to support universal access to a minimum level of retail telecommunications services.

Should the Commission recommend the retention of government interventions in the telecommunications market to achieve universal access, the terms of reference set out a range of issues that the Commission should make recommendations on:

- the objectives for a universal service obligation arrangement or its equivalent
- the scope of the services needed to be provided to achieve those objectives
- whether sections of the Australian community have differing needs to which additional government intervention should be directed
- who should bear the costs or regulatory burdens from those interventions, if any

⁹ Mobile networks cover around 31 per cent of Australia's land mass.

¹⁰ NBN fixed-line infrastructure includes fibre to the premises, to the basement, to the curb, to the node and hybrid fibre-coaxial.

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- the optimal funding model(s)
 - transitional arrangements from the current universal service obligation model.

In undertaking its assessment, the Commission was asked to consider a range of issues including the need for a durable and flexible framework that can accommodate changes in technology, the impact on competition in relevant markets, and significant investments already made by the Government, including the NBN. It was also asked to consider the current telecommunications regulatory framework and existing contractual commitments, as well as recent and ongoing reviews and relevant international approaches.

1.3 The Commission's approach

The Commission has adopted a ‘first principles’ approach to considering the role of government with respect to the provision of universal telecommunications services.

Consistent with the OECD (Garcia Calvo 2012) and the International Telecommunications Union (2016), the Commission has used the term ‘universal service’ to encompass the key elements of universality:

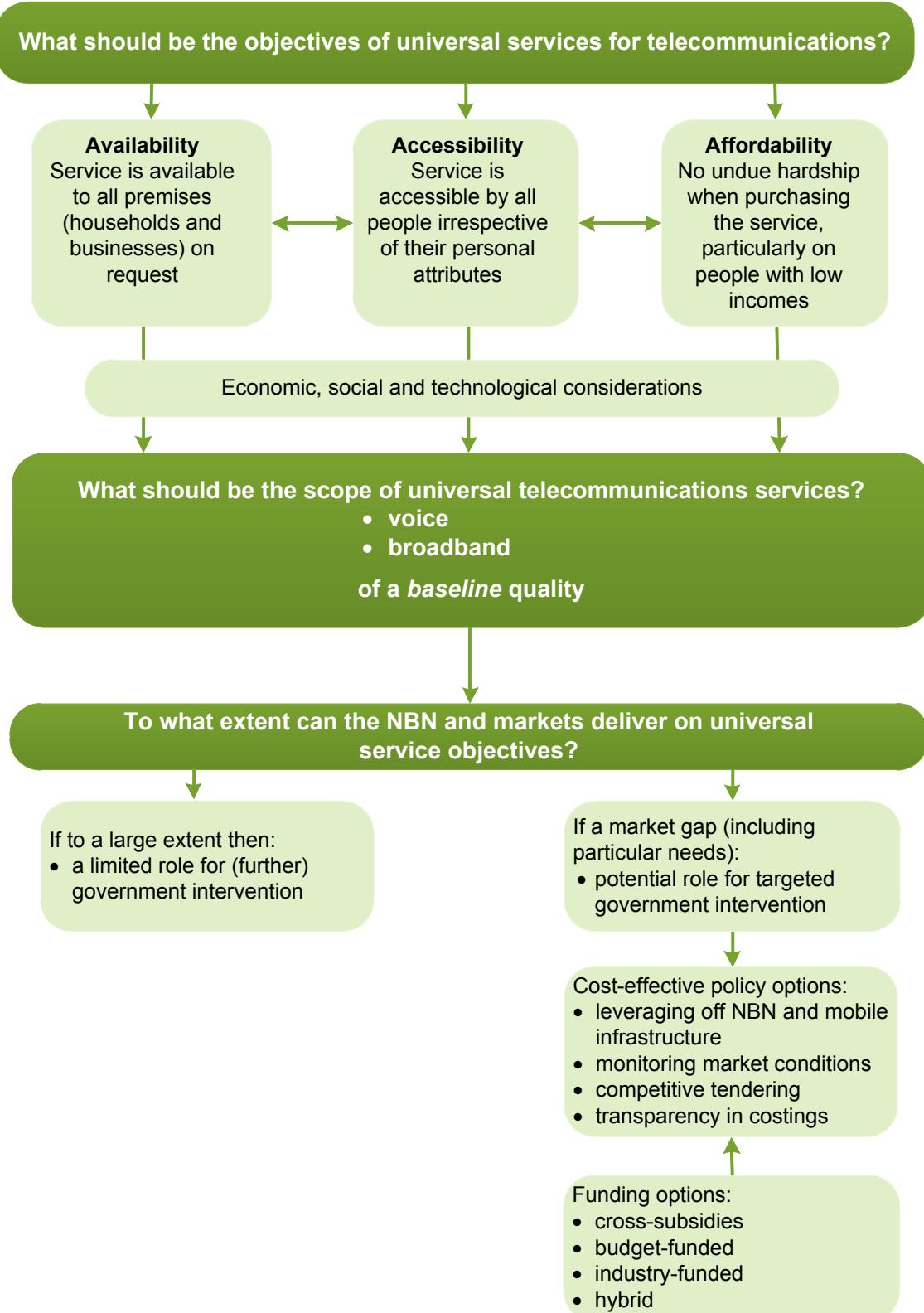
1. *availability* — the service is available to all premises (on request) and is subject to a minimum quality
2. *accessibility* — the service is accessible by all people irrespective of their personal (physical, cognitive and cultural) attributes
3. *affordability* — the purchase of the service does not place undue hardship, particularly on people with low incomes.

While universal service is conceptually distinct from universal access, in that the former relates to availability of a service on a private basis (for example, a standard telephone in every household) and the latter relates to availability on a shared basis (for example, public payphones and community WiFi), the term universal service is used in this report to include both concepts unless otherwise noted. These two concepts are not mutually exclusive — indeed, many countries have both universal access and universal service as complementary policy objectives.

The framework adopted in this inquiry explicitly recognises that market mechanisms and commercial interests play the primary role in enabling access to universal telecommunications services, confining any potential role for government to instances where there are availability, accessibility or affordability gaps in service provision or where there is some form of market failure (figure 1.1). A case can be made for government to intervene and address ‘market gaps’ and ‘market failures’ only when there is a net benefit to the Australian community.

In operationalising this framework, the Commission has used a number of principles to guide its assessment of the current TUSO and the configuration of options for a future telecommunications universal service policy (box 1.1).

Figure 1.1 The Commission's framework



Box 1.1 Some guiding principles

The objective of any policy intervention should ultimately be to maximise community wellbeing. The Commission has focused on the most efficient way of delivering on a universal service policy objective — with this objective couched in terms of delivering a *baseline* level of telecommunications services to all Australians. Key considerations guiding the Commission's assessments include the following principles.

Establishing a universal service policy objective

A telecommunications universal service objective should be:

- founded on clearly-specified and evidence-based economic and/or social policy rationales
- based on clear definitions of universal access and service and their scope
- specified in the form of measurable user outcomes
- subject to review.

Designing a universal service policy

A universal service policy should be effective in meeting a universal service policy objective at least cost to the community by:

- harnessing markets where efficient to do so
- targeting areas where efficient market solutions are not feasible
- being technologically neutral
- promoting efficient contestability or competition in the telecommunications sector and being competitively neutral
- promoting administrative simplicity and reducing regulatory compliance burdens
- being sufficiently flexible to adjust to future changes.

Funding a universal service policy

The funding of a universal service policy should:

- seek to reflect the efficient costs of service provision
- minimise distortions to investment and consumption choices
- be transparent
- have regard to administrative simplicity and compliance burdens
- be flexible to respond to future changes and be appropriately time-limited while providing enough certainty for investment decisions.

Managing the transition to a new universal service policy

Transition to any new universal service policy should:

- be fully supported by access to relevant information
- aim to achieve an appropriate balance between the benefits and costs of shifting to a new arrangement as soon as possible, relative to within a longer time frame
- be sufficiently transparent and subject to clear timeframes to enable effective business decision making
- incorporate effective stakeholder and community engagement strategies
- be carefully managed to mitigate the risks of loss of access to critical services.

Consistent with its standard process, the Commission has drawn upon publicly available information to the largest extent possible, including recent reviews (box 1.2), in order to provide transparency around the evidence used to inform its findings and recommendations. That said, the Commission's analysis has been hampered by a paucity of publicly available data and by the commercial-in-confidence nature of some of the information provided by certain participants. Where such information was received, the Commission has carefully considered the information and made necessary judgments.

Box 1.2 Reviews and legislative developments relevant to this inquiry

- NBN Market and Regulation Report (Vertigan Panel 2014)
- The Regional Telecommunications Review (RTIRC 2015)
- The Productivity Commission's research report on Public Safety Mobile Broadband (PC 2015)
- The review of NBN non-commercial services funding options (BCR 2016a)
- The Australian Infrastructure Plan (Infrastructure Australia 2016)
- The ongoing consultation on communications accessibility, which covers the National Relay Service (DoCA 2016a)
- The Spectrum Review Report (DoC 2015c) and ongoing consultation on spectrum reform legislative proposals (DoCA 2016f)
- The ongoing review of the Australian Communications and Media Authority (DoCA 2015a)
- The ongoing market study of the communications sector (ACCC 2016d)
- The ongoing inquiry into declaration of mobile roaming (ACCC 2016f)
- The ongoing performance audit of the contract management of selected telephone universal service obligations (ANAO 2016b)
- Exposure draft of the Telecommunications Legislation Amendment (Competition and Consumer) Bill 2017 (DoCA 2016d)
- Exposure draft of the Telecommunications (Regional Broadband Scheme) Charge Bill 2017 (DoCA 2016d)

1.4 Structure of this report

The remainder of this report is structured as follows.

- Chapter 2 provides an overview of the evolving landscape of telecommunications.
- Chapter 3 reviews and evaluates the current TUSO against a number of guiding principles.
- Chapter 4 identifies other government programs that are broadly designed to meet telecommunications universal service objectives.

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- Chapter 5 examines the considerations that should frame a new telecommunications universal service policy objective.
 - Chapter 6 assesses the extent to which the market and NBN might address the various dimensions of universal telecommunications services.
 - Chapter 7 considers policy options to address any ‘gaps’ identified in chapter 6.
 - Chapter 8 discusses the relative merits of alternative funding models for telecommunications universal service policies.
 - Chapter 9 canvasses issues associated with transitional arrangements.

The following appendixes support the analysis in the main body of the report.

- Appendix A outlines the conduct of the inquiry, including consultations undertaken and submissions received.
- Appendix B provides further information on the NBN.
- Appendix C presents an overview of approaches to telecommunications universal service policies in OECD countries.
- Appendix D touches on the relative affordability of NBN services.

2 An evolving telecommunications sector

Key points

- The continued revolution in telecommunications technology has offered profound benefits to consumers. Telecommunications services have improved in quality and variety, fallen in price and widened in availability.
- The telecommunications sector has evolved over the past several decades from enabling analogue voice-only conversations over copper lines to broader communications connectivity over a wide range of technologies.
 - Technological change is enabling convergence within the sector, resulting in increasing contestability between services.
 - With the advent of 4G wireless technology and the rollout of National Broadband Network infrastructure, voice services are increasingly provided over internet protocols — meaning that voice is becoming another form of data.
- Together with rapid changes in consumer preferences and relative prices, these technological advances have resulted in some key trends.
 - Increasingly, consumers are using mobile services instead of fixed services. Over the 11 or 12 years to 2016:
 - … there was a 211 per cent increase in voice call minutes from mobile services compared with a 81 per cent decrease in voice call minutes from fixed services
 - … the number of mobile voice services grew by 61 per cent, and there are now around 10 per cent more mobile voice services than there are people in Australia.
 - Although the overall volume of voice call minutes decreased by 35 per cent between 2004-05 and 2009-10, it has since stabilised — suggesting a persistent demand for voice-based telecommunications services.
 - 31 per cent of Australian adults rely solely on mobile phones for voice calling.
 - Internet data traffic has grown exponentially, rising by over 50 per cent per annum between 2006 and 2016. Growth is now strongest over wireless broadband services, but fixed-line broadband services still carry 93 per cent of download traffic.
- There is increasing structural separation in the provision of fixed telecommunications services — between infrastructure and retail services — due to the rollout of National Broadband Network infrastructure and regulatory requirements for fixed networks.
- The mobile services sector has developed largely on a market-driven basis. The three network operators — Telstra, Optus and Vodafone — have continued to improve their service coverage, with 99.3 per cent of Australia's population now having access to at least one mobile voice service provider at their premises.

The Australian telecommunications sector (box 2.1) has evolved rapidly over the past two decades compared with slower evolution over earlier periods (box 2.2). Where once telecommunications services consisted of analogue voice conversations delivered over copper lines, services now enable broader communications ‘connectivity’ over a wider range of technologies. Technological advances in fixed-line and especially wireless technologies have underlined these developments.

The changing role of government has also contributed to the evolution of the sector. In early years, the Postmaster-General’s Department provided both postal and telecommunications services. In 1975, these services were split into two agencies; the Australian Postal Commission and Telecom Australia. In 1992, Telecom Australia and the Overseas Telecommunications Commission merged and became Telstra.

The sector was opened to limited competition with the entry of Vodafone (mobile only) and Optus (mobile and fixed) in 1991, and to full competition in 1997. Telstra (with both wholesale and retail services) was privatised in three stages — in 1997, 1999 and 2006. In 2009, the Australian Government once again became involved in the provision of telecommunications services with its establishment of NBN Co Limited (now known as nbn) to build the National Broadband Network (NBN), a national open access and wholesale-only network (appendix B). It is envisaged that when the NBN is completed (expected in 2020) it will offer high speed broadband infrastructure to all premises in Australia that wish to access the service.¹¹

In considering whether further government intervention is needed to provide universal access to a minimum level of retail telecommunications services, it is important to understand the evolution of the telecommunications sector. This chapter examines recent developments and general trends in the Australian telecommunications sector, noting that some of these may not apply to the same extent across metropolitan, regional and remote areas. It begins with trends in the use and availability of telecommunications services (section 2.1), before discussing technological developments (section 2.2) and changes in industry structure and the competitive landscape (section 2.3).

¹¹ According to nbn (2016g), ‘Broadband is a term used to refer to “always on” high speed internet. In the past, broadband services and technologies were defined in terms of a capability to transfer information at higher rates than traditional dial-up services. Today broadband is more commonly associated with the speeds equal to or greater than those provided by [asymmetric digital subscriber line], that is, a minimum download speed of 256 kbps [kilobits per second] and minimum upload speed of 64 kbps’ (p.1). High speed broadband is considerably faster.

Box 2.1 Defining telecommunications

According to the *Telecommunications Act 1997* (Cth), telecommunications is ‘the carriage of communications by means of guided and/or unguided electromagnetic energy’. This inquiry focuses on two-way telecommunications — where a capacity to both send and receive communications is present — which excludes radio and televisual broadcasting.

Components of the telecommunications sector can be categorised either by:

- **fixed and mobile** services — which focuses on the mobility of the consumer interface^a
- **fixed-line and wireless** technologies — which focuses on the technology used to deliver the service to the consumer.

From a consumer’s perspective, the main types of telecommunications services are voice, messaging and internet (or data). Increasingly, internet protocol-based networks are being used in the provision of all services.

Telecommunications services are provided using a range of technologies.

- Voice services can be carried over both fixed-line and wireless technologies, and are transmitted through either ‘circuit switched’ or ‘packet switched’ networks. Traditional fixed and mobile telephony services use circuit switching, which involves a dedicated connection for the duration of the call. Voice over internet protocol (VoIP) telephony uses packet switching, where the signal ‘competes’ with other internet data. VoIP telephony can be either ‘managed VoIP’ or ‘Over-the-Top (OTT) VoIP’.
 - Managed VoIP, which is provided by a retail service provider, is similar to traditional telephony. To the extent that the provider prioritises the call over other traffic, the quality of a managed VoIP call can be as good or better than that of a circuit switched call, and at a lower cost. Managed VoIP may be used to provide a *standard telephone service* (chapter 3). All voice services supplied over the NBN will be VoIP services, and in late 2015 Australian mobile network operators began offering managed VoIP for some enabled mobile handsets, known as ‘voice over the long term evolution’.
 - OTT VoIP is provided on a ‘best efforts’ (non-prioritised) basis by third parties such as Skype and Apple FaceTime. These services are often ‘free’ as providers generally do not directly collect revenue from consumers, although consumers must supply the internet connection to enable the service.
- Messaging services are usually carried between mobile devices, although some OTT messaging can be accessed through a personal computer. The short message service (SMS) and multimedia messaging service (MMS) are provided by mobile operators, and allow text and picture messages to be sent between mobile devices. As with OTT VoIP, OTT messaging uses internet protocols and is provided by third parties, such as Facebook, Wickr and WhatsApp. OTT messaging services can offer additional flexibility, functionality and security.
- Access to the internet is provided over both fixed-line and wireless technologies. Internet access is the most recent of these three service types to become available on mobile devices.

^a Defined as the point at which the consumer takes responsibility for the service. For example, the use of WiFi routers to distribute broadband internet within a home or business is considered a fixed service because the service was provided to a fixed point.

Box 2.2 **Historical examples of long distance communications**

- The ancient Greeks, Romans and Chinese, and Australian and North American indigenous peoples communicated over long distances using smoke signals.
- The ancient Greeks and Romans also devised an optical hydraulic semaphore telegraph system and the heliograph (mirror) to send visual signals via watchtowers in line of sight. The Roman Emperor Tiberius was able to send encrypted signals from Capri to Rome in this way.
- The first working electrical telegraph was invented in 1816.
- The electric telephone was invented in the 1870s, and the first commercial services were introduced in 1878.
- Between 1886 and 1888, Heinrich Hertz successfully experimented with the transmission of electromagnetic waves thus proving James Maxwell's theory about the propagation of electromagnetic radiation. This was developed further into the early 20th century by inventors such as Nikola Tesla and Guglielmo Marconi.
- Australia's first telegraph line was erected between Melbourne and Williamstown in 1854. Australia's first telephone exchanges were opened in Brisbane and Melbourne in 1880, followed by Sydney in 1881 providing 'party line' (shared telephone line) services. While automatic exchanges were introduced in Australia from 1912, party lines continued to be used in some rural communities until 1986 (in Collarenebri). The party line was the bane of many people living in rural Australia, with phone-hogging, endless ringing and eavesdropping being common concerns.

2.1 Trends in the use and availability of telecommunications services

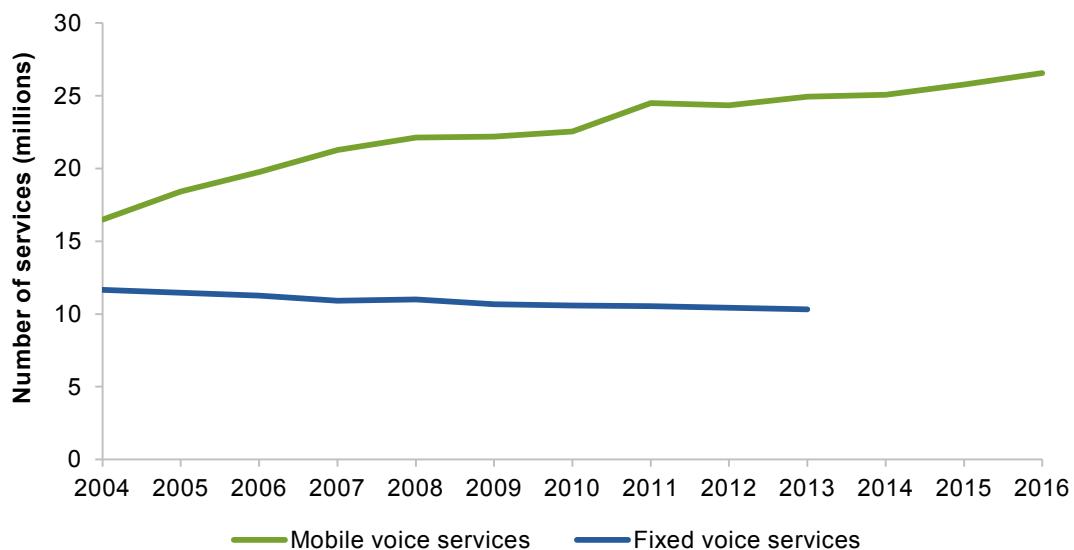
Mobile voice is replacing fixed voice

Recent years have witnessed a rise in the number of mobile voice services and a fall in the number of fixed voice services.

- The number of mobile voice services in Australia grew by 61 per cent during the 12 years to June 2016 (figure 2.1), and there are now around 1.1 services per person. Meanwhile, the number of fixed voice services declined by 11 per cent between June 2004 and June 2013. This may overstate the number of actual fixed voice services in use, because around 4 per cent of Australian adults received a fixed voice service as part of a service bundle but did not connect the service to a telephone (unpublished data from the Australian Communications and Media Authority — ACMA).
- The proportion of the adult population with a mobile voice service but no fixed voice service more than doubled between June 2011 and June 2016, growing from 15 to 31 per cent. These 'mobile-only' users were more likely to be young (59 per cent of 25-34 year olds compared with 12 per cent of people aged 65 and over) and about equally likely to be residents of capital cities or regional areas (ACMA 2016d).

Figure 2.1 Trends in voice services^{a,b}

June 2004 to June 2016



^a Comparable fixed voice services data are not available after June 2013 due to a methodological change in ACMA reporting. ^b Mobile voice services are calculated by deducting non-handset mobile internet services (USB modems, data cards etc.) from total mobile services (which includes non-handset mobile internet services). Total mobile services were sourced from ACMA annual industry data requests prior to June 2014 and from company annual reports and press releases thereafter. Non-handset mobile services were not reported prior to June 2009.

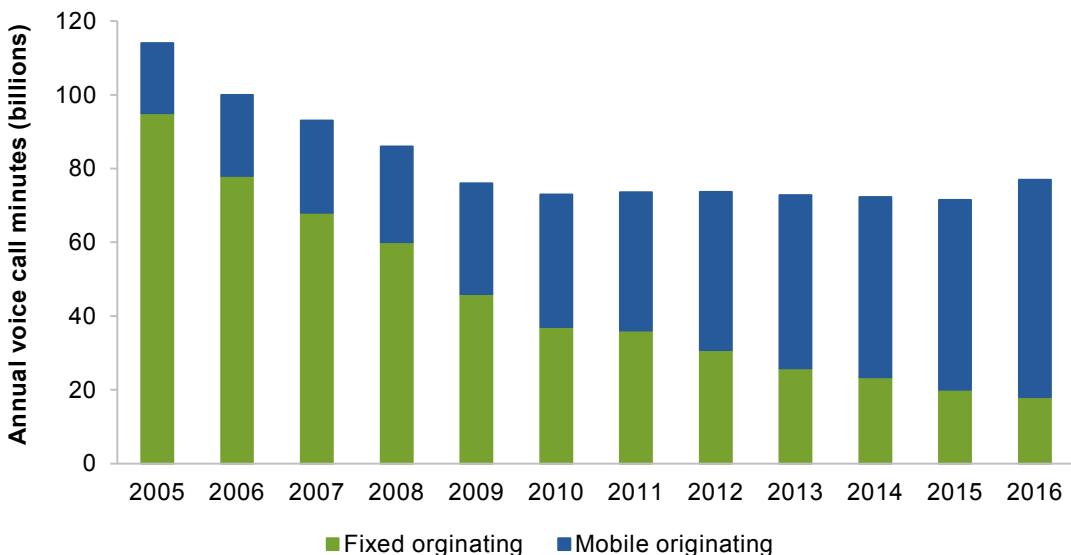
Sources: Productivity Commission estimates based on ABS (*Internet Activity, Australia, December 2015*, Cat. no. 8153.0) and ACMA *Communications Report* (various years).

This trend has also been mirrored by an increase in the *use* of mobile services and a decline in the *use* of fixed services for voice calling.

- In the 11 years to 2015-16, the number of voice call minutes originating from fixed services fell by 81 per cent, while the number of minutes originating from mobile services grew by 211 per cent, with mobiles becoming the main source of voice call minutes since 2011 (figure 2.2).
- In the six months to May 2015, 94 per cent of adult Australians made a mobile phone call (up from 90 per cent in the six months to May 2011), while 68 per cent made a phone call from a fixed service (down from 78 per cent in 2012) (ACMA 2015b). Fixed services are used on an increasingly sparing basis for voice calls, with monthly outbound voice minutes per fixed service falling by 23 per cent in the five years to 2014 (Ofcom 2015). A survey conducted by Ofcom (2015) found that while 68 per cent of Australians had a fixed voice service in the home, only 50 per cent used it at least once a week.
- In 2015-16, 69 per cent of calls to emergency services were placed from mobile phones (ACMA 2016d). This contrasts with 63 per cent a decade earlier (ACMA 2006).

Figure 2.2 Trends in voice calling^a

Voice call minutes by origin, 2004-05 to 2015-16



^a Data from 2004-05 to 2009-10 are sourced from the Australian Competition and Consumer Commission (ACCC) Regulatory Accounting Framework Record Keeping Rule and include only Telstra, Optus, Vodafone, AAPT and Primus. Data from 2010-11 onwards are from the Division 12 Record Keeping Rule which includes a broader set of providers. Most forms of managed VoIP are not included, and OTT VoIP services are not included.

Source: ACCC *Telecommunications Reports* (various years).

After falling by 35 per cent between 2004-05 and 2009-10, total voice calling appears to have now stabilised — even rising over the year to June 2016 (figure 2.2). This point is reinforced when VoIP usage is also considered, with OTT VoIP services used by a quarter of Australians in 2015-16, up from less than 20 per cent in 2010-11 (ACMA 2015b, 2016d)

The use of messaging has increased

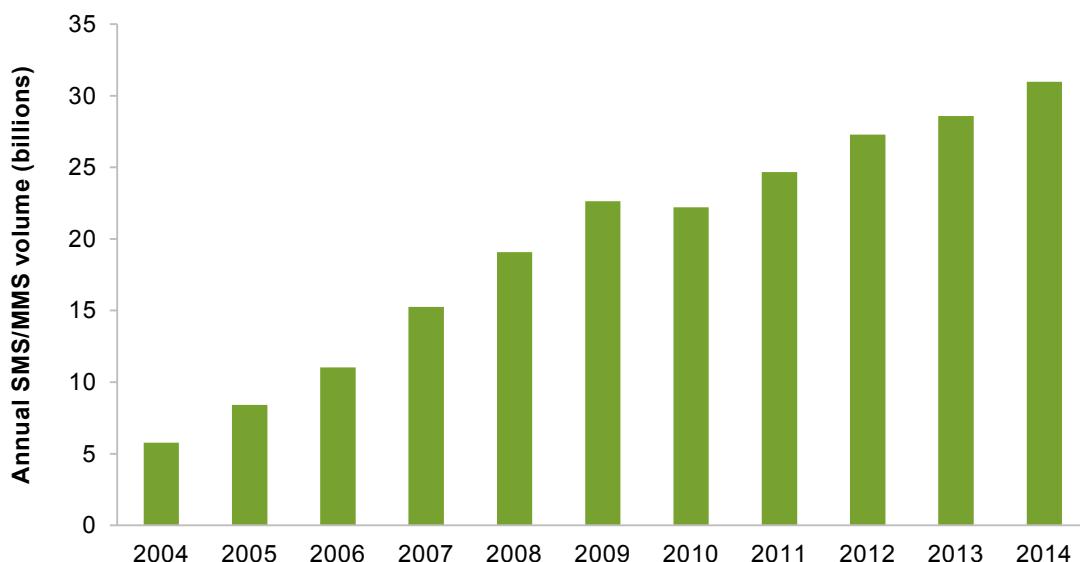
The use of mobile messaging services — through both SMS/MMS and OTT messaging services such as WhatsApp, Facebook Messenger, and Wickr — has grown strongly in recent years. SMS/MMS traffic grew fivefold between 2004 and 2014 (figure 2.3). Even though equivalent data relating to OTT messaging traffic are not available, a 2015 survey found that 64 per cent of Australians with mobile phones use OTT messaging services (compared with 89 per cent who use SMS) (Ofcom 2015). Moreover, Deloitte (2015) found that the use of OTT messaging services increased by almost 70 per cent between 2014 and 2015.

Although it is not yet the case in Australia (figure 2.3), international trends suggest that OTT messaging services may bring about a fall in the use of SMS/MMS. In countries such

as the Italy, the Netherlands, South Korea, the United Kingdom and the United States, SMS/MMS traffic has declined on a per person basis in recent years, with Ofcom (2015) attributing this to the increased use of email and OTT messaging services. Given the superior functionality offered by many OTT services, it remains to be seen as to whether the growing ubiquity of unlimited SMS mobile phone plans (ACCC 2016b) may prevent SMS/MMS use declining in Australia.

Figure 2.3 SMS/MMS volumes have grown strongly^a

Australian SMS/MMS messages sent, 2004 to 2014



^a Data from 2004–2008 are based on Ofcom (2010) and ACMA (2015b). Data from 2010–2014 are based on Ofcom (2015) and ABS (*Australian Demographic Statistics, Sep 2015*, Cat. no. 3101.0). 2009 figure is an average of both methodologies.

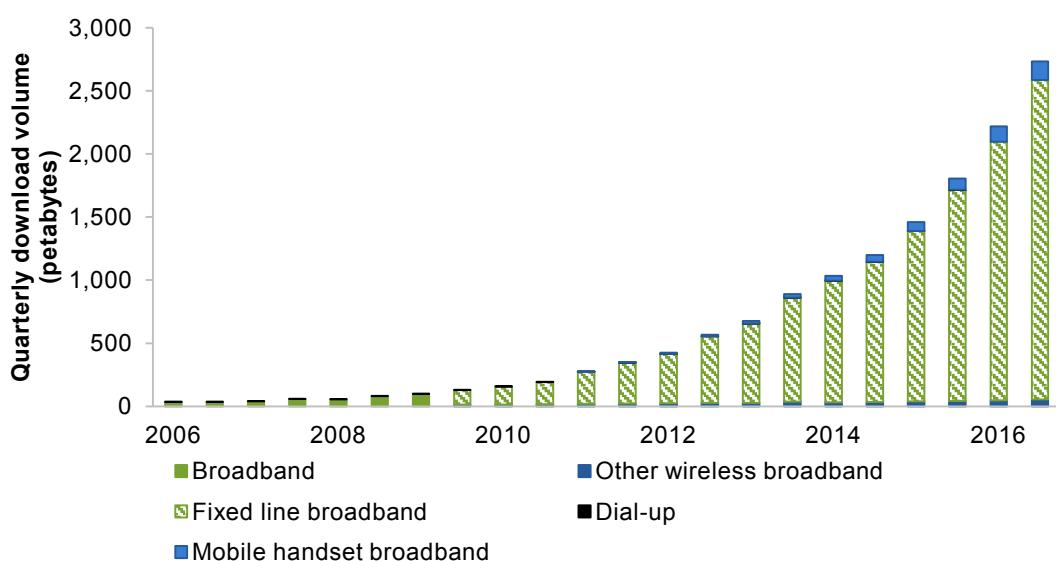
Sources: Productivity Commission estimates based on ABS (*Australian Demographic Statistics, Sep 2015*, Cat. no. 3101.0), ACMA (2015b) and Ofcom (2010, 2015).

The demand for data has grown

Data download traffic grew exponentially between June 2006 and December 2016, rising by around 7500 per cent, or over 50 per cent per annum (figure 2.4). In the three years to June 2016, annual growth was strongest in mobile handset broadband (74 per cent), followed by fixed-line broadband (45 per cent) and other wireless broadband (13 per cent). The rapid expansion in mobile handset data usage corresponds with at least an additional 12 per cent of Australian adults accessing the internet on their mobile phone over this period (ACMA 2015b). However, despite stronger growth of traffic over wireless broadband services, fixed-line broadband services still accounted for 93 per cent of download traffic in June 2016.

The growth in data consumption from fixed services has, in recent years, been underlined by the rapid uptake of OTT subscription video on demand services, such as Netflix, Presto and Stan (ACCC 2016b). Indeed, Netflix and YouTube collectively account for more than half of all global internet traffic (Hall 2016). The ACCC (2016b, p. 19) considered that ‘the data intensive nature of this content is likely to lead to a significant increase in the already robust growth in fixed broadband data consumption’.

Figure 2.4 Data consumption has grown exponentially, with fixed-line broadband services accounting for the bulk of the traffic^{a,b,c}
Data download traffic, June quarter 2006 to December quarter 2016



^a The wireless/fixed-line division was not reported prior to December 2010. Fixed-line includes digital subscriber line, hybrid fibre coaxial and fibre-based services; other wireless includes satellite, fixed wireless and non-handset mobile via data card, dongle, USB modem and tablet SIM card. ^b Comparable mobile handset data not available prior to June 2011. ^c Includes internet service providers with more than 1000 subscribers only.

Sources: Adapted from ABS (*Internet Activity, Australia, December 2010*, Cat. no. 8153.0; *Internet Activity, Australia, December 2016*, Cat. no. 8153.0).

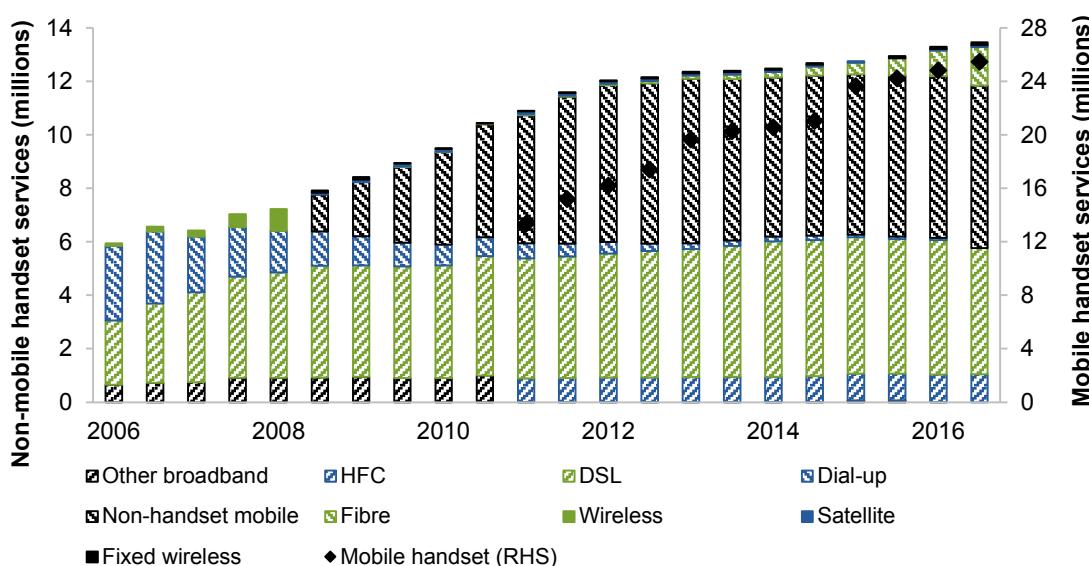
Nonetheless, broadband consumption is highly asymmetric. In 2013-14, around 90 per cent of premises in the United States were below average users of fixed broadband, and the bottom 50 per cent of premises accounted for just 10 per cent of total fixed broadband consumption (James 2016). Assuming similar trends carry over to Australia, this suggests that the needs of many households may be adequately catered for with mobile broadband.

The way Australians access the internet has changed and varies across the community

Internet service volumes have grown over the past decade, driven by the growth of handset and non-handset mobile broadband, with fixed services — through dial-up, hybrid fibre coaxial (HFC) cable, fibre, digital subscriber line (DSL), fixed wireless and satellite — at saturation levels (figure 2.5). Non-handset mobile broadband services grew by 345 per cent over the eight years to December 2016, while mobile handset broadband services grew by around 91 per cent between June 2011 and December 2016 to now significantly outnumber all other forms of internet services. The rate of take-up of both of these services has slowed in recent years, indicating that these markets are now also approaching saturation.

Figure 2.5 The changing nature of internet access^{a,b,c,d,e}

Internet service volumes, June 2006 to December 2016



^a Other broadband includes 'other broadband' as reported and broadband connections of unspecified type. ^b Wireless disaggregation (into non-handset mobile, satellite and fixed wireless) not reported prior to December 2008. Non-handset mobile includes mobile wireless via data card, dongle, USB modem and tablet SIM cards. ^c Mobile handset and HFC not reported prior to June 2011 and fibre not reported prior to December 2009. ^d Includes internet service providers with more than 1000 subscribers only. ^e Fibre includes fibre to the premises, fibre to the node, and fibre to the basement.

Sources: Productivity Commission estimates based on ABS (*Internet Activity, Australia, December 2010*, Cat. no. 8153.0; *Internet Activity, Australia, December 2016*, Cat. no. 8153.0).

While total fixed service volumes have been relatively stable over the past decade, the market has not been static. Consumers have shifted away from slower dial-up services toward mostly DSL services (figure 2.5). While the proportion of Australians who reported having an internet connection at the home (excluding mobile handset broadband) grew from 79 to 85 per cent in the five years to June 2016, the proportion who reported a non-broadband (dial-up) home internet connection fell from 10 per cent to less than

1 per cent over the same period (ACMA 2016d).¹² More recently, annual growth in fibre services has been close to 100 per cent due to the ongoing rollout of NBN infrastructure (appendix B), with DSL services decreasing for the first time (albeit by less than 2 per cent) over the six months to December 2015 (figure 2.5). The strong uptake in mobile broadband services (both handset and non-handset) does not appear to have brought about a decline in the volume of fixed broadband services.

Instead, Australians are increasingly using multiple devices to connect to the internet. In the six months to May 2015, 26 per cent of Australian adults who accessed the internet did so using five or more devices, up from 23 per cent one year previously, and 86 per cent used more than one device (ACMA 2015b). Of these, 79 per cent used a mobile phone, 74 per cent a laptop computer, 61 per cent a desktop computer, 58 per cent a tablet computer, 27 per cent a television or ‘smart’ television, 17 per cent a non-portable game console, 12 per cent an mp3 player and 7 per cent used a portable game console (ACMA 2015b).

These trends are indicative of the complementary nature of fixed and mobile broadband access (ACCC 2016b; BCR 2016b). Australians appear to strongly prefer fixed broadband for downloading bandwidth intensive content (such as video) (ACCC 2016b), while mobile broadband is used more frequently but with less intensity (BCR 2016b). This reflects the large differences in price and, especially, data quotas offered by these services (section 2.4). Reviewing several recent international studies, analysis by Ockerby and Wongsosaputro for nbn (sub. 47, attachment, p. 24) finds that ‘the most likely service where fixed to mobile substitution will continue is for voice and lower bandwidth broadband services’. However, to the extent that mobile data quotas expand, there may be increased substitutability between these services in the future (section 2.3).

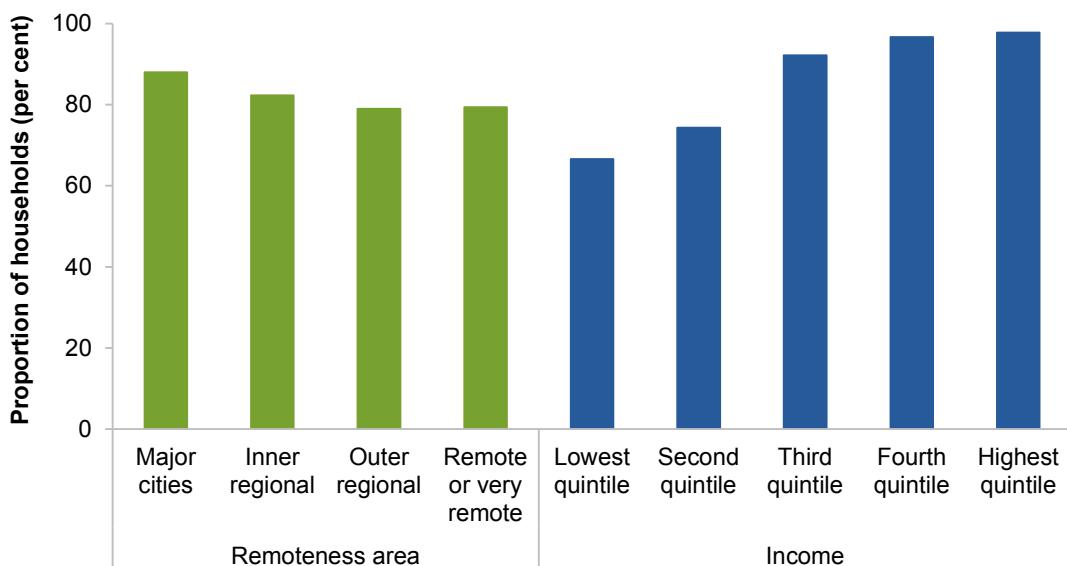
Cross-sectional variation

The proportion of Australians with internet access in the home generally decreases with remoteness and increases with household income (figure 2.6). In 2014-15, 88 per cent of households in major cities had internet access, compared with 79 per cent of households in remote or very remote areas. Meanwhile, 67 per cent of households with income in the lowest quintile had internet access, compared with 98 per cent of households in the highest quintile. Internet access also varies by age (chapter 6).

¹² The proportion of Australians with a non-broadband home internet connection is calculated as the difference between the proportion of Australians with a home internet connection and the proportion with a home broadband internet connection.

Figure 2.6 Internet access varies with remoteness and household income^a

Proportion of households with internet access at home, 2014-15



^a Internet access through both fixed and mobile services.

Source: ABS (*Household Use of Information Technology, Australia, 2014-15*, Cat. no. 8146.0).

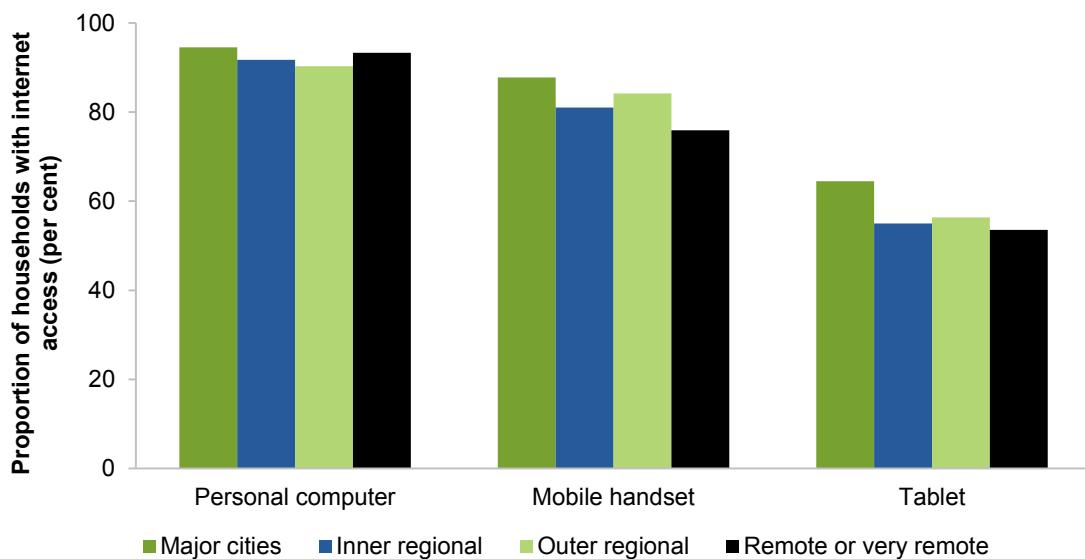
The medium of internet access also varied with remoteness. This variation is greater for access through mobile handsets and tablets than for personal computers (figure 2.7), which may reflect more limited access to quality mobile broadband in remote areas.

Likewise, mobile handset internet access varied more with income than fixed internet access. The use of both personal computers and mobile handsets to access the internet increased with income among households with internet access, but the range was 85–96 per cent for personal computers and 75–95 per cent for mobile handsets (ABS 2016d).

Across all remoteness classes, a higher proportion of Australians used the internet for banking and social networking than for other purposes (figure 2.8). While for most services usage rates fall with remoteness, in remote or very remote areas a relatively high proportion of users accessed the internet to purchase goods or services and for banking purposes.

Figure 2.7 Types of internet access vary with remoteness

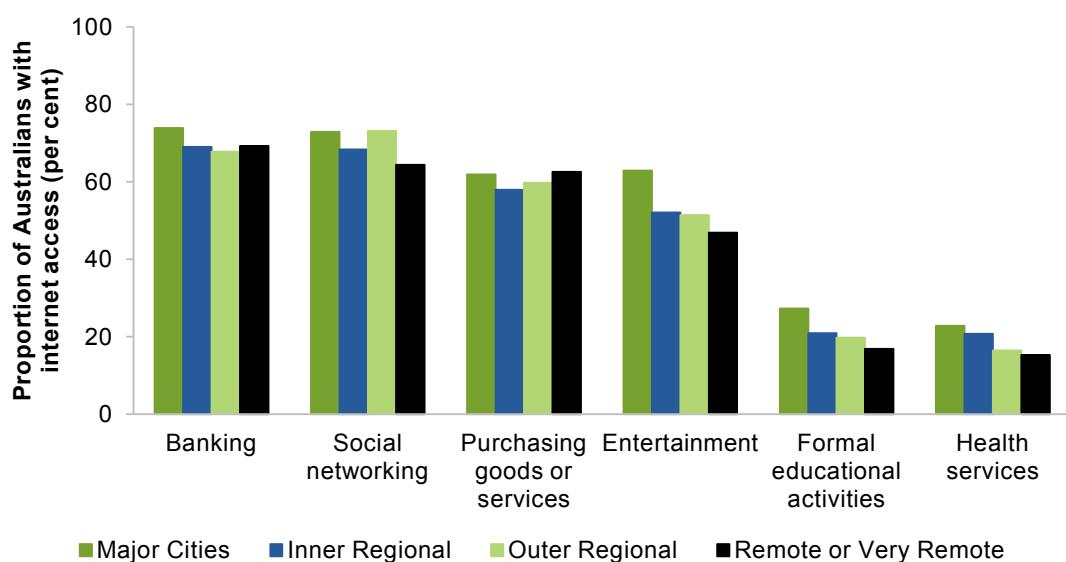
Medium of internet access by internet-connected households, 2014-15



Source: ABS (*Household Use of Information Technology, Australia, 2014-15*, Cat. no. 8146.0).

Figure 2.8 Australians use the internet for a variety of reasons

Online services accessed by internet-connected Australians in a three month period, 2014-15



Source: ABS (*Household Use of Information Technology, Australia, 2014-15*, Cat. no. 8146.0).

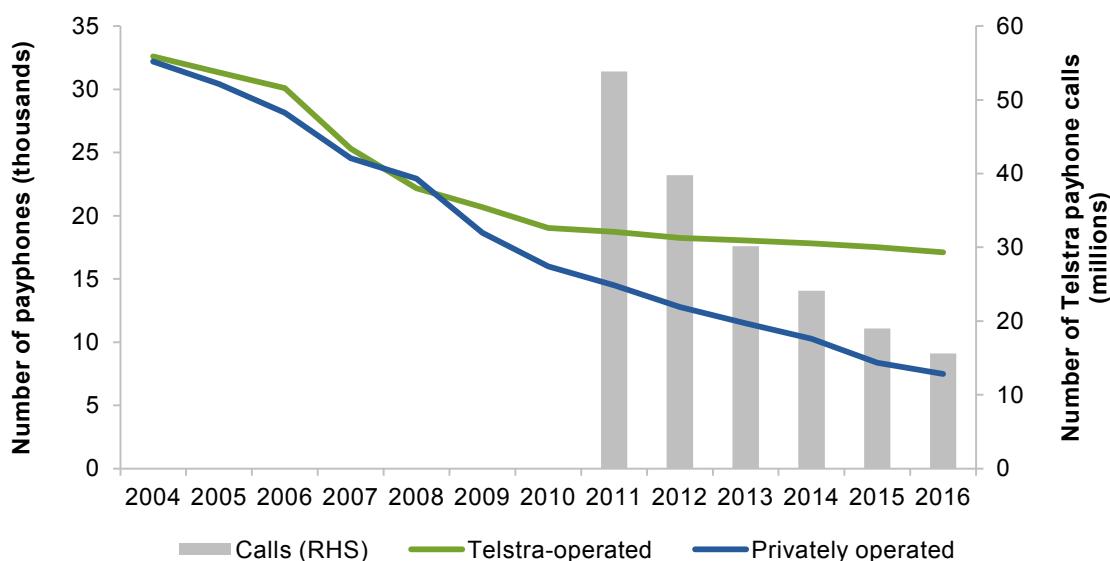
Payphones are in decline

Payphones — both those supplied by Telstra under the telecommunications universal service obligation (TUSO) and those commercially supplied by other private providers — have declined in number over the past decade, and calls from Telstra payphones have declined at a faster rate (figure 2.9). The number of payphones operated by Telstra and other private operators fell by 48 and 77 per cent respectively between June 2004 and June 2016. Meanwhile, the number of calls made from Telstra payphones fell by 71 per cent between 2010-11 and 2015-16 and the number of emergency calls made from all payphones declined by around one quarter (ACMA 2011b, 2016d).

Telstra's share of the payphone market (70 per cent at June 2016) is at its lowest in urban areas and in remote Indigenous communities. Other privately operated payphones are often located in hotels, clubs and convenience stores (ACMA 2015b), while Telstra payphone locations are determined on the basis of proximity to residential and commercial areas and other payphones, and commercial viability — as set out by the ACMA's guidelines (chapter 3). Although the total number of Telstra payphones is in decline, Telstra continues to install new payphones to meet its obligations under the TUSO. For example, 67 new payphones were installed in 2014-15 (TUSMA 2015). This was against the removal of 361 payphones in that year, generating a net decline of 294 payphones (ACMA 2015b). Telstra also uses some of its payphones as WiFi hotspots, as part of its 'Air Network' (made available to Telstra customers) (Telstra 2015a).

Figure 2.9 **Payphones are in decline^a**

Payphones and payphone calls placed, June 2004 to June 2016



^a Number of calls made from Telstra payphones not available prior to 2011.

Sources: ACMA *Communications Report* (various years); Telstra (pers. comm., 31 August 2016).

2.2 Technological changes

The above trends in the use and availability of telecommunications services have been enabled by continual and rapid technological advances. These advances are driving the ‘convergence’ of the sector, with different devices and networks moving toward performing similar tasks. Convergence is most evident in improvements to wireless networks, which provide increasingly similar services to fixed networks.¹³

Fixed-line technologies

The majority of Australian premises receive fixed voice and broadband services over fixed-line networks — terrestrial networks featuring fixed-line access infrastructure (box 2.3). Although wireless technologies (such as fixed wireless and satellite connections) are increasingly used to supply fixed services, the NBN will still use fixed-line technologies to supply broadband access to around 92 per cent of Australian premises.

Fixed-line technologies have progressed in two dimensions. First, the development of DSL technology has allowed existing fixed-line infrastructure to be used in a more technically efficient manner. Using the same copper network, the theoretical maximum download speed that can be reached with an asymmetric digital subscriber line (ADSL) 2+ connection is over 400 times greater than that of dial-up internet access (which was the most common form of internet access in Australia until 2006 — figure 2.5).¹⁴

However, the extent to which the copper access network can be used to deliver DSL broadband is limited. Generally speaking, DSL broadband cannot be delivered over a copper run exceeding 5 km, so premises must be situated sufficiently close to the exchange (DoC 2013).¹⁵ Moreover, DSL broadband requires the installation of a DSL access multiplexer at the exchange, either by Telstra or a competing retail service provider. But exchanges may be ‘capped’, meaning that no further DSL services can be supported; there may be no free space for third parties to install a DSL access multiplexer; or multiple standard telephone lines may be carried over a single copper wire, which limits the extent to which DSL broadband can be provided (DoC 2013). The Department of Communications (2013) estimated that around 9 per cent of premises in Australia were unable to receive a DSL broadband service in 2013 (table 2.1).¹⁶ Availability decreases

¹³ Another clear example of convergence in telecommunications is the emergence of OTT subscription video on demand services, which are challenging traditional broadcasting models (BCR 2016b). However, this trend is not discussed here due to the Commission’s focus on two-way communications (box 2.1).

¹⁴ 56 kbps for dial-up versus 24 megabits per second (Mbps) for ADSL2+.

¹⁵ Rural areas are often serviced with heavier gauge cable that can support ADSL on runs as far as 8.6 km (DoC 2013).

¹⁶ Although the availability of DSL broadband is also restricted by the rollout of the NBN and other superfast broadband networks, as at 2013 this was unlikely to be a large contributing factor. For example, around 70 per cent of the premises that could not receive DSL broadband in 2013 were located in areas where only around 1 per cent of premises had access to FTTP, FTTN or HFC broadband (DoC 2013).

with remoteness, with almost 95 per cent of premises in major cities having access compared to less than 70 per cent in very remote areas (DoC 2013).

Box 2.3 Telecommunications networks

Telecommunications networks (fixed-line and wireless, including satellite) consist of two basic components — access infrastructure and transmission infrastructure (also known as backhaul).

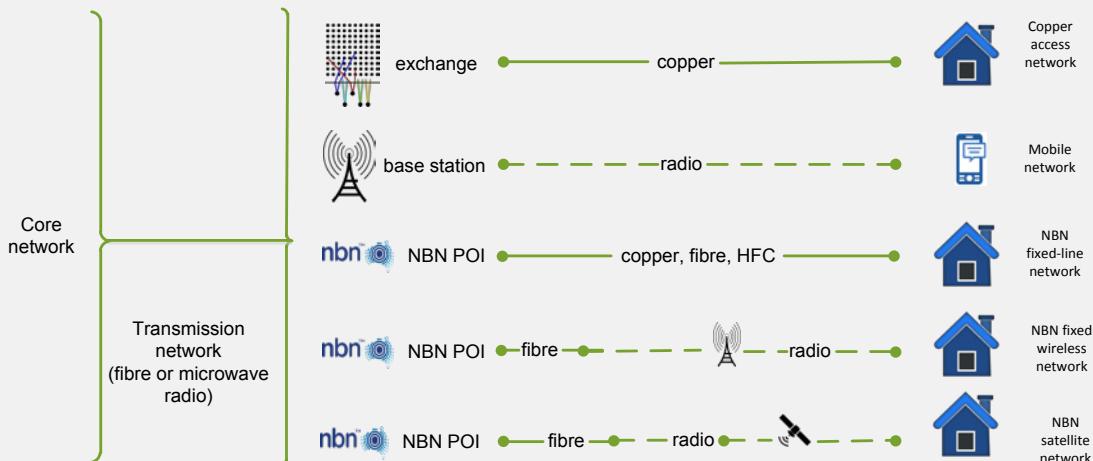
Access infrastructure carries data from consumers to aggregation points (in a generic sense), where it is aggregated and carried to retail service providers' core networks. Fixed-line and wireless networks are largely distinguished by their access infrastructure.

- Fixed-line access infrastructure uses wired cabling. Older networks, such as the ubiquitous copper access network, use copper cabling, while modern networks typically use optical fibre cabling, which allows data to be transmitted at much faster speeds.
- Wireless networks use radiofrequency signals to transport data at this level.
 - For a mobile network, this is known as the radio access network (box 2.6).
 - To provide satellite voice or broadband, signals are either 'bounced' off a satellite to an aggregation point, or the satellite itself may serve as an aggregation point.

Transmission infrastructure carries data from aggregation points to retail services providers' core networks, and is becoming an increasingly important component of networks due to the exponentially increasing demand for data over both fixed and mobile services. Most transmission infrastructure is fibre-based, although microwave and satellite links are also used.

Because aggregation may occur at many different levels, the boundary between access and transmission networks may be somewhat arbitrary. For the purposes of this report, the Commission has made the following distinctions:

- when considering the NBN, points of interconnection (POIs) mark the boundary between the access and transmission networks. Because traffic is passed from nbn to retail service providers at the POIs, nbn is considered an access infrastructure provider^a
- when considering mobile networks, base stations mark the boundary between the access and transmission networks.



^a Not accounting for nbn's potential expansion into the transmission market (chapter 6).

Table 2.1 Premises unable to receive DSL broadband and contributing factors^a
2013

<i>Contributing factor</i>	<i>Premises affected</i>	<i>Proportion of total premises</i>	
		No.	%
No access multiplexer installed	384 000		4
Too far from exchange	307 000		3
Limited port availability ^b	1 093 100		10
Capped exchange ^b	102 900		1
Premises unable to receive DSL broadband	1 058 600		9

^a Premises may appear in multiple categories. ^b Includes all premises in affected distribution areas, and hence overstates the actual number of affected premises.

Source: Adapted from DoC (2013).

Newer technologies allow for faster transmission of data over copper than ADSL2+ but can only operate over short copper runs, which precludes their use over the copper access network.¹⁷ However, nbn is running tests of some of these technologies and already implementing others in areas where its access networks have a shorter copper component (appendix B).

Second, existing networks have been upgraded and new networks have been constructed with greater use of fibre-optic — rather than copper — cabling (box 2.4), which allows data to be transmitted at much faster speeds and much higher volumes. Telstra and Optus deployed HFC networks in the 1990s, which were originally for the purpose of supplying subscription television services but have since been upgraded to supply broadband. Prior to the establishment of nbn, Telstra's network was capable of serving approximately 2.5 million premises in Sydney, Brisbane, the Gold Coast, Adelaide and Perth, while Optus' network was capable of serving around 1.4 million premises in Sydney, Melbourne and Brisbane (Vertigan Panel 2014); although there are significant overlaps in the coverage of these networks.

The NBN infrastructure rollout involves both upgrades to existing networks and construction of entirely new networks. Its fixed-line networks will be composed of a mixture of fibre to the premises (FTTP), fibre to the node (FTTN), fibre to the curb (FTTC) and fibre to the basement (FTTB) technologies — named according to the extent to which they replace the copper with fibre cabling — and HFC. To allow this, the ownership of Telstra's copper and HFC networks and Optus' HFC network is progressively transferring to nbn as the NBN is rolled out, although nbn announced in September 2016 it will not recondition Optus' HFC network as part of the rollout (nbn 2016i). Around 5 per cent of premises will be reached by fixed wireless technologies,

¹⁷ These include (in order of increasing speed) very-high-bit-rate DSL (VDSL), G.fast and XG.FAST.

with the *Sky Muster* satellite service covering the remaining 3 per cent. Collectively, these technologies aim to meet the Australian Government's expectation that nbn will provide (on request) peak wholesale download rates of at least 25 Mbps to all premises¹⁸ and at least 50 Mbps to 90 per cent of premises in the fixed-line footprint (Fifield and Cormann 2016b). More detailed information on the NBN can be found in appendix B.

Box 2.4 Fibre, copper or wireless — what is the cheapest?

Aside from the clear benefit of vastly increased bandwidth capacity, fibre (over recent years) can also be less costly to install and maintain than copper. While fibre cabling remains more expensive to purchase than copper cabling, it is more durable and requires less supporting hardware (such as signal repeaters), meaning lower maintenance costs (Bowyer 2016; Collins 2015). Wireless technologies can reduce costs further, because they require much less physical network infrastructure.

Where copper lines are already installed, a large share of these costs are sunk — so using the existing copper is often economical in the short to medium term. But as maintenance costs grow over the longer term, a point will be reached where there is no justification for maintaining copper infrastructure.

Assessing the optimal balance of technologies to supply fixed services requires a complex cost–benefit calculation that depends on, among other things, the likely data volume load and the costs of constructing and maintaining the service. In general (and at the present time), fibre is the preferred option for new installations in metropolitan areas and those reasonably close to urban areas. Wireless (both terrestrial and satellite) technologies are more cost-effective in more remote areas.

Wireless technologies

Wireless technologies (box 2.5) have advanced dramatically in recent years, and are now increasingly used in the provision of both fixed and mobile services. The NBN will offer fixed wireless and satellite broadband to 8 per cent of premises when completed.

A key development in mobile and fixed wireless technologies is the evolution of their underlying capabilities from 1G (the first generation) in the 1980s to 4G (the fourth generation) today, with 5G currently in development and expected to be launched commercially in Australia in 2020 (figure 2.10).¹⁹ In Australia, all mobile network operators provide 4G service for the majority of their consumers (section 2.3), and nbn's fixed wireless networks use 4G technology.

¹⁸ Because nbn offers a 12 Mbps peak download wholesale speed tier at lower cost than 25 Mbps, some premises may choose a peak speed below 25 Mbps.

¹⁹ The International Telecommunications Union is responsible for setting the standards that govern the technical aspects of each generation to ensure compatibility between devices and networks.

Box 2.5 Wireless technologies

Mobile and fixed wireless (terrestrial wireless)

Terrestrial wireless networks are distinguished by the use of radio access networks for the access network component (box 2.3; box 2.6). Fixed wireless networks can support superior speeds and data allowances as each base station services a fixed number of stationary receivers and because fixed wireless antennas can be optimally positioned.

Multiple network operators can share radio access network infrastructure. Sharing is considered ‘passive’ or ‘active’ depending on the degree of operational coordination between providers. Site and mast sharing arrangements (where mobile network operators share antennas) are passive in that they require minimal coordination (because competing mobile network operators are licensed to use different spectrum frequencies), while any further sharing involving signal processing and transmission sharing requires increasing degrees of network compatibility (GSMA 2012). The most comprehensive form of sharing is known as ‘roaming’, where traffic from multiple providers is carried over a single network. Retail mobile service providers who solely roam over other operators’ networks and do not own any radio access network infrastructure (including spectrum) are known as mobile virtual network operators.

Satellite

Satellites are used to deliver voice and broadband services in areas of very low population density or challenging geography, where fixed-line and terrestrial wireless services are not economically viable. For this reason, they often play a ‘technology of last resort’ role. Although satellite services are limited in capacity and costly to upgrade, they can provide coverage on a much lower cost per unit area basis.

Most telecommunications satellites are geostationary or low earth orbit satellites. Geostationary satellites (including nbn’s *Sky Muster* and *Sky Muster II*, and Telstra’s USOSat) deliver higher throughput over each satellite, while low earth orbit satellite constellations (such as the Iridium and Globalstar networks) offer services with lower transmission delay (latency) due to their location closer to the Earth. High throughput low earth orbit satellite constellations have been proposed (this is discussed later), but require ground receiver dishes that can track the satellites as they move across the sky — a feature that has so far proved a cost barrier (Farrar 2015). Existing low earth orbit satellite constellations can supply voice services to mobile devices, which use antennas as ground receivers.

In addition, satellites may be optimised to provide different services. For example, Telstra’s USOSat satellite is optimised for voice, while nbn’s *Sky Muster* satellites are optimised for broadband. Hence, *Sky Muster* provides for far greater quantities of data to be transmitted at faster speeds, while USOSat features ‘meshing’ technology which reduces the latency of data transmitted between two satellite connections. Higher latencies reduce the quality of real-time user-to-user communications (such as voice and video calling and online gaming), but have less effect on web browsing and video streaming where most traffic is unidirectional.

Direct radio communication

Two-way radios continue to be used for communications, especially in remote areas, aviation and maritime. Several bands in the ‘high frequency’, ‘very high frequency’ and ‘ultra-high frequency’ ranges are class licenced to allow public use (box 2.7). Because these devices communicate directly with one another (and all others tuned into the spectrum band), they require no physical network infrastructure.

Box 2.6 Radio access networks

A radio access network consists of ‘base stations’ (also known as cell towers) and consumer radio antennas, which are contained within mobile devices (originally just mobile phones, but now also smartphones, tablets and mobile internet USB dongles and data cards) in the case of a mobile network or attached to the outside of premises in the case of a fixed wireless network.

Base station antennas can be mounted on either purpose-built towers or the rooftops of existing buildings, and are typically positioned between 15 to 50 meters above ground.

The coverage provided by a base station (known as the cell coverage or cell size) depends on the power of the base station antennas, the frequency of the radio spectrum in use and the geographical features of the cell. Generally, a cell size with a radius of between around 0.3 and 22 km is achieved, but distances of up to 200 km are possible in some circumstances. In densely populated areas, smaller cells are necessary to handle network congestion — as more consumers are contained within a cell, the demands on the base station become greater. There is a general trend toward smaller cell sizes, as these are necessary to provide consumers with faster broadband speeds and greater data allowances.

The radiofrequency spectrum used for a radio access network (box 2.7) is a scarce resource. Lower frequency spectrum bands are especially valuable, as they allow signals to be transmitted over longer distances with greater building penetration; however the trend toward smaller cell sizes is increasing the relative value of higher frequency spectrum bands.

Sources: ACCC (2016e); ACMA (2014a); Mobile Network Guide (2016a).

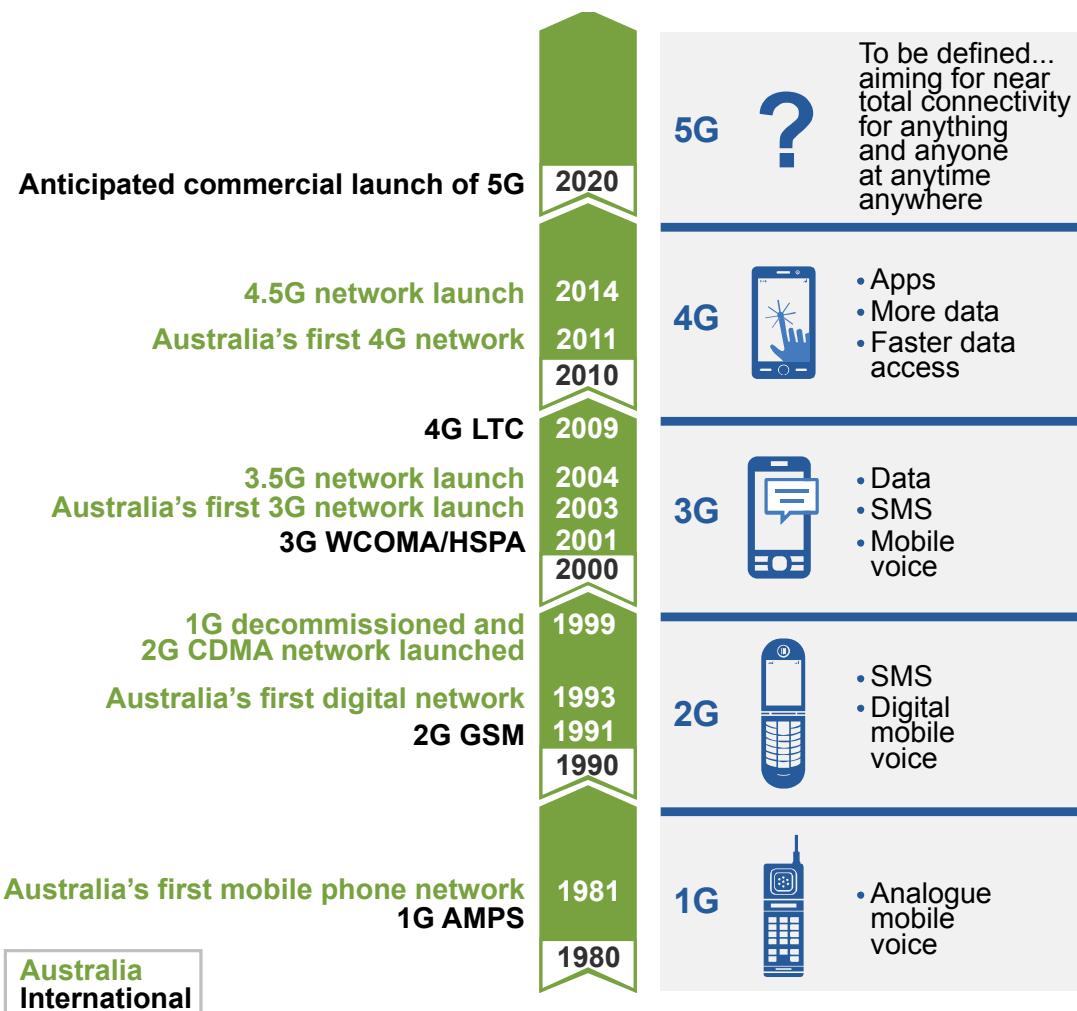
Box 2.7 Allocating radiofrequency spectrum

In Australia, the Australian Communications and Media Authority is responsible for managing radiofrequency spectrum. It does so by issuing three types of licences.

- *Spectrum* licences allow the holder to transmit within a specified frequency bandwidth and geographical area. They are allocated by auction for a period of up to 15 years and can be traded. Spectrum bands used in the provision of most wireless networks are allocated in this way.
- *Apparatus* licences grant permission for a licensee to use a particular frequency bandwidth in a particular area for a specified purpose for a period of up to five years. Holders pay an annual licence tax. Radio and televisual broadcasting is generally carried out using this form of licence, and nbn holds apparatus licences (in addition to spectrum licences) to operate its fixed wireless network.
- *Class* licences are designed for small-scale local transmissions, such as WiFi. They are not issued to individual users and involve no fee; rather they act as an industry standard for applicable products.

Sources: ACMA (2013a, 2015a, 2016c).

Figure 2.10 The evolution of mobile networks



Source: ACMA (2016a).

5G is expected to bring significant further advances in mobile technology through improved mobile connectivity (in terms of broadband speed and data allowances) (figure 2.10; box 2.8). It is also expected to result in mobile broadband expanding into new areas. For example, the scope of the internet of things (box 2.9) is likely to expand once 5G mobile connectivity becomes available. Improvements in bandwidth and energy efficiency will allow more devices to be connected at all times, while improved reliability and ultra-low latencies will enable potentially life-critical automotive and medical functions such as automated vehicles and remote surgery (ACMA 2016a).

Another key development in wireless technologies is in WiFi technology. This technology, originally developed for short range non-commercial communications (on a private and public basis), is now being used on a commercial basis to supplement fixed and mobile broadband.

Box 2.8 Expected characteristics of 5G networks

The ACMA (2016a) lists the following seven expected characteristics of 5G networks.

- *Data rates* — increased to 1000–10 000 Mbps, which is a step change for mobile networks and is expected to facilitate a high quality and a more seamless user experience.^a By comparison, 4G networks in Australia provide advertised data rates of 2–100 Mbps.
- *Ultra-low latency* — reduced to a 1 millisecond end-to-end round-trip delay. This is also a step change for mobile networks. By comparison, 4G networks can theoretically achieve a minimum round-trip latency of 10 milliseconds.
- *Bandwidth* — increased by 1000 times per unit over existing mobile networks. This will support faster data rates and increase network capacity to support data intensive applications in both the uplink and downlink.
- *Connections* — 10 to 100 times more connected devices than are now supported by existing networks. This is theoretically possible on 4G networks. Mass connectivity is identified as a key enabler for the internet of things.
- *Always on* — available everywhere (100 per cent coverage) at all times (99.999 per cent of the time) within designated locations. This requirement is also theoretically achievable using 4G technologies. It is necessary for high mobility applications and coverage indoors and outdoors as well as high reliability requirements for services where network outage could have catastrophic consequences.
- *Energy usage* — network energy usage reduced by 90 per cent.
- *Battery life* — of up to 10 years for low power, machine-type devices. Both the energy usage and battery life requirements are theoretically achievable using 4G technologies and are aimed at ensuring future networks are cost-effective for network operators.

^a However, the International Telecommunication Union's official roadmap states that 5G could achieve speeds of up to 20 Mbps (ACMA 2016a).

Box 2.9 The internet of things

The internet of things (also known as the ‘internet of everything’) describes the wireless connection of devices and sensor-embedded objects — ‘things’ — to the internet. These can monitor the location, health and activities of people and animals, the state of the natural environment and much else.

The internet of things has growing consumer, producer and societal applications, usually through the collection and real-time analysis of data and the automation of processes. ‘Smart’ homes can automatically unlock doors for occupants, adjust light and heating settings and even order groceries, while automated production methods can reduce production costs and create safer working environments. In the future, some health services (both monitoring and treatment) could be delivered remotely or even automatically. In rural areas, smart monitoring systems allow for the precise application of water and fertiliser to reduce waste and optimise yield.

Source: OECD (2015).

Telstra's Air Network features thousands of WiFi hotspots around Australia, including many co-located with payphones. Telstra fixed broadband customers can access their data allowance at these hotspots, and receive additional data for allowing their private WiFi hotspot to be used as part of the network. iiNet has a similar system in place for its customers.

In addition, new providers such as Lightning Broadband are using a WiFi-based access network to deliver fixed wireless broadband. As WiFi spectrum bands are class-licensed, this allows the provider to avoid paying spectrum licence fees. However, there is insufficient WiFi spectrum to support mass-market products of this variety (Tsang 2016b).

WiFi technology is also adapting to allow features associated with traditional mobile networks. Features such as WiFi calling (also known as voice over WiFi) over both commercial and non-commercial WiFi networks will soon be available through all Australian mobile network operators (Optus 2015; Pearce 2016; Reichert 2016).²⁰ Further, a new WiFi connectivity standard called Hotspot 2.0 (also known as WiFi Certified Passpoint) has been developed, which allows users to seamlessly roam between public WiFi networks without having to connect with each individually (WiFi Alliance 2017). This should reduce problems with 'black spots' under existing mobile networks.

Advances in both geostationary and low earth orbit satellite technology are allowing for improved telecommunications outcomes in remote areas. Advanced high throughput geostationary satellites include nbn's *Sky Muster* and *Sky Muster II* satellites, which each feature 101 fixed spot beams covering Australia, allowing for more efficient spectrum reuse. The satellites also operate in the higher frequency 'Ka' band (26 500–40 000 megahertz), which allows for faster data transfer rates.

Several advanced low earth orbit satellite networks have been proposed or are currently under development, including those of OneWeb and SpaceX. The OneWeb constellation is anticipated to consist of 650 satellites, while the SpaceX network is anticipated to feature 4000 satellites (BCR 2016a). Both networks are intended to supply global broadband coverage.

2.3 Industry structure

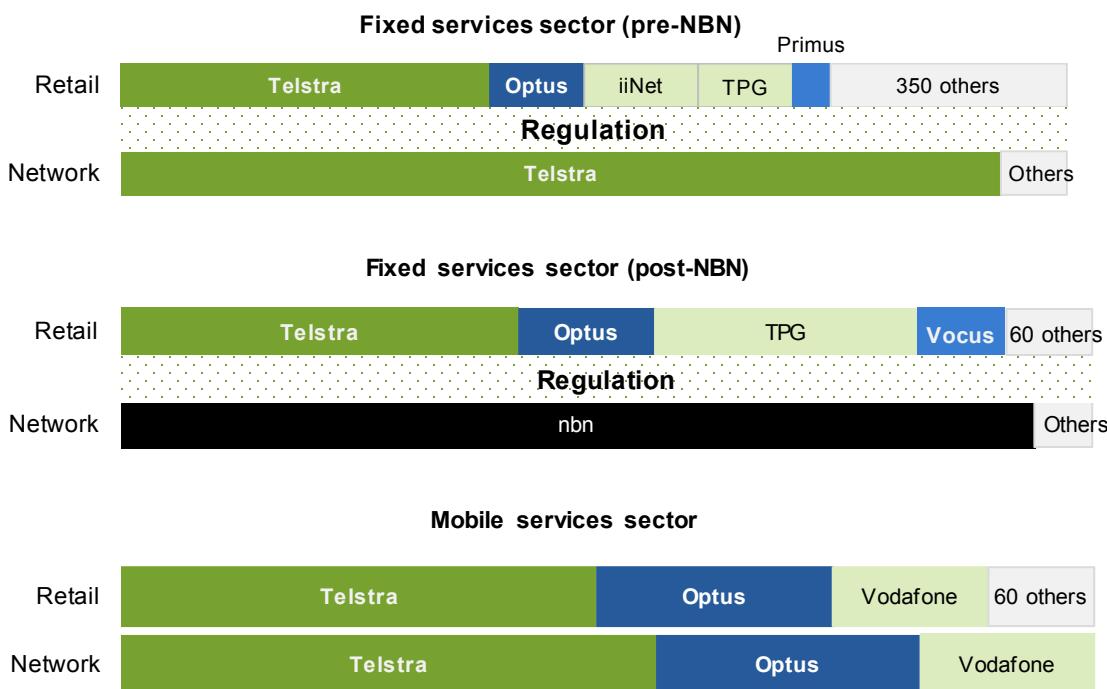
Technological and policy developments are shaping the structure of the telecommunications sector. While technological factors tend to influence the provision of both fixed and mobile services in a similar manner, the Australian Government has played a far larger role in the provision of fixed services than in mobile services. Most significant is the establishment of nbn, underwritten by the Australian Government. As well as providing the infrastructure for faster fixed broadband connections across Australia, nbn will cement a wholesale-only infrastructure provision regulatory framework in the fixed services sector.

²⁰ While these services are new in that they offer voice calling over WiFi which mimics traditional mobile voice calling, WiFi voice calling through OTT providers was previously possible.

An overarching technological trend is the convergence between fixed and mobile services. The fixed services sector is facing increasing competition from the mobile sector, placing downward pressure on retail prices. This trend will continue into the future, most notably with the introduction of 5G wireless technology.

Figure 2.11 shows the structure of the fixed and mobile telecommunications markets. The fixed services market is shown both before and after the emergence of the NBN. Even though convergence is increasingly allowing consumers to access the majority of telecommunications services through mobile devices, there are significant structural differences between the fixed and mobile services sectors.

Figure 2.11 The Australian telecommunications sector^{a,b,c}
Key players and market shares



^a Proportions are indicative of market shares. Pre-nbn (June 2010) retail market shares are based on fixed broadband market shares from figure 2.12 and corresponding network market shares are based on ABS (*Internet Activity, Australia, December 2010*) and ACCC (2011a). Post-nbn retail market shares are based on fixed broadband market shares from figure 2.12 (June 2016) and network market shares are based on 2022 forecasts by the BCR (2016a). Mobile market shares are based are an average of non-handset mobile and mobile handset market shares from figure 2.13 weighted by service volumes. ^b ‘Regulation’ represents the access regulation detailed in box 2.11. ^c iiNet was acquired by TPG Telecom (TPG) in 2015 and Primus was acquired by M2 in 2012, which was itself acquired by Vocus Communications (Vocus) in 2015. ^d Only retail service providers with over 1000 subscribers are shown.

Sources: Productivity Commission estimates based on ABS (*Internet Activity, Australia, December 2010*, Cat. no. 8153.0) and ACCC *Telecommunications Reports* (various issues).

Fixed services

The provision of fixed services is undergoing a transition. Previously, fixed services (voice and broadband) were provided primarily over Telstra's networks by either a non-integrated retail service provider purchasing (regulated) wholesale access, or by Telstra itself — the integrated infrastructure and retail service provider (RSP). With the rollout of NBN infrastructure, however, the market is moving toward the provision of access infrastructure on an open access and wholesale-only basis.

There is a separate market for the provision of transmission infrastructure that enables retail service providers to connect their core networks to Telstra's or nbn's access networks. However, because of the high (and increasing) degree of integration between transmission infrastructure and retail service provision, these are considered together in this section.

A time of transition in the provision of access infrastructure

Prior to the commencement of the NBN infrastructure rollout, Telstra was the near sole provider of fixed access infrastructure in the form of its ubiquitous copper access network (box 2.10), built before the sector was opened to competition in 1997. In June 2010, just prior to the commencement of the NBN rollout, around 90 per cent of fixed voice services were supplied over Telstra's copper access network.²¹ The network is still used in areas not yet covered by the NBN for the provision of fixed voice and DSL broadband services.²² At 30 March 2017, nbn had declared around 38 per cent of premises 'ready for service' and around 17 per cent of premises were receiving a service (nbn 2017d).

Box 2.10 The copper access network

The copper access network is the largest fixed access network in Australia. It was largely constructed under the auspices of the Postmaster-General's Department, which was responsible for the provision of telecommunications services prior to the telecommunications reforms of the 1970s. At liberalisation in 1997, the network was owned by Telstra and became privately owned as Telstra was privatised, a process completed in 2006.

The network consists of around 5000 Telstra exchanges, with copper lines connecting premises to their local exchange. Prior to the commencement of the NBN rollout, the network was capable of supplying fixed voice services to 99.75 per cent of all premises (McKinsey & Company and KPMG 2010).

When the NBN is completed, nbn is likely to hold a significant share of the fixed wholesale market. The Bureau of Communications Research (2016a) estimated that the

²¹ Productivity Commission estimate based on table 2.3 in ACCC (2011a).

²² Under the 'Copper Continuity Obligation', the copper access network will be used to deliver USO services outside of the NBN fixed-line footprint. See chapter 3 for more information.

proportion of superfast broadband (normal download speeds in excess of 25 Mbps) services in operation using the NBN is likely to reach 90 per cent in 2018 and 94 per cent in 2022. Alternative infrastructure providers will predominantly operate in new housing developments and some profitable metropolitan areas (BCR 2016b). A summary of current fixed-line superfast broadband infrastructure providers is listed in table 2.2.

Table 2.2 Superfast fixed-line broadband providers^a

As at August 2015

Network operator	Network technology	Premises ready for service	Notes
nbn	FTTP, FTTN, FTTC, FTTB, HFC	897 000	Forecast to increase to 10.9 million premises by 2020.
OptiComm	FTTP	147 000	Operating in around 100 sites.
Telstra	FTTP	118 000	Velocity and South Brisbane networks. Telstra's Velocity (Fibre Access Broadband) service is available in 130 sites.
iiNet (TPG)	FTTC, FTTP	65 000	The former TransACT network services the Canberra region and contains largest VDSL2+ network in Australia.
iiNet (TPG)	HFC	80 000	The former TransACT network services the regional Victorian centres of Ballarat, Geelong and Mildura.
Other greenfield operators	FTTP	50 000	Includes OPENetworks, Pivot and other private FTTP greenfield networks operators.
TPG	FTTB	3 200	Passes 352 multi-dwelling units in metropolitan centres. TPG has announced plans to connect a total of 500 000 premises to this network.

^a All fixed-line nbn connections were FTTP at August 2015.

Source: BCR (2016a).

Access infrastructure is increasingly provided on a wholesale-only basis

While two of the superfast network operators listed in table 2.2 also provide retail services (TPG and iiNet — now owned by TPG), and Telstra operates as a vertically integrated infrastructure/retail provider in areas not yet served by NBN infrastructure, the sector is moving toward a model of wholesale-only access infrastructure. This shift is due to government policies, rather than market forces.

- nbn is not permitted to offer retail services. Moreover, access by RSPs to the NBN must be provided on a non-discriminatory basis.
- Non-NBN superfast networks built after 1 January 2011 must operate on a wholesale-only basis.

In addition, the ACCC regulates access infrastructure (box 2.11).

Box 2.11 Access regulation of fixed services

The Australian Competition and Consumer Commission (ACCC) regulates third party access (price and non-price terms) to fixed access infrastructure. Nine non-NBN fixed-line services are 'declared'. These are the unconditioned local loop service, line sharing service, fixed originating access service, fixed terminating access service, wholesale line rental, local carriage service, wholesale asymmetric digital subscriber line, local bitstream access service, and superfast broadband access service.

Although NBN services can also be declared, the ACCC accepted a 'special access undertaking' from nbn in December 2013, which established principles for regulating access to the NBN until June 2040. In addition, nbn publishes 'standard forms of access' agreements relating to its services, which declares those services according to the terms of the agreements.

The ACCC also oversees the 'structural separation' of Telstra — the process whereby Telstra end-users are migrated to the NBN — through its 'structural separation undertaking'. The undertaking outlines how Telstra will progressively cease supplying services over its copper and HFC networks and commence supplying these services over the NBN, and also provides that in the interim it will continue to supply regulated services to its wholesale customers and its own retail business units on equivalent terms (in line with previous operational separation arrangements).

Over the past several years, various non-nbn superfast broadband networks have been subject to varying degrees of access regulation, with some largely unregulated, some subject to declaration and others subject to carrier licence conditions that mimic declaration. However, since the ACCC's declaration of a superfast broadband access service in July 2016, all *fixed-line* non-nbn superfast broadband networks are subject to either this service or the local bitstream access service.

- Networks built, upgraded or altered after 1 January 2011 are subject to 'level playing field' provisions set out in the *Telecommunications Act 1997* (Cth) as subsequently amended and the local bitstream access service declaration.
- Older networks fall under the superfast broadband access service declaration.

In January 2017, the ACCC released a draft decision on price and non-price terms for both access regimes. With the exception of Telstra's FTTP networks in South Brisbane and 'Velocity estates', all networks are required to supply 25/5 Mbps wholesale open access services at nbn-equivalent prices. Access to Telstra's FTTP networks is at rates benchmarked against the wholesale asymmetric digital subscriber line access service because these older networks were built to be compatible with the copper access network.

Wireless non-nbn superfast broadband services are not subject to access regulation.

Sources: ACCC (2016b, 2016e).

... and NBN wholesale prices are capped

Wholesale access to NBN infrastructure involves three charges, each of which features a price cap which is uniform across the entire network.

- For each connected consumer, the RSP must pay an Access Virtual Circuit (AVC) charge. This also includes a 0.15/0.15 Mbps prioritised channel which can be used to supply a managed VoIP service (chapter 6).
- RSPs purchase data capacity by paying the Connectivity Virtual Circuit (CVC) charge. How much capacity to purchase and how the capacity is divided between consumers is at the discretion of the RSP, which allows for a degree of product differentiation.
- At each connected point of interconnection (POI), the RSP pays a Network to Network Interface (NNI) charge.

More information on these charges can be found in appendix B.

Retail service and transmission infrastructure providers have consolidated and integrated

Consolidation of retail providers of both fixed voice and fixed broadband services has occurred, involving mergers between, or acquisitions of, mostly small and medium-sized RSPs to create larger RSPs (box 2.12). The number of retail internet service providers in Australia with more than 1000 subscribers declined from 104 to 62 over the five years to December 2015 (ABS 2016e, 2016f), and the ACCC noted ‘a feature of the fixed broadband market over a number of years has been consolidation through acquisition, with no large-scale new entry or significant organic growth’ (2015, p. 14).

Box 2.12 Major mergers and acquisitions in the fixed services sub-sector

Between retail service providers

- iiNet acquired Westnet in 2008, Netspace in 2010, AAPT’s retail division in 2010, Internode in 2012 and Adam Internet in 2013.
- TPG acquired iiNet in 2015.
- M2 acquired Primus Telecommunications in 2012, and Dodo in 2013.
- Vocus and M2 merged in 2016.

Between retail services provider and transmission infrastructure providers

- TPG acquired PIPE Networks in 2009 and AAPT in 2013.
- iiNet acquired TransACT (access infrastructure) in 2011.
- Vocus acquired Amcom in 2015 and NextGen Networks in 2016.

Industry maturation may account for the acquisitions of smaller local providers by larger national providers that occurred in the mid to late 2000s, but more recent activity can be attributed to the increasing economies of scale on offer in the retail market as the NBN is rolled out. Relevant factors include:

- nbn's national wholesale price caps, which allows RSPs to develop broadband plans on a national level. Indeed, where possible, RSPs are already offering such plans (ACCC 2016b)
- nbn's CVC charge, which results in RSPs with fewer customers at a POI paying higher per-customer wholesale rates.

In addition to consolidation in retail service provision, RSPs (box 2.13) have also sought to acquire transmission infrastructure, usually through the acquisition of wholesale transmission networks (box 2.12). Moreover, transmission markets have also consolidated as single RSPs have purchased multiple wholesale transmission providers.

As a result of these developments, retail and transmission services are now largely provided by four vertically-integrated national providers — Telstra, Optus, TPG/iiNet (referred to hereafter as TPG) and Vocus/M2 (referred to hereafter as Vocus). These providers collectively hold 91 per cent of the fixed broadband services and 96 per cent of the fixed voice services retail markets (figure 2.12), and over 90 per cent of transmission contracts (ACCC 2016g). However, there are 140 retail service providers supplying services over the NBN (nbn 2016h) and 62 RSPs with more than 1000 subscribers (figure 2.11).

At the retail level, the market shares of TPG and Vocus (including acquisitions) have increased over the six years to June 2016, mostly at the expense of Telstra in the fixed voice services market and Optus in the fixed broadband services market (figure 2.12) — although Telstra still holds the largest share of both markets, with 62 per cent of the fixed voice services market and 41 per cent of the fixed broadband services market. Telstra's share of the NBN fixed broadband market is higher, at 48 per cent for FTTP, 47 per cent for FTTB, 59 per cent for FTTN, 36 per cent for HFC and 57 per cent for fixed wireless at December 2016 (ACCC 2017d).²³ However, this is likely to be due to the NBN rollout reaching rural and regional areas before metropolitan areas and, hence, can be expected to subside over time (Boyd 2016).

²³ Telstra does not offer NBN satellite services.

Box 2.13 What do NBN retail service providers (RSPs) do?

RSPs use a combination of nbn's, other providers' and their own infrastructure to supply retail broadband and voice services to retail customers. But what does this actually entail? And to what extent can RSPs differentiate themselves to address the needs of different customers?

nbn supplies infrastructure connecting end users' premises to their corresponding NBN POI and runs a data link protocol known as 'Ethernet' over the network. This leaves the RSP to both connect the POI to the internet and manage their retail customers' connection.

The former occurs in several stages. Transmission links are needed to connect the NBN POI to the RSP's core network (which typically runs between capital cities). Australia's four major RSPs each own substantial transmission networks, and smaller RSPs can source wholesale transmission from these or a wholesale-only provider. Core networks are then connected to other networks within Australia and overseas (by submarine cables in the latter case). The major RSPs each own all or a share of a submarine cable network, and also rent transit capacity from other providers^a and offer wholesale access to smaller RSPs. Access to further networks involves renting additional transit capacity or engaging in an arrangement known as 'peering' where networks voluntarily exchange traffic at no charge. These arrangements reduce the total cost of capacity on global networks to around one-half to one-third of the cost of capacity on the NBN.

Where capacity must be rented or capacity constraints are present, these processes inevitably involve decisions about the quantity of bandwidth to provision. For example, an RSP must choose how much aggregated bandwidth to purchase from nbn (and pay the CVC charge) and how to divide this among its retail customers. And while a major RSP may own sufficient transmission infrastructure to carry any reasonable quantity of traffic from the NBN POI to its core network, a smaller RSP will need to purchase aggregated capacity at this level too. It is with these decisions that a RSP can transform the same nbn wholesale access product into a lower cost and lower quality or a higher cost and higher quality retail service.

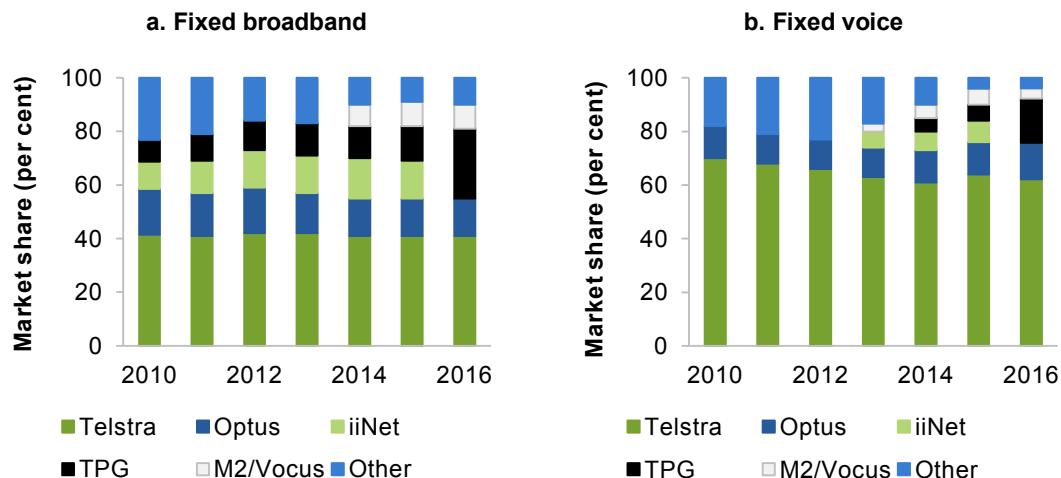
Key issues here are the size of the RSP and the 'contention ratio' — the ratio of potential maximum bandwidth demand to the actual provisioned bandwidth. For example, purchasing 100 Mbps of aggregated bandwidth to serve 20 users who each have a 100 Mbps peak download speed connection would imply a contention ratio of 20:1. A higher contention ratio leads to a lower cost and lower quality retail service. That said, for any given contention ratio, larger RSPs may be able to deliver a higher quality of retail service because a larger pool of retail customers tends to smooth fluctuations in demand.

^a For example, TPG owns the PPC-1 cable which connects Australia to Guam, Optus has a 40 per cent stake in the Southern Cross Cable Network connecting Australia, Fiji, New Zealand, Hawaii and the mainland United States, and Telstra owns up to 30 per cent of all active intra-regional submarine cable capacity.

Sources: Slattery (2016); Southern Cross (2017); TPG (2016); van der Berg (2008); Vocus (2017); Webb (2016).

Figure 2.12 Fixed services retail market shares^{a,b,c}

Based on service volumes, June 2010 to June 2016



a Companies in ‘other’ category vary over time. **b** TPG and iiNet merged in 2015-16. **c** Data on market share of ‘other’ fixed voice providers were unavailable in 2015-16 and so market share is assumed to be unchanged from 2014-15.

Source: ACCC Telecommunications Reports (various years).

Mobile services

While developments in the fixed services sector have been driven by high levels of government-funded infrastructure and regulation, the mobile services sector has been mostly market-driven with limited government intervention.

The provision of mobile services is undertaken by network-owning vertically-integrated mobile network operators, and mobile virtual network operators who resell wholesale mobile services. There are currently three mobile network operators in the Australian market — Telstra, Optus and Vodafone Hutchison Australia (Vodafone).²⁴ Infrastructure sharing between mobile network operators is limited (box 2.14), although co-location is actively promoted by the ACCC through its Facilities Access Code.

²⁴ In April 2017 TPG announced that it will invest \$1.9 billion (including spectrum licence costs) over three years to build a mobile network with approximately 80 per cent population coverage (Wilton 2017). This development will make TPG Australia’s fourth mobile network operator.

Box 2.14 Infrastructure sharing between mobile network operators

- Beginning in 2004, Telstra and Hutchison (prior to its merger with Vodafone in 2009, and branded as '3') shared a 3G network on equal terms. Known as the 3GIS network, it had a population coverage of approximately 56 per cent. Hutchison's customers were also permitted to roam over Telstra's Next G (more advanced 3G) network and 2G networks in other areas. The 3GIS network was decommissioned in 2012.
- In 2012, Vodafone and Optus announced an agreement to share 500 new 4G base stations and some existing base stations, including around 500 of Vodafone's base stations. Vodafone also gained some roaming access to Optus' network in areas where Telstra also had network coverage as part of the agreement.
- Vodafone and Telstra had a roaming arrangement that allowed Vodafone customers to access Telstra's 2G network on eight highways in Victoria and 12 in Tasmania. Telstra's 2G network was decommissioned on 1 December 2016, but Vodafone now offers mobile coverage on many of these highways.

Sources: Angrove (2012); Hutchinson (2012); Telstra (2015b); Vodafone (2016b).

In addition to their mobile networks, Telstra and Optus both own significant transmission networks, while Vodafone leases some transmission infrastructure from other providers.²⁵ There is a degree of transmission infrastructure sharing between the fixed and mobile services sub-sectors, although the precise extent to which this occurs is unclear. Many of these transmission services are covered by the domestic transmission capacity service declaration, which provides for wholesale access at regulated prices in areas not deemed sufficiently competitive. After reducing regulated access prices in April 2016, the ACCC (2016a) anticipated that competition in downstream markets (which include mobile networks) will intensify.

The three networks vary in their attributes, and — for users positioned to access all three — each offers a degree of differentiation to their customers. Telstra's network has the greatest population and geographical coverage, at 99.3 per cent and 30.6 per cent respectively (table 2.3). The coverage of all three networks has improved over the past two decades (figure 2.14).

For access to superior network coverage and faster 4G download speeds, Telstra's customers pay a premium of, on average, around \$9 per month (CIE 2015). Moreover, Telstra was the first network operator to launch its 4G network (in September 2011), ahead of Optus (April 2012) and Vodafone (June 2013).

²⁵ For example, in September 2015 TPG and Vodafone signed an agreement for TPG to supply transmission infrastructure and network services to over 3000 Vodafone base stations over 15 years (TPG 2015).

Table 2.3 Australian mobile networks^{a,b}
Main technologies and features

<i>Coverage, latency and reliability</i>		<i>Unit</i>	<i>Telstra</i>	<i>Optus</i>	<i>Vodafone</i>
All	Population coverage	%	99.3	98.5	96
	Landmass coverage	%	>31	15.6	3G: 7.5 4G: 3.6
3G	Population coverage	%	99.3	98.5	95.5
	Metro population coverage	%	100	100	99.7
	Non-metro population coverage	%	98	98	84
	Average download speed	Mbps	3.95	4.35	4.76
	Latency	milliseconds	94.47	87.39	72.02
	Reliability	%	94	95	95
4G	Population coverage	%	98	95	93.7
	Metro population coverage	%	95	98.5	99.5
	Non-metro population coverage	%	74	89	78
	Average download speed	Mbps	23.6	19.18	18.49
	Latency	milliseconds	56.26	51.88	54.71
	Reliability	%	99	98	97

a Bolded values indicate superior scores. **b** Telstra metro/non-metro breakdowns are from 2014, and may understate actual coverage figures.

Sources: OpenSignal (2016); Optus (pers. comm., 31 October 2016); RTIRC (2015); Telstra (pers. comm., 4 November 2016); Vodafone (pers. comm., 1 November 2016).

Each network operator provides access (on a voluntary, commercial basis) to virtual network operators. It is common for virtual network operators to be provided access to only a limited portion of their host network, such as only the 3G network where 4G is available, or to restricted network coverage. Hence, virtual network operators are typically budget-priced providers, adding further degrees of differentiation to the market. Most virtual network operators roam over only one network, but some have agreements with multiple network operators (such as Macquarie Telecom which uses the Optus and Vodafone networks, and Southern Phone which uses the Optus and Telstra networks), but offer consumers access to only one of these networks. Optus and Vodafone host the greatest number of virtual network operators at about 30 and 20 respectively, with Telstra offering wholesale services to fewer than 10 virtual network operators (Mobile Network Guide 2016b). In addition, all Telstra-serviced virtual network operators are limited to 98.8 per cent population coverage (Telstra 2016h) — allowing Telstra to maintain its retail monopoly outside of these areas. The arrangement between Optus and its virtual network operator Virgin Mobile is unique — Virgin Mobile has been a wholly-owned subsidiary of Optus since 2006, and now effectively operates as its budget brand.

All network operators and virtual network operators offer national pricing regimes (ACCC 2016e). Telstra mobile plans (both pre- and post-paid) start at around \$30 per month, while virtual network operators offer budget plans starting at around \$15–20 per month. Implicit in these pricing structures is a level of cross-subsidisation between

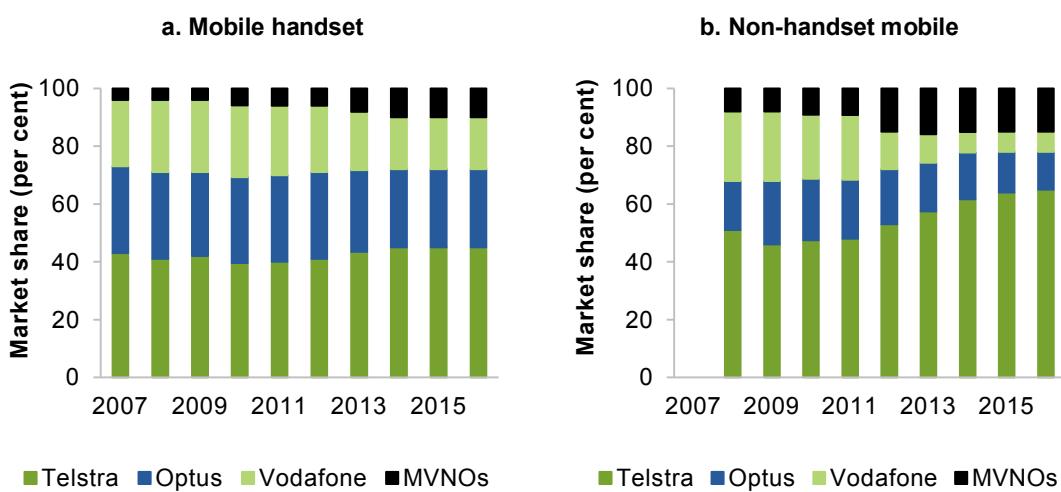
low-cost users typically based in metropolitan areas and high-cost users in non-metropolitan areas.

Telstra and the virtual network operators' market shares are growing

In both the mobile handset and other mobile broadband markets, the market shares of both Telstra and the virtual network operators have increased since 2007, at the expense of Vodafone and, to a lesser extent, Optus (figure 2.13). Telstra held 45 per cent of the retail mobile handset services market in June 2016 (up from 40 per cent in 2011) and 65 per cent of the retail wireless broadband market (up from 47 per cent in 2011). The market share of virtual network operators increased from 4–10 per cent in the mobile handset market in the nine years to June 2016 and from 8–15 per cent in the non-handset mobile broadband market over the eight years to June 2016. Takken (2016) attributes the increase in the virtual network operators' market share to the rising popularity of 'bring your own device' mobile plans, which have lowered customer acquisition costs for providers.

Figure 2.13 **Mobile services retail market shares^{a,b}**

Based on service volumes, June 2007 to June 2016



a MVNOs are mobile virtual network operators. **b** June 2007 non-handset mobile market shares not available.

Source: ACCC *Telecommunications Reports* (various years).

Investment by mobile network operators is significant

Infrastructure competition is driving significant investment in the development and upgrade of mobile networks. In 2015, Telstra announced it would increase its total capital expenditure in its mobile network to 15 per cent of sales, and that in the three years to June 2017 it planned to invest over \$5 billion in its mobile networks (Telstra 2015a). Later in 2015, following Optus' announcement of an increase in annual capital expenditure to

\$1.85 billion, Telstra announced that it would raise spending as much as needed to remain Australia's leading mobile services provider (Ramli 2015). In 2014 Vodafone invested almost \$1 billion in network capital expenditure — comparable to Telstra's \$1.2 billion (Ramli 2014). Vodafone has invested a total of around \$3 billion in the three years to July 2015. (ACCC 2016e).

This investment extends to non-metropolitan areas, with Telstra (2016h) noting that 51 per cent of its mobile network capital expenditure from 2004-05 to 2015-16 has been directed outside of Australia's major cities — where only 29 per cent of the population reside. Meanwhile, the 2015 Regional Telecommunications Independent Review Committee (2015, p. 4) found that 'current investment plans and competitive dynamics are likely to provide additional regional coverage in the near future'.

The Australian, State and Territory, and local governments have also funded the expansion of mobile coverage, most recently through the Mobile Black Spot Program, which has drawn a commitment of \$311.2 million of public funding in its first two rounds (chapter 4).

2.4 What has this meant for consumers?

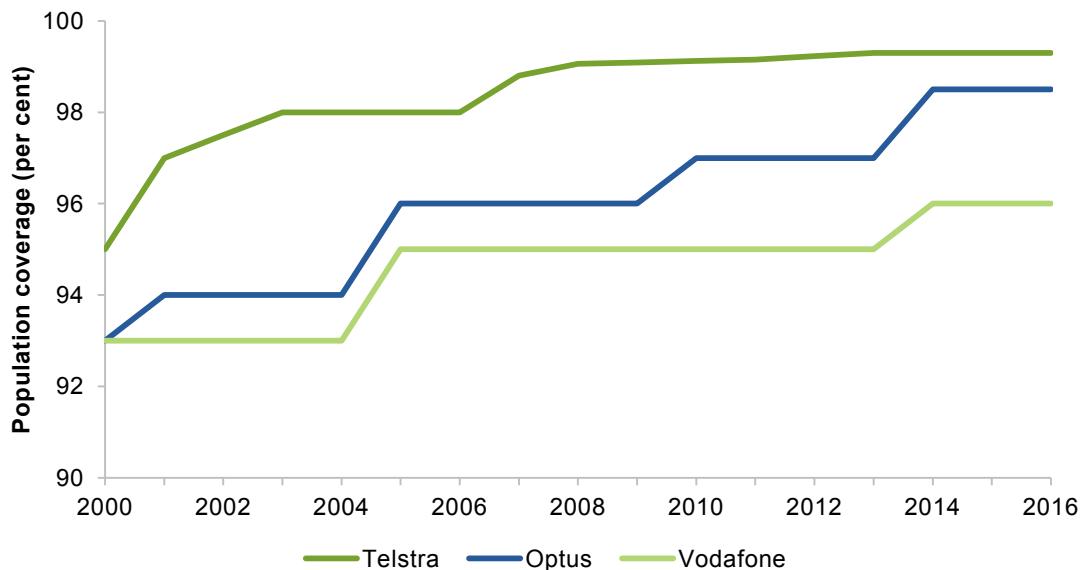
Consumers have generally benefited from developments in the telecommunications sector through enhanced choice, better products and lower prices.

There is more choice

Telecommunications markets are delivering more choice to consumers with the range of offerings expanding across mobile and fixed platforms. In the mobile sector, consumers can choose between budget-priced virtual network operators at one extreme (with the majority operating off Optus' network) and Telstra's extensive network at the other. In the fixed services sector, the NBN offers multiple speed tiers, and it is anticipated that all consumers will have at least two RSPs to choose from (chapter 6).

Options for those in remote areas have significantly improved, with each mobile network operator continually expanding their network coverage (figure 2.14). While the degree of choice in offerings is more limited for those residing in areas that can only access Telstra's network (0.8 per cent of the population), the benefits of strong infrastructure competition in more population-dense areas are still felt through nationwide uniform pricing. More remote areas are afforded more consumer choice than previously in the fixed sector too, with 10 RSPs currently offering services across the entire NBN satellite footprint.

Figure 2.14 Population coverage of Australian mobile networks^a
2000 to 2016



^a Interpolation used where data are unavailable.

Source: Telstra (2016h).

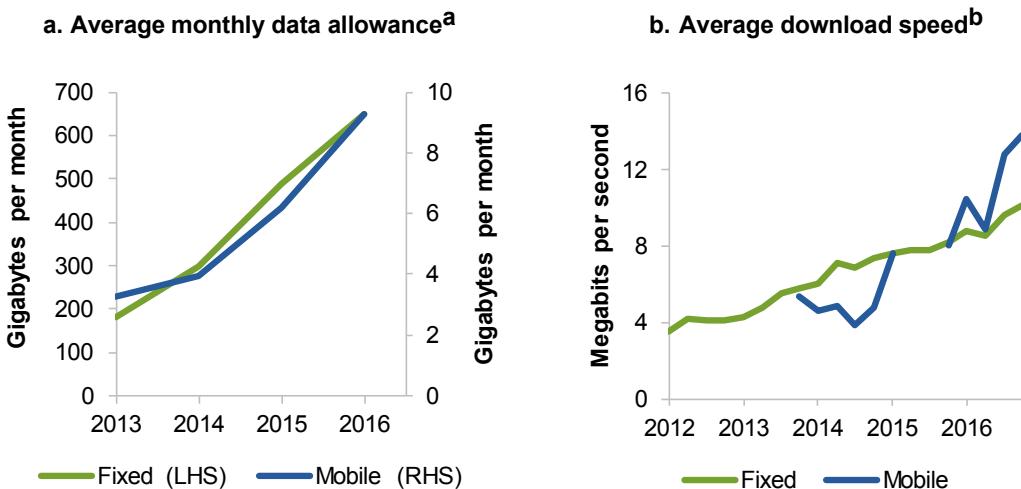
Further, fixed and mobile services are converging, so that consumers can increasingly choose between a fixed and a mobile service to perform a desired function. Consumption patterns reflect this shift, with consumers treating voice calls via a mobile service as largely a substitute for voice calls via a fixed service (section 2.1).

Convergence is also evident in the provision of broadband services, although not to the same extent as voice services. Average mobile broadband download speeds now slightly exceed average fixed broadband download speeds, but average fixed broadband data allowances exceed average mobile broadband data allowances by a factor greater than 50 (figure 2.15). Hence, the ACCC (2016b) noted when analysing trends in fixed and mobile broadband usage:

... the majority of consumers are using a mobile broadband service as a complement to a fixed line broadband service, rather than as a direct substitute ... Consumers appear to strongly prefer to use fixed broadband networks when downloading bandwidth intensive content such as video. (p. 20)

However, mobile broadband data capacity is expected to expand significantly with the introduction of 5G technology (box 2.8), which may continue the trend of an increasing share of data being channelled through mobile services (section 2.1).

Figure 2.15 Mobile broadband is now faster than fixed broadband, but with much lower data allowances



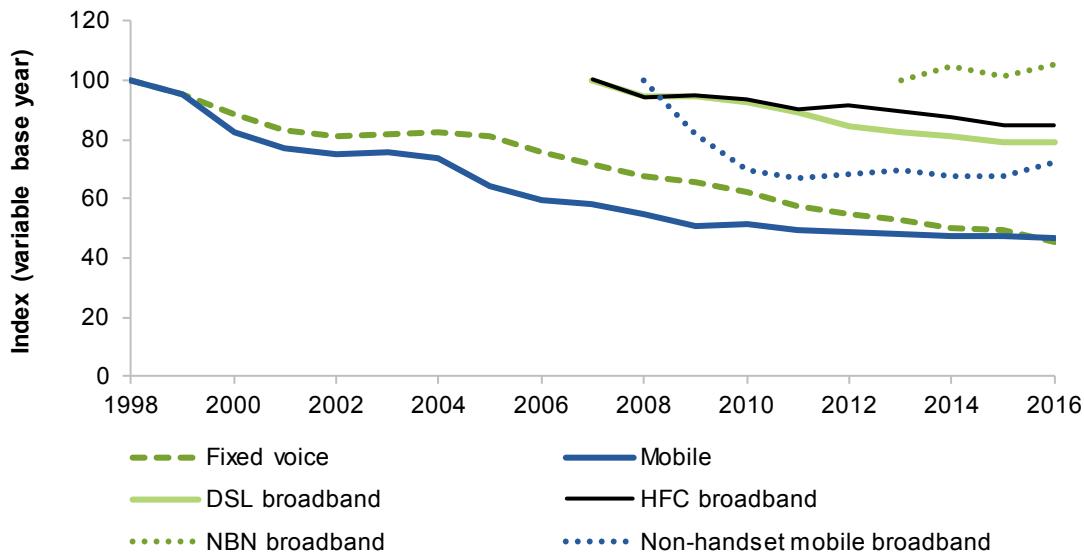
^a Contributions of fixed and mobile services are weighted by number of services in operation. Fixed includes DSL, HFC and NBN broadband (from June 2014 onwards) while mobile includes mobile handset and non-handset mobile broadband (known as wireless broadband by the ACCC). Plans marketed as unlimited are assumed an allowance of 1000 gigabytes per month. ^b Average mobile broadband speeds unavailable prior to September quarter 2013 and between March and December quarters 2015.

Sources: Productivity Commission estimates based on ABS (*Internet Activity, Australia, June 2016*, Cat. no. 8153.0) and ACCC (2017a); Akamai *State of the Internet Connectivity Report* (various issues).

Prices are falling and service quality is improving

At the same time, real prices of telecommunications services have fallen across both fixed and mobile sectors. The average real price of fixed voice and mobile services fell by 51 and 54 per cent, respectively, between June 1998 and June 2016, while DSL and HFC broadband service prices fell by 21 and 16 per cent, respectively, between June 2007 and June 2016 (figure 2.16). Average real non-handset mobile broadband prices fell by 28 per cent between June 2008 and June 2016, but real prices have been stationary since around 2010. The slight upward trend in NBN retail prices is discussed in chapter 6.

Figure 2.16 Real prices of telecommunications services have fallen^{a,b}
June 1998 to June 2015



a Base year is 1998 for mobile, 2007 for DSL and HFC, and 2013 for NBN. **b** Mobile services include voice, SMS, MMS and data as these have become available.

Source: ACCC (2017a).

A number of factors have underpinned these price reductions.

- The costs of supplying fixed-line services over the copper access network have fallen substantially. Accordingly, the ACCC has repeatedly reduced the prices of declared services that are used in the provision of fixed voice services — for example, the regulated local carriage service price per call fell from 19 cents per call in 2002 to 9 cents per call in 2011 (ACCC 2002, 2011b). Equivalence principles in Telstra's structural separation undertaking (box 2.11) also require that wholesale cost savings are passed onto retail customers. Between the September quarter 2012 (when reporting began) and the December quarter 2016, average fixed services wholesale costs fell by around 20–25 per cent (ACCC 2017a).
- The increasing convergence of the sector has led to competition *between* fixed and mobile services.
- Competition in the provision of DSL broadband services using Telstra's copper network and RSP infrastructure in Telstra exchanges strengthened over the period in question.²⁶ The number of these services more than doubled in the six years to 2015 (ACCC 2016h) and the Vertigan Panel (2014) noted that this had led to a 'highly competitive provider sector and significant benefits for consumers' (p. 36).

²⁶ Known as DSL access multiplexer-based competition, this involves a RSP installing a DSL access multiplexer in a Telstra exchange, then using this to provide a service over a (declared) unconditioned copper service knowns as an 'unconditioned local loop service'.

- More broadly, technological improvements have driven down costs.

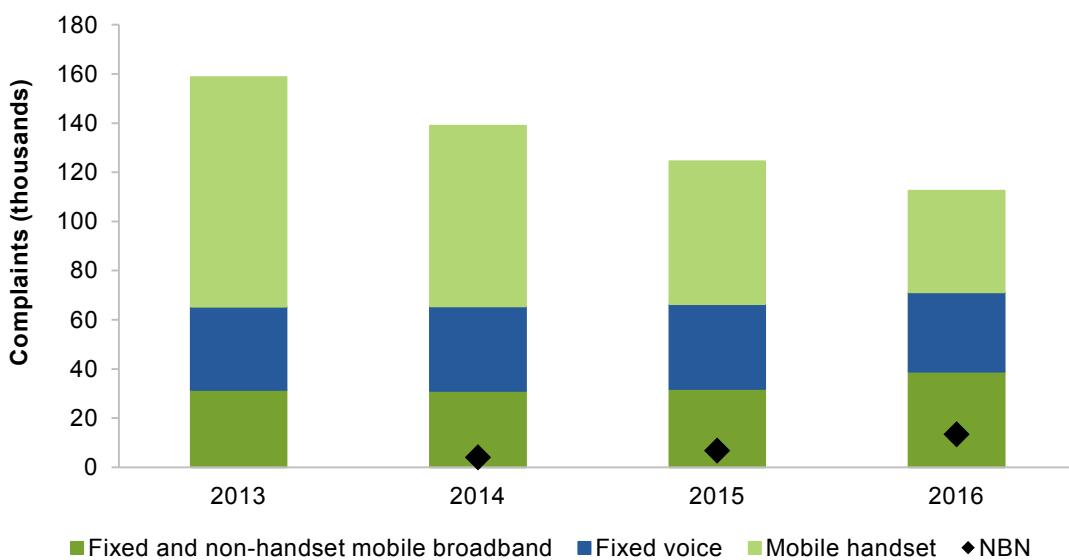
In conjunction with lower prices, service offerings have also improved. Possibly as a result of competitive pressures from OTT providers, unlimited voice calling and messaging is now a standard inclusion in most post-paid and many pre-paid mobile plans, with data allowances becoming the key point of differentiation (ACCC 2016b). Meanwhile, average data allowances for fixed and mobile services grew by over 50 per cent per annum and over 40 per cent per annum respectively in the three years to June 2016 (figure 2.15).

Complaints have fallen

Complaints to the Telecommunications Industry Ombudsman fell by 29 per cent over the four years to 2015-16 (figure 2.17). This was driven by a 56 per cent decline in complaints about mobile handset services, with little change to other complaint levels (although fixed and non-handset mobile broadband complaints increased by 22 per cent in the year to 2015-16). Complaints regarding services supplied over the NBN grew by more than 200 per cent between 2013-14 and 2015-16, but this is against an increase in the number of active NBN services in operation of greater than 600 per cent in the two years to December 2015. The Telecommunications Industry Ombudsman attributes the fall in complaints about mobile handset services to improvements in mobile networks.

Figure 2.17 Complaints have fallen^a

Complaints to the Telecommunications Industry Ombudsman, 2012-13 to 2015-16



^a NBN complaints are a subset of fixed and non-handset mobile broadband complaints.

Source: *Telecommunications Industry Ombudsman Annual Report* (various years).

Australia's mobile services sector performs well by international standards

Because of the wide range of factors that can influence telecommunications performance (such as geography and population density), international comparisons must be treated with caution. It is also difficult to determine whether cross-country differences are the result of different market and regulatory structures, or different technologies.²⁷ Nevertheless, a clear pattern has emerged of Australia's mobile service sector performing relatively better than its fixed services sector.

Australia's mobile infrastructure performs well, especially in metropolitan areas. The *GSMA Mobile Connectivity Index* (2016) placed Australia sixth in the world for mobile infrastructure and eighth for network performance,²⁸ behind mostly higher population density South-East Asian and European countries. Moreover, OpenSignal (2016) concluded that:

If anything, Australia is *too* far ahead when it comes to network innovation. Telstra and Optus have built LTE-Advanced networks capable of theoretical speeds far faster than its subscribers can access. Smartphone technology is still catching up. (p. 1)

In terms of prices, the *GSMA Mobile Connectivity Index* (2016) placed Australia eighth in the world by mobile tariffs (and fifth for affordability overall), and the World Economic Forum's Global Information Technology Report (2016) places Australia 19th by prepaid mobile tariffs.

... but the fixed services sector is lagging

By international standards, Australia's fixed services perform relatively poorly with respect to prices and broadband speeds. In terms of retail prices, the *World Economic Forum's Global Information Technology Report* (2016) places comparable countries (in terms of income and population density) Iceland (44th) and Canada (81st) ahead of Australia (100th) for fixed service broadband tariffs. Australian fixed service broadband tariffs are, on average over 70 per cent higher than Icelandic rates.²⁹ In terms of broadband speed, the *Akamai State of the Internet Connectivity Report* (2016) placed Australia 51st for average connection speeds in the fourth quarter of 2016 — behind Iceland (12th) and Canada (24th). Fixed broadband connection speeds are likely to improve in coming years as the NBN is rolled out.

²⁷ These factors are not independent. Superior market and regulatory structures will better promote the uptake of new technologies.

²⁸ Australia placed first overall, in part due to higher scores in criteria which are not directly related to telecommunications, such as literacy rates and education levels.

²⁹ Based on the World Economic Forum's (WEF 2016) purchasing power parity measures.

FINDING 2.1

Technological progress is transforming the way in which people access and use telecommunications services, with benefits for individuals, businesses, governments and the wider community. Prices of telecommunications services are falling, while service quality is improving across both fixed and mobile platforms. Moreover, these services are converging, allowing users to readily choose between fixed and mobile access, and generating additional competitive pressure on service providers.

What could the future hold?

The telecommunications sector has evolved rapidly, and will continue to. The early 2020s are likely to see the completion of the NBN infrastructure rollout and the launch of 5G technologies, resulting in a significant improvement in both fixed and mobile telecommunications. 5G technologies will require denser mobile networks and deeper transmission networks to match, which may lead to greater integration between fixed and mobile networks (Entwhistle 2016; James 2016).

Technological advances will unlock new roles for telecommunications. High-speed broadband will enable more immersive consumer experiences through applications such as the internet of things and virtual reality. The Commission's recent research report *Digital Disruption: What do governments need to do?* discussed some of these developments further. In particular, it highlighted the impacts of advanced manufacturing processes and transport technologies (including automated vehicles), both of which will make rich use of wireless connectivity.

Further improvements in technology can be expected to address to some extent the lower quality of broadband in more remote areas of Australia, which are still relatively expensive to service. For example, the Commission heard from satellite providers about the significant capacity improvements over each generation of satellite. With satellite services having a limited lifespan (typically 15 years), newer generations of satellites are likely to continue replacing older generations over time. Australia is not alone in this regard, with similarly large and sparsely populated countries such as Canada and Russia facing similar challenges.

3 The telecommunications USO

Key points

- Australia has a plethora of policies and programs designed to enable universal access to telecommunications. These measures are aimed at ensuring that telecommunications services are provided to regional and remote areas that tend to be relatively high cost to serve and are often non-commercial. The telecommunications universal service obligation (TUSO) is one of these policies.
- The TUSO has taken various forms over time, but has barely evolved relative to considerable developments in technology, markets and consumer preferences.
 - In its current form, the TUSO is a legislative requirement to provide a *standard telephone service* to all premises in Australia and payphones that are generally accessible. The TUSO remains focused on the delivery of fixed voice services, mainly over fixed-line copper connections, while customer communications needs are overwhelmingly being met by a wide range of digital technologies and applications.
- Telstra is the designated universal service provider. Telstra's obligations are in accordance with legislation and its 20-year Agreement with the Australian Government (to 2032). Telstra receives gross annual funding of around \$300 million to deliver the TUSO. Funding is met through an Australian Government (non-indexed) contribution of \$100 million per year and through the Telecommunications Industry Levy, paid by eligible carriers.
- Telstra is not required to (and advised that it does not) collect data on the number of non-commercial telephone services or on the costs of any service it supplies under the TUSO. The Agreement suffers from a lack of transparency and accountability.
 - However, it is clear that the demand for services covered by the TUSO — the *standard telephone service* and payphones — is falling.
 - Using the number of non-commercial premises for the NBN as a proxy for the number of non-commercial premises for the TUSO, the current TUSO implies an average subsidy of around \$250 per 'TUSO' service per year.
- The TUSO has a number of other shortcomings. It is a blunt instrument with a one-size-fits-all approach to universal service provision and is out of sync with the widespread deployment and use of mobile and broadband services. The basis for TUSO funding (a total of around \$3 billion in net present value terms over 20 years) is unclear and disputed, while the principal technology — voice over copper — is becoming increasingly irrelevant and expensive to maintain.
- Notwithstanding these deficiencies, consumers in regional and remote Australia who do not have access to mobile services still value access to reliable voice technologies. They see their landline or an equivalent service as critical, particularly in times of emergency.
- While access to telecommunications services is viewed as important and some users still value the TUSO, the weight of evidence suggests that its costs are likely to be greater than its benefits, and that the TUSO is no longer fit-for-purpose.
- The TUSO should be wound up by 2020 and replaced by a new framework to reflect changing policy, market and technological realities.

A universal service obligation (USO) is one of a number of policy mechanisms used to deliver either universal telecommunications access or universal telecommunications services. These are used both in Australia and internationally (appendix C).

In general, a USO is a legally enforceable requirement to provide a service (often at a controlled reasonable price and given quality) to all users within a jurisdiction. A USO can be delivered by a single universal service provider, or by multiple providers. The purpose of such an obligation is to ensure the provision of services that would otherwise be economically unviable, to correct a market failure and/or to address gaps in under-served markets.

This chapter provides information on universal service policies, with a particular focus on the telecommunications USO (TUSO) in Australia. It commences with an examination of how Australia's TUSO has evolved over time and its current scope (section 3.1). It then outlines the Commission's assessment of various concerns with the TUSO, supported by input from inquiry participants (section 3.2).

3.1 Australia's approach to universal service

Universal service has long been a feature of telecommunications in Australia. There is a wide range of programs at the Australian, State and Territory and local government levels broadly associated with supporting universal service objectives (chapter 4). Fundamentally, these measures are aimed at ensuring that telecommunications services are available, accessible and affordable to geographical areas or cohorts of users that may be high cost and uneconomic to serve.

One of the key instruments through which universal service is facilitated in Australia is the TUSO. This obligation aims to ensure reasonable access to fixed voice services (primarily using a fixed-line technology) for all Australians on an equitable basis, regardless of where people reside or work. The TUSO has taken various forms over time, but has evolved little relative to advances in technology, market developments, and consumer preferences (box 3.1), and regulatory and structural reforms (figure 3.1). Despite these developments, the TUSO has always centred on delivering a landline to all premises across Australia.

Box 3.1 Early TUSO and government monopoly

Arguably the first example of telecommunications universal service provision in Australia was established by the Postmaster-General's Department in 1901 (Corner 2012) when much of Australia's fixed-line infrastructure was progressively rolled out, and profitable areas were used to cross-subsidise the provision of non-commercial services.

However, it was not until the enactment of the *Telecommunications Act 1975* (Cth) that the TUSO (the 'Community Service Obligation') was formally introduced. This legislation required Telecom Australia to provide telecommunications services that best met 'the social, industrial and commercial needs of the Australian people' and were 'available throughout Australia for all people who reasonably require[d] those services' (s. 6). Telecom Australia operated as a vertically-integrated government monopoly, and the Australian Government was able to provide relatively straightforward regulatory oversight of the TUSO (Gregory 2015).

Deregulation and privatisation

The Government deregulated the telecommunications sector in the 1990s to develop an internationally competitive, low cost and innovative industry (Ross 2004). Telecom Australia was gradually replaced by Telstra between 1992 and 1995, and the Government began to licence competing carriers in the fixed and mobile services markets. During this period, the Government determined that Telstra would provide its services to all Australians at standardised prices and would be responsible for the funding and provision of the TUSO (DCITA 2007).

Telstra underwent partial privatisation in 1997 and became fully privatised in 2006. Since opening the provision of telecommunications services to full competition, the number of services has increased and the variety of platforms has greatly diversified. Twenty-one licenced carriers operated in Australia by the late 1990s, compared with 261 active today (ACMA 2017a).

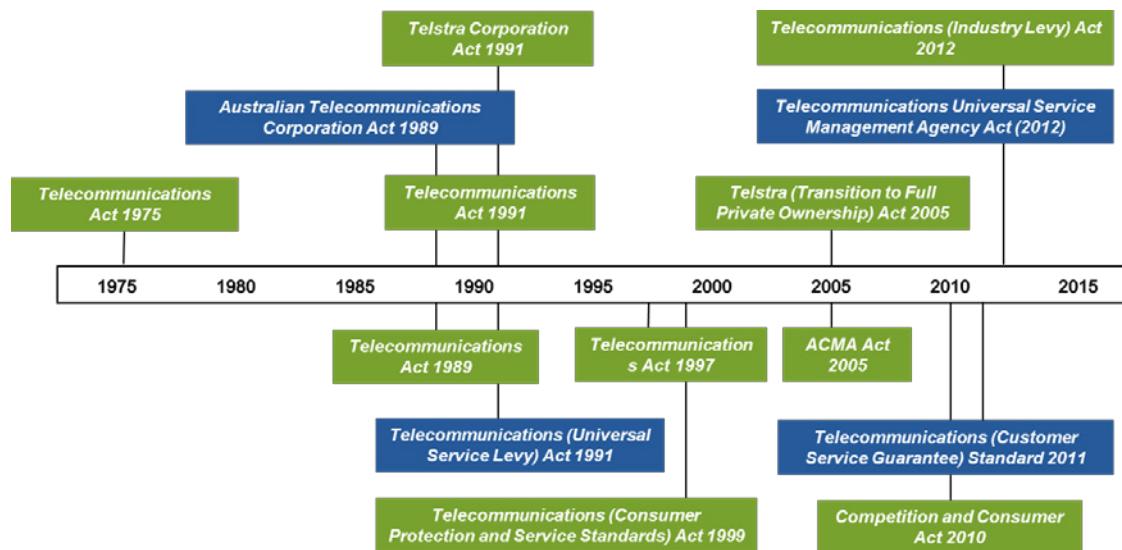
Funding and bidding for the TUSO

As competition developed, the monopoly model of internal cross-subsidisation of TUSO services became more complex. Competition and technological advances lowered prices, particularly in metropolitan markets. Price controls were also imposed on Telstra to prevent leveraging of market power in rural markets (DCITA 2007). Telstra was compensated for providing non-commercial services under the TUSO — funded by a combination of an internal industry cross-subsidy (the Universal Service Levy) and a direct payment from the Government.

In 1999, the Government established the 'Australian Universal Service Obligation Fund' to encourage competition in universal service provision. They identified two underserved 'net cost' regional areas to act as pilot projects, but failed to attract any of Telstra's competitors to provide these services (ACMA 2000). To become more technology relevant, the TUSO definition was expanded to include data and services to enable better access for people with disability. However, the digital data service obligation was later removed from the TUSO's scope.

TUSO funding has varied significantly over time, reflecting the different modelling approaches to calculate its costs (Fletcher 2015). The use of detailed cost models in estimating the cost of the TUSO was largely discontinued, and (prior to 2012) the Minister for Communications, based on advice from the Australian Communications and Media Authority (ACMA), set the annual level of TUSO funding (Coutts 2015). In 2012, the USO levy and the National Relay Service levy were combined to create the 'Telecommunications Industry Levy' (TIL). The annual level of TUSO funding (and the Government's contribution) was set to a fixed amount in 2012. This amount was significantly higher than the average TUSO funding received in years prior (Fletcher 2015).

Figure 3.1 Timeline of legislation relevant to the TUSO



The current TUSO

The current TUSO is a legislative requirement under the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth) (TCPSS Act), with respect to the *standard telephone service* (box 3.2), payphones and prescribed carriage services. Its objective is to ensure that these services are ‘reasonably accessible to all people in Australia on an equitable basis, wherever they reside or carry on business’ (s. 9). This Act consolidated the various consumer safeguards³⁰ into a single piece of legislation.

Under the TCPSS Act, the Minister for Communications determines which carrier will be the ‘primary universal service provider’. As the designated provider, Telstra is responsible for the provision of TUSO services throughout Australia. Telstra is currently the sole universal service provider, however, competing carriers may also provide the *standard telephone service* (but do not receive public funding) (ACMA 2016o). Telstra’s obligations are in accordance with the legislation and the Telstra USO Performance Agreement (TUSOP Agreement) it has with the Australian Government (box 3.3).

In conjunction with the *standard telephone service*, the TUSOP Agreement stipulates that Telstra will supply a basic telephone handset upon request for an additional cost, with end-users given the option of hiring or purchasing the handset. In addition, the TUSO ensures access to the *standard telephone service* for people with disability or impairments relating to hearing, speech, vision, dexterity or mobility. Where necessary, Telstra is obliged to provide equipment to support an alternative form of communication, such as

³⁰ Previously contained in the *Telecommunications Act 1997* (Cth) and the *Telstra Corporation Act 1991* (Cth).

volume control phones, hands-free phones, or a teletypewriter (TTY).³¹ The universal service provider is also required to supply equipment to allow those with disability to access the separately funded National Relay Service (NRS).³² In order to meet NRS obligations, Telstra is required to provide equipment to facilitate text-to-text communication (for example, a TTY), data transmission (for example, a modem), and data transmission and its transfer into Braille (for example, a telebraille) (Telstra 2016d).

Box 3.2 **What is a *standard telephone service*?**

The TUSO includes an obligation on the primary universal service provider to supply a *standard telephone service* to all people in Australia upon reasonable request. The service is defined^a as a ‘telephone service fit for the purpose of voice telephony’. If voice telephony is impractical for a person with disability, an ‘equivalent’ form of communication must be provided.^b

The legal requirement for Telstra to provide a *standard telephone service* was first introduced as a ‘community service obligation’ under the *Australian Telecommunications Corporation Act 1989* (Cth) (s. 27). This ensured that Telstra (then Telecom Australia) would supply a public switched telephone service ‘between places within Australia’, as ‘efficiently and economically as practicable’. The design of the *standard telephone service* also recognised the social importance of reasonable access to telecommunications, and the importance of quality and performance standards that met the ‘social, industrial and commercial needs of the Australian community’.

Details regarding the conditions, charges and specifications for the service are contained within the ‘General Conditions’ and ‘Public Switched Telephone Service’ sections of Telstra’s Customer Terms^c (ACMA 2016o).

While supplying the *standard telephone service*, Telstra is required to provide users with:

- the ability to make and receive automated national and international voice grade telephone calls 24 hours-per-day
- 24 hour access to emergency service numbers free of charge
- a unique telephone number (allocated in accordance with the *Telecommunications Numbering Plan 1997* (Cth)) with a directory listing, unless otherwise requested
- access to operator assisted services (such as assistance for directory assistance, national and international call connection and reporting of service difficulties)
- itemised billing, including itemised local calls on request (for a fee).

^a Under the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth) (s. 6). ^b In order to comply with the *Disability Discrimination Act 1992* (Cth). ^c Requests for, and supply of, the *standard telephone service* are governed by the *Telecommunications Universal Service Obligation Standard Telephone Service – Requirements and Circumstances Determination (No.1) 2011*.

³¹ These technologies can be provided through Telstra’s Disability Equipment Program or through other suppliers that meet the requirements of the ACMA.

³² Specified in the *Telecommunications (Equipment for the Disabled) Regulations 1998* (Cth).

Box 3.3 The Telstra USO Performance Agreement

The Telstra USO Performance Agreement (TUSOP Agreement) sets out Telstra's contractual obligations in relation to the universal service obligation and some other 'public interest telecommunications services'. The Agreement's duration is 20 years — commencing on 1 July 2012 and ceasing on 1 July 2032. If the Agreement were to run its full course, with no reduction in costs, it would ultimately cost \$5.4 billion (in undiscounted terms) or around \$3 billion (in 2012 net present value terms), with the Australian Government contributing around 35 per cent and the industry levy contributing the remainder.

The Agreement is currently administered by the Department of Communications and the Arts (DoCA).^a Telstra's performance under the TUSOP Agreement is assessed annually against performance requirements set out in legislation and the Agreement, which includes the Customer Service Guarantee that relates to *standard telephone services*. The Agreement currently provides for a mandatory 10 year independent review of the technologies and systems used by Telstra to provide the current USO services.

The TUSOP Agreement is one of a series of separate, yet interrelated, agreements signed by the Australian Government, Telstra and NBN Co Limited (nbn) to enable the NBN infrastructure to be built and operated.

^a The Agreement was administered by the Telecommunications Universal Service Management Agency (TUSMA) until 1 July 2015 when the Agency was abolished and its functions transferred to DoCA.

Sources: Telstra (2011); TUSMA (2015).

Telstra also has obligations regarding timeframes for connection and repair of *standard telephone services*. These are covered by the *Telecommunications (Customer Service Guarantee) Standard 2011* (Cth). If there is an extended delay and these timeframes are not met, Telstra is obliged to offer an interim service and/or financial compensation to customers under certain circumstances. Telstra also has a number of responsibilities that are separate, but related, to the TUSO, imposed through its carrier licence conditions (box 3.4).

The *standard telephone service* has traditionally been provided as a fixed-line telephone service, however the obligation under the TUSOP Agreement is 'technology neutral,' and some remote areas have been provided with a *standard telephone service* over radio and satellite technologies (Telstra, sub. 30). However, this technological neutrality is partly restricted by the Copper Continuity Obligation, as existing customers outside of the nbn's fixed-line footprint are currently guaranteed continued access to copper on request.

Box 3.4 Telstra's carrier licence conditions and the TUSO

Owners of network infrastructure used to supply carriage services (telephony or internet) to the public are required to hold a carrier licence.^a Carrier licences are granted by the ACMA, and impose various conditions, including obligations under the *Telecommunications Act 1997* (Cth) (such as contributing to the Telecommunications Industry Levy) and the telecommunications access regime^b and communications facilities, powers and immunities (such as some exemptions from local planning laws).

The Minister for Communications can impose further licence conditions on particular carriers. Telstra has a number of unique responsibilities, separate to its TUSO obligations, borne from its legacy role as a government-owned, dominant telecommunications provider. The majority of these are imposed as licence conditions, mandated by the *Carrier Licence Conditions (Telstra Corporation Limited) Declaration 1997*. They include:

- providing operator services and directory assistance services for *standard telephone service* users
- providing a free annual alphabetical public number directory to all customers and maintaining an integrated public number database
- priority assistance arrangements (chapter 4)
- maintaining the Low Income Measures Assessment Committee (LIMAC) and offering products to low-income customers, endorsed by low-income consumer advocacy groups
- providing mobile phone services to towns with populations of over 500, in selected population centres and on selected highways
- maintaining a local presence in regional, rural and remote parts of Australia where this is compatible with overall commercial interests of Telstra, is not unduly prescriptive, and does not impose undue financial and administrative burdens
- the Network Reliability Framework (chapter 4)
- an obligation to offer the Customer Service Guarantee (CSG) (chapter 4). Unlike other providers, Telstra cannot allow its customers to waive their CSG rights
- monitoring and reporting at the Field Service Area, Cable Run and CSG service levels.

^a A carrier licence is required unless a nominated carrier declaration is in force in relation to the network unit or an exemption applies, according to the *Telecommunications Act 1997*. ^b The access regime is defined under Part XIC of the *Competition and Consumer Act 2010* (Cth).

Sources: ACMA (2016j, 2017b); *Carrier Licence Conditions (Telstra Corporation Limited) Declaration 1997*; *Telecommunications Act 1997*.

Copper Continuity Obligation

Within the context of the NBN infrastructure rollout (appendix B), Telstra is responsible for operating and maintaining its existing copper network in areas outside of nbn's fixed-line footprint, and providing fixed voice services over that network. Telstra also has an obligation to not disconnect any copper connections (regardless of location) except in accordance with the Subscriber Agreement (between nbn and Telstra) or as agreed with the Department of Communications and the Arts (DoCA). This is defined as the 'Copper Continuity Obligation' under the TUSOP Agreement, and is Telstra's responsibility until

the specified cessation date in 2032. Telstra is also required to act as the ‘retailer of last resort’, and is obliged to provide *standard telephone services* on request over the NBN fixed-line network.³³

Payphones obligation

The obligation of the universal service provider extends to the supply, installation and maintenance of public payphones. This aims to ensure that payphones are reasonably accessible to all people in Australia, on an equitable basis, regardless of location.

Telstra operates various types of payphone terminals. These are required to provide:

- local, national and international calls for a fee
- 24 hour access to emergency service numbers, free of charge
- operator assisted services (such as directory assistance).

The obligation to facilitate equitable access to the *standard telephone service* for individuals with disability extends to payphones. A proportion of Telstra’s payphones are ‘Smart Payphones’, which provide various features to meet this obligation. These payphones accept payment via both coins and phonecards, and provide features such as adjustable volume control, built-in acoustic hearing aid couplers, and a tactile orientation mark on the number ‘5’ on the keypad (ACMA 2016h). In addition, Telstra provides payphones with built-in TTY machines to enhance access and usage for people with impairments relating to hearing or speech. About 150 payphones have been modified to include a TTY facility (Telstra 2016i), with the majority of these located in shopping centres, airports and other high usage sites (ACMA 2016h).

Telstra is also responsible for conducting public consultation and resolving any complaints regarding the location of payphones. When determining where to install a payphone, Telstra applies an assessment framework (ACMA 2016h), and considers factors such as:

- the size of the community and the location of the nearest payphone
- accessibility of the site and the availability of appropriate infrastructure
- the risk of damage from vandalism
- environmental impacts
- the anticipated demand and commercial viability of the payphone.

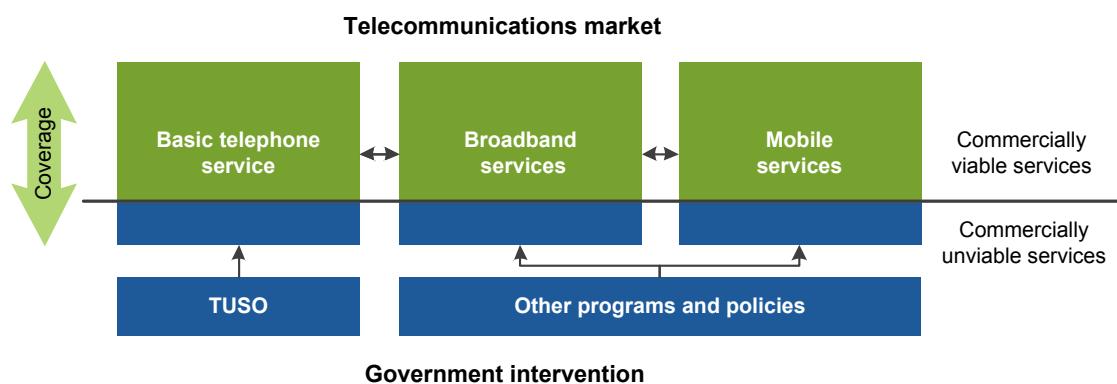
³³ Earlier Australian Government policy (DBCDE 2012) referred to Telstra’s responsibility to deliver the *standard telephone service* USO with respect to nbn’s ‘optic fibre footprint.’ However, a subsequent change in policy in 2014 (Turnbull and Cormann 2014) to allow nbn to use a mix of fixed-line technologies, not just optical fibre to the premises, has meant the appropriate reference is the fixed-line footprint.

When considering the removal or relocation of a payphone, Telstra is required to consult with the local community, site owner and local government. Any individual or group can apply to Telstra for the installation, relocation or removal of a payphone. Telstra's performance regarding the supply of the *standard telephone service* through payphones is monitored by the ACMA, with results publicly available on the ACMA website (ACMA 2016o).

The TUSO is intended to focus on non-commercial areas

The current TUSO requires Telstra to provide voice telephony coverage in those areas that would be commercially unviable in the absence of government intervention (figure 3.2). The revenue from some connections may be insufficient to cover service provider costs let alone meet a minimum rate of return on their investment. These services are considered 'commercially unviable' or 'non-commercial' and can be difficult to determine (box 3.5).

Figure 3.2 The TUSO aims to expand coverage to non-commercial areas
Policies to address telecommunications availability



Source: Adapted from DCITA (2007).

How is the TUSO funded?

Telstra currently receives gross funding of around \$300 million annually for the provision of USO services — consisting of \$253 million for *standard telephone services* and \$44 million for payphones (including GST) (DoCA 2016p; TUSMA 2015).

Box 3.5 Determining non-commercial services

In the absence of government intervention, a profit-maximising service provider would only connect premises where the expected revenues are sufficient to cover costs.

The direct costs of a telecommunications service can include the fixed and variable costs of providing network infrastructure and its maintenance, and the retail and support costs required to service the connection. The provider also has indirect costs of raising capital and opportunity costs, as a provider's resources can instead be used for other services (Paterson 2011). Substitution costs may also exist for a designated universal service provider. In supplying a telephone service, a provider could forego revenue that it might receive by selling other types of services to the customer (for example, a wireless internet or mobile service) (Paterson 2011).

Revenues include the direct revenue from customers, as well as any wholesale revenue received from line rentals and other carriage and call origination services for these connections (Paterson 2011). Additional (secondary) revenues can come from selling, or 'bundling', other services to a customer. There may be other less tangible benefits in extending network services to non-commercial areas, for example the ability to charge a higher price to other customers. Economies of scale and network effects can add value to a universal service provider, and can lower the costs of adding users to the network. By providing more connections, the universal service provider can increase market share, improve brand recognition and enjoy other benefits from market ubiquity (DCITA 2004).

Many uncertainties exist in the long-term viability of telecommunications services. Uncertainties include the expected future costs and revenues of the service, the productive life of the telecommunications infrastructure and whether this infrastructure can adapt to changing consumer expectations, market competition and technology. Government intervention, or the risk of future intervention, can also affect the size of non-commercial service losses. The various methodologies for calculating and appropriating the costs of non-commercial services are described in chapter 8.

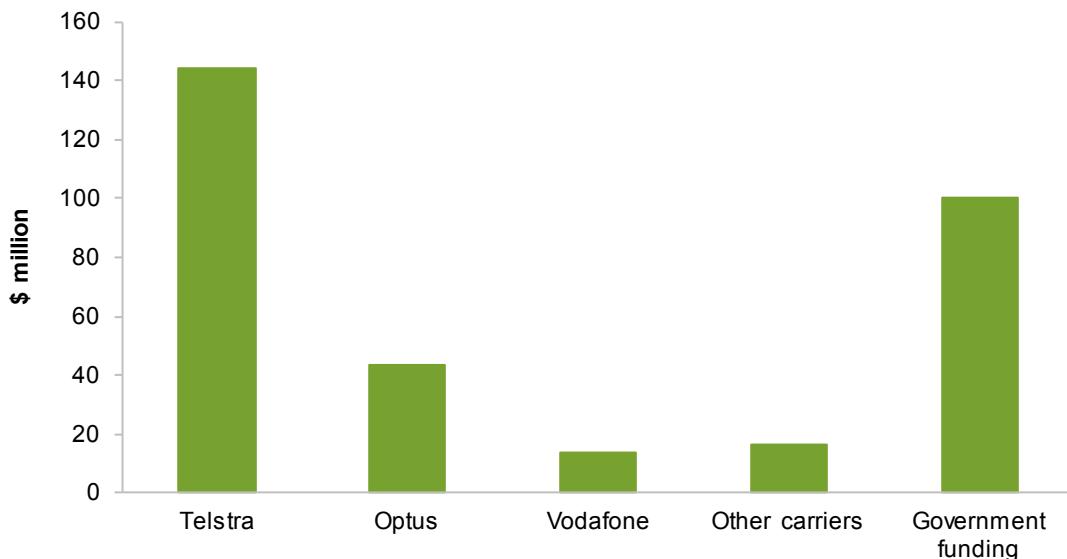
Funding for the provision of TUSO services (as well as other 'public interest' telecommunications services) is met through an Australian Government (non-indexed) contribution of \$100 million per year³⁴ (TUSMA 2015) and through the Telecommunications Industry Levy (TIL). The TIL is collected by the ACMA from telecommunications carriers with gross annual telecommunications sales revenue of \$25 million or more.³⁵ Eligible carriers pay a proportion of the TIL based on their share of total industry revenue. In 2015-16, the industry levy raised around \$218 million,³⁶ with Telstra contributing around 66 per cent (\$144 million) of the total (figure 3.3). These percentages are expected to change over time as NBN infrastructure is rolled out, with nbn contributing a growing percentage of the levy.

³⁴ Excluding the 2012-13 and 2013-14 financial years, where Australian Government funding was \$50 million.

³⁵ The *Telecommunications Act 1997* (Cth) established methodologies to determine the cost of the TUSO, and the basis on which such cost should be divided among relevant carriers and carriage service providers (Raiche 2010). The current process for assessing and collecting the TIL is outlined in the TCPSS Act.

³⁶ The TIL is used to fund the TUSO, as well as the National Relay Service, and the delivery of emergency call services and other public policy telecommunications outcomes (ACMA 2016l).

Figure 3.3 Contribution to funding of the TUSO
2015-16



Source: Productivity Commission estimates based on ACMA (2016m).

The TIL funding model effectively allows carriers to share the TUSO cost burden. That is, by partially funding the supply of telephone connections in non-commercial areas. Telstra's national pricing means that all customers pay the same rates for a *standard telephone service* despite the higher supply costs in regional areas. Urban users therefore cross-subsidise regional users, although competition in urban areas limits the extent to which this cross-subsidisation is possible. Ultimately, telecommunications consumers and taxpayers in general pay for the TUSO.

The TUSOP Agreement granted Telstra an extra \$125 million per year (GST exclusive) for the provision of TUSO services relative to the subsidy that Telstra was receiving immediately prior to the TUSOP Agreement (table 3.1). The funding increase was mostly met by the Australian Government contribution (DBCDE 2011).

Table 3.1 Annual payments to Telstra for TUSO services^a
\$million

	2011 ^b	2012 – 2032 ^c
Standard telephone service	131.2	230
Payphones	13.8	40
Total	145	270

^a GST exclusive. ^b Pre-TUSOP Agreement. ^c As per TUSOP Agreement.

Source: DBCDE (2011).

Performance and reviews of the TUSO

To receive funding for the TUSO, Telstra must meet various performance requirements. There are no regulations that specifically relate to the performance of the *standard telephone service* USO (ACMA, sub. 49). However, performance requirements and protections are set out in legislative instruments made under the TCPSS Act and secondary instruments — in particular the Customer Service Guarantee (CSG). The ACMA uses the CSG as a ‘proxy’ to assess Telstra’s compliance and performance of *standard telephone service* delivery, with results published on its website (ACMA 2016o).

The CSG sets standards and benchmarks relating to installation, fault repair and appointment keeping timeframes. If a provider fails to meet these minimum standards, compensation may be payable to the customer. Telstra’s Carrier Licence Conditions also contain the Network Reliability Framework (box 3.4), which requires Telstra to identify and remediate its copper network to ensure reliability of fixed telephone services. As highlighted above, the ACMA is also responsible for monitoring Telstra’s compliance with the TUSO payphones obligation.³⁷ The ACMA encourages and monitors compliance to these various consumer safeguards through environmental scanning, submitting enquiries to providers and investigating possible non-compliance (ACMA, sub. 49).

The TUSO and related matters have been subject to several reviews in recent years (box 3.6). There are also various reviews scheduled for a future date or on an ad hoc basis as detailed within the TUSOP Agreement. The scope for changes to the TUSO arrangements is considered further in chapter 9.

Outside of the NBN fixed-line footprint, Telstra delivers the current TUSO almost exclusively over copper lines. According to the 2010 NBN Implementation Study:

Today, 99.75 percent of all premises are capable of receiving voice over Telstra’s copper access network, with low latency and high availability providing a high quality of service. In addition, Telstra implements a number of copper-based solutions to serve remote premises, including pair-gain systems that enable service for long loops and serve multiple customers over a single copper line. (McKinsey & Company and KPMG 2010, p. 319)

Telstra delivers the remainder of its TUSO services using a mix of alternative technologies, including through its own fibre, satellite and point-to-point radio infrastructure, and via the NBN fixed-line network. Telstra provided around 6 million fixed voice services to consumers across Australia in 2015-16 (Telstra, pers. comm., 4 November 2016). Of Telstra’s 5067 Exchange Service Areas, only 543 will sit wholly within nbn’s fixed-line footprint.³⁸ In more remote areas, such as Australia’s islands and parts of the outback, Telstra uses radio infrastructure to deliver fixed voice services. While in the most isolated parts of Australia, Telstra delivers fixed voice services over satellite.

³⁷ This monitoring is assisted by the *Telecommunications Universal Service Obligation (Payphone Performance Benchmarks) Instrument (No. 1) 2011 (Payphone Benchmarks)*.

³⁸ Telstra has estimated this number based on information published by nbn and it is subject to any changes to nbn’s corporate plan.

Box 3.6 **Reviews relevant to the TUSO**

- In 2004, DoCA (previously the Department of Communications, Information Technology and the Arts) conducted a review of the operation of the USO and the CSG (DCITA 2004).
- In 2004, the ACMA conducted the *Payphone Policy Review* (ACMA 2004).
- In 2007, a comprehensive review of the TUSO was announced by the Minister for Communications (and an issues paper was released), but not completed due to a change in government (Corner 2012).
- In 2010, the Government held public consultations regarding the implementation of a universal service policy for the transition to the NBN environment. These were followed by another round of public consultation and the release of an issues paper in 2011: *Universal Service Obligation Legislative Reform for the Transition to the National Broadband Network* (Corner 2012).
- The Australian Government is required to commission an independent review of the adequacy of telecommunications services in regional, rural and remote parts of Australia every three years.^a Previous reviews include the 2000 ‘Besley Review’, the 2002 ‘Estens Review’, the 2008 ‘Glasson Review’, the 2012 ‘Sinclair Review’ and the 2015 ‘Shiff Review’.
- While not a formal review, ACCAN (the Australian Communications Consumer Action Network) held a conference in 2015 themed ‘Rethinking the USO’ (ACCAN 2015).
- DoCA completed a draft report in May 2016, reviewing the ACMA in order to determine whether its objectives, functions, performance, governance and resource base are fit-for-purpose for the contemporary and future communications regulatory environment (DoCA 2015a). This report is currently being considered by the Government.
- DoCA intends to conduct a review of the telecommunications consumer safeguards framework. The review is intended to examine consumer protections, affordability and accessibility of telecommunications ‘in parallel’ with the Commission’s inquiry (DoCA, sub. 58, p. 5).
- The Australian National Audit Office has commenced an audit assessing the effectiveness of DoCA’s contract management of selected telephone universal service obligations, due for completion in September 2017 (ANAO 2016b).

^a As required under Part 9B of the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth).

Beneficiaries of the TUSO

There is limited evidence on TUSO customers in Australia as Telstra’s obligation to provide a service does not require it to explicitly distinguish between TUSO and non-TUSO customers, nor collect data on the number or location of these customers (Telstra, sub. 30). Users of the TUSO would include customers who have a landline connection from Telstra, live in an area where the provision of such a service is assessed as loss-making (generally in regional and remote Australia), and do not have an alternative service available (for example, a mobile service). In theory, a TUSO customer would be a premises that has a *standard telephone service* with Telstra — a service that neither Telstra

nor other providers would have connected on a commercial basis. In practice, there appears to be no recent data on this.³⁹

Aside from Telstra's performance against the CSG performance standard and benchmarks relating to installation, fault repair and appointment-keeping timeframes, Telstra is not required to record any performance data specifically for the *standard telephone service* USO. Oddly, Telstra is not required to report on the number of non-commercial services or on the costs of any telephone service it supplies. Even though slightly less opacity applies to Telstra's payphones, Telstra is also not required to specify which payphones are non-commercial — that is, those that would require a subsidy to service.

This lack of transparency and accountability makes the continuation of current arrangements difficult to justify to those parties required to contribute to the annual TIL. It also makes any assessment of the value of the TUSO to the Australian community challenging. Any renegotiation of the TUSOP Agreement would need to be underpinned by robust and transparent data. This is considered further in chapter 9.

Indicators of non-commercial areas

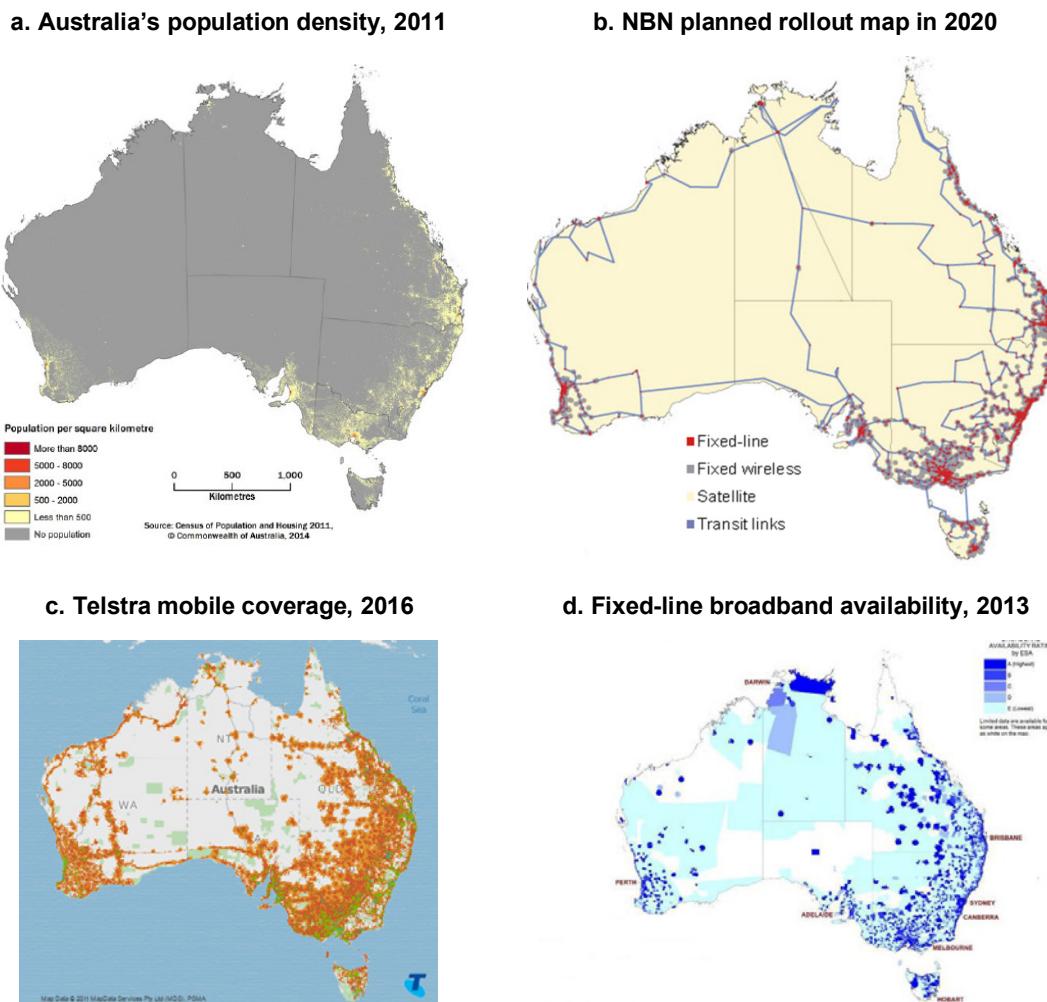
In the absence of information on the commercial viability of providing telecommunications services to particular areas, non-commercial TUSO areas can be gauged by a number of indicators related to population density and service coverage. In figure 3.4:

- panel a shows Australia's population density. While most people live along Australia's eastern seaboard and in the south-west corner of Western Australia, about 29 per cent live outside Australia's major cities (ABS 2016g). Much of this population is dispersed over a large geographic area that is potentially uneconomic to service. In model documentation by Analysys Mason (and also used by the Australian Competition and Consumer Commission and Paterson), Australia's remote area network costs were estimated to be 2.7 times higher than the national average (Paterson 2011)
- panel b shows the planned rollout map for the NBN using fixed-line, fixed wireless and satellite technologies. The Bureau of Communications Research (BCR) identified the areas outside of the NBN's long-term fixed-line footprint as non-commercial (BCR 2016a). These areas cover most of Australia's landmass and represent about 1 million premises (or around 8 per cent of Australian premises) (nbn 2016b). The BCR noted that these areas were considered non-commercial largely because of the high costs of delivering broadband through fixed wireless and satellite technologies (BCR 2016a)

³⁹ The cost of Telstra's TUSO commitments were estimated in a 2011 report prepared for the Department of Broadband, Communications and the Digital Economy (Paterson 2011). Using 2009-10 data, Paterson estimated that Telstra operated about 810 000 copper-based fixed voice services in commercially unviable areas. In the same year, Telstra had about 20 000 payphones in operation. Paterson's overall USO net cost estimates for 2009-10 were \$215–262 million for the *standard telephone service* and \$35–48 million for USO payphones. Paterson stated that a limitation to his analysis was obtaining reliable cost data.

- panel c shows Telstra's mobile coverage in 2016. Telstra's mobile coverage is the most extensive of Australia's mobile carriers. It now covers 99.3 per cent of the Australian population based on where people live. However, little more than 30 per cent of Australia's landmass is covered by a mobile service (RTIRC 2015). Areas without mobile coverage can indicate where services are, at present, commercially unviable
- panel d shows the geographic spread of fixed-line broadband availability in 2013, according to the Australian Government's *Broadband Availability and Quality Report* (DoC 2013). According to that report, about 6 per cent of Australian premises were identified as unable to access fixed broadband, with availability lowest in remote parts of Australia. Broadband availability in some remote parts of Australia primarily reflects the recent rollout of NBN infrastructure, which has prioritised connections in regional and remote Australia.

Figure 3.4 Possible extent of non-commercial services



Sources: Productivity Commission based on ABS (2014a); Australian Government (2011); Telstra (2016g); DoC (2013).

The lack of data on the number of ‘TUSO services’ provided by Telstra has led the Commission to develop estimates on the basis of several proxies for non-commerciality (table 3.2). These estimates suggest that the current TUSO could imply a subsidy ranging anywhere between \$248 and \$2811 per ‘TUSO service’ per year. The Commission has drawn on published estimates that also display a wide range: \$312 to \$2530 per year. In table 3.2, the ‘2011 Paterson Report estimate’ reflects the number of net-cost TUSO premises assumed at the time by the Department of Broadband, Communications and the Digital Economy (Paterson 2011), while the ‘Optus submission estimate’ shows the results of calculations made by Optus (sub. 4) in their submission to this inquiry, based on a range of assumptions.

Table 3.2 Estimated annual *Standard Telephone Service* USO subsidy per premises

Assuming a total annual *Standard Telephone Service* USO subsidy of \$253 million^a

	Assumption				
	Premises outside of the NBN fixed-line footprint rely on the TUSO	Premises within the NBN satellite footprint rely on the TUSO	Premises in areas with no mobile coverage rely on the TUSO	2011 Paterson Report estimate	Optus submission estimate
Number of premises	1 020 000	412 000 ^b	up to 90 000 ^c	810 000	100 00–150 000
Percentage of total Australian premises	8 ^d	3	up to 0.8	9 ^e	1–1.5
Subsidy per premises	\$248	\$614	at least \$2 811	\$312	\$2 530–1 687

^a Based on GST-inclusive figure for 2014–15. ^b Assumes NBN has been fully rolled out (nbn 2015a). ^c As calculated in chapter 6. ^d Represents 8 per cent of premises by 2021 (nbn 2014b). ^e Assumes 9.27 million premises in 2011.

Sources: Productivity Commission estimates based on ABS 2015, *Household and Family Projections, Australia, 2011 to 2036*, Cat. no. 3236.0; nbn (2014b, 2015a); Optus (sub. 4); Paterson (2011); RTIRC (2015).

Payphones are another part of Telstra’s TUSO commitments. As at June 2016, Telstra had about 17 000 payphones in operation (ACMA 2016d). About 71 per cent of payphones were in urban areas, 24 per cent in rural areas, and 5 per cent in remote areas (including 580 payphones located in remote Indigenous communities). In the absence of data regarding the number of non-commercial payphones funded by the TUSO, the Commission has developed estimates based on a number of assumptions (table 3.3). These estimates point to an average subsidy per payphone ranging from \$2574 to \$49 718 per year.

Table 3.3 Estimated annual TUSO subsidy per payphone

Assuming a total annual TUSO payphone subsidy of \$44 million^a

	Assumption		
	All Telstra payphones are non-commercial	Telstra payphones in rural and remote areas are non-commercial	Telstra payphones in areas with no mobile coverage are non-commercial
Number of payphones	17 093	4 955	885
Subsidy per payphone	\$2 574	\$7 882	\$49 718

^a Total annual USO payphones subsidy is based on GST-inclusive figure for 2015-16.

Sources: Productivity Commission estimates based on DoCA (2016p); Telstra (pers. comm., 31 August 2016).

FINDING 3.1

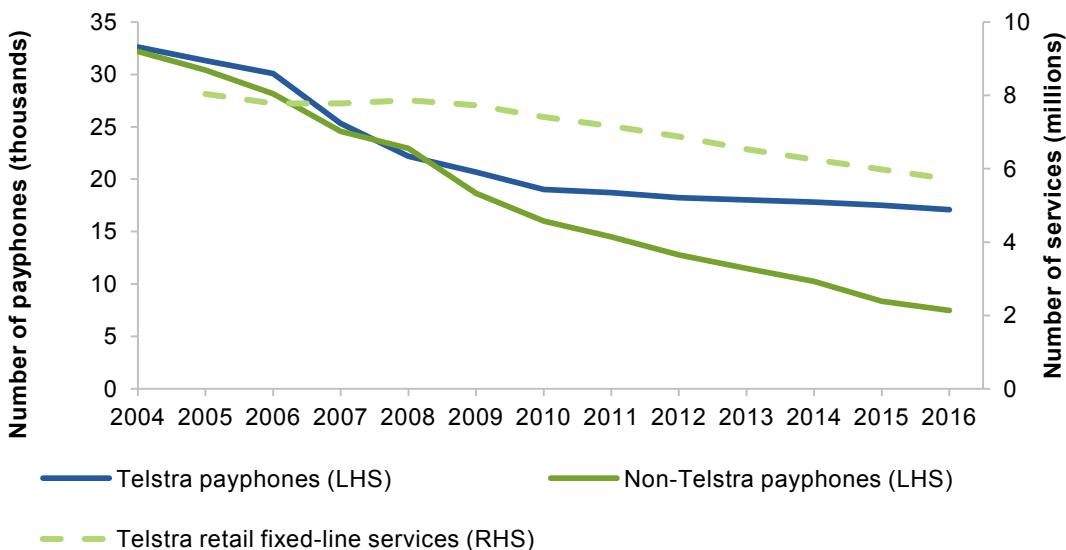
Data on the number and location of premises covered by the telecommunications universal service obligation (TUSO) are scant. Tentative Commission estimates suggest that the TUSO could imply an annual subsidy for a *standard telephone service* ranging anywhere between \$250 and \$2800 per 'TUSO' service, and an annual subsidy for each payphone of anywhere between \$2600 and \$50 000.

Demand for TUSO-funded services is decreasing

Even though there is limited information on the number and location of TUSO services, it is clear that consumer demand for these services is decreasing. Overall, Telstra's active retail fixed-line services have declined by about one quarter in the past decade, from about 8 million to just under 6 million services (figure 3.5). Over the same period, Telstra payphones have almost halved in number (from over 30 000 to about 17 000), while non-Telstra operated payphones have fallen by an even greater amount (figure 3.5).

In terms of usage, about 67 per cent of adult Australians made a phone call from a fixed service in the six months to June 2016 (ACMA 2016d), while only 6 per cent used a payphone in the same period. The number of voice call minutes originating from a fixed service fell by 79 per cent over the decade to June 2015 (figure 2.2), while the total number of calls made from payphones fell by approximately 71 per cent from 2010-11 to 2015-16 (from around 54 million to around 16 million) (Telstra, pers. comm., 31 August 2016).

Figure 3.5 Trends in payphones and Telstra's retail fixed-line services



Source: ACMA Communications Report (various years).

Decreased demand for TUSO services reflects changes in telecommunications technology and in consumer preferences (chapter 2), as well as the increasing number of customers being serviced by the NBN. As already noted, a growing number of Australians are using mobile services, while there has been a slight decrease in the number of fixed voice services. As at June 2016, 96 per cent of Australian adults owned a mobile phone (ACMA, sub. DR157). Mobile-only communication is also becoming increasingly common. In 2016, 31 per cent of adults used only a mobile service and did not have a fixed service for voice (ACMA 2016d). These ‘mobile-only’ users were slightly more likely to live in capital cities than regional areas (32 per cent of people in capital cities compared with 30 per cent of people in regional areas). It was also more common among young people and those who lived in a shared household.

The average subsidy per TUSO service is influenced by the demand for TUSO services. If demand falls, the revenue received by Telstra for providing these services falls commensurately. Telstra also incurs costs of maintaining network infrastructure, which may remain relatively fixed regardless of the number of active retail services. However, due to the non-commercial nature of TUSO services, these trends imply that the overall average subsidy for the TUSO is increasing over time, as the number of loss-making TUSO services continues to fall within a static funding envelope.

FINDING 3.2

There is unequivocal evidence that the relevance of services covered by the telecommunications universal service obligation — the *standard telephone service* and payphones — is declining. Over the past decade, Telstra's active retail fixed voice services have fallen by about one quarter (from about 8 million to just under 6 million services), while the number of Telstra payphones has almost halved (from over 30 000 to around 17 000). One third of Australian adults in capital cities and regional areas now rely solely on mobile phones for voice services.

Is the TUSO really universal?

A *standard telephone service* is available to all households and businesses under the TUSO. However, this excludes Australians with no fixed address, such as those who are homeless or itinerant. The Australian Bureau of Statistics (2012d) estimated that there were about 105 000 people homeless on Census night in 2011. The TUSO may also be less available to disadvantaged Australians living in shared or low-cost housing.

For a premises to be covered by the TUSO it must be habitable and secure. The TUSO provider also requires access to power for the installation of the *standard telephone service*. These changes were made in 2011 to formalise what was a ‘reasonable’ request for a TUSO service to be provided to premises (Fletcher 2015). Excluded premises from a TUSO service can include non-permanent structures, such as portable homes and non-permanently moored boats, among other exclusions.⁴⁰

These restrictions can exclude *standard telephone service* availability for some of the most remote and disadvantaged Australians, including some remote Indigenous communities. The payphones component of the TUSO aims to provide reasonable access to a telephone service, including for people without a fixed address. But this does not include some of the most remote and isolated communities. According to the ACMA (2008):

Significantly for remote Indigenous communities, the [TUSO] stipulates that a payphone should be provided to communities with a permanent population of more than 20 adult residents or 50 people in total, unless there are extenuating circumstances such as low site accessibility.⁴¹ In the latter case, a viable alternative service is provided, such as mobile or satellite coverage. (p. 8)

In these instances, other government policies and programs are often used to provide universal access to telecommunications infrastructure (chapter 6). For example, in 2015 the Australian Government tendered for the supply of 301 WiFi telephones and

⁴⁰ *Telecommunications Universal Service Obligation (Standard Telephone Service—Requirements and Circumstances) Determination (No. 1) 2011.*

⁴¹ As outlined by the *Telecommunications Universal Service Obligation (Location of Payphones) Determination 2011.*

245 community payphones to deliver services to remote Indigenous communities (Connolly 2015).

3.2 Assessing the current TUSO

Throughout the 20th century the TUSO was regarded as an important policy to ensure telecommunications access in the bush. In more recent times, however, it has attracted criticism for being outdated and overdue for reform. Each of the past four Regional Telecommunications Reviews have commented on the declining relevance of the TUSO in the context of an evolving telecommunications market (RTI 2002; RTIRC 2008, 2012, 2015). In 2011, the ACMA (2011a) referred to the USO as a ‘broken concept’.

A wide range of participants to this inquiry viewed the current TUSO as no longer fit-for-purpose (box 3.7). Some participants saw the TUSO as an inefficient policy instrument. Many, however, wanted the TUSO extended to other services such as broadband and mobile. Some groups also wanted the TUSO to better address accessibility and affordability issues. Critics of the TUSO rightly argued that it duplicates other government programs. Other concerns related to the current TUSOP Agreement, which was seen to lack transparency or justification for many of its changes. However, a number of participants highlighted the value that they place on a landline — particularly users located in regional and remote areas with no mobile coverage — and advocated for its continuation, mostly in conjunction with any NBN service that they may have access to.

The Commission has developed a set of guiding principles for the development of a universal service objective and policy (chapter 1). In addition to the concerns raised by participants, these principles provide a basis for an assessment of the current TUSO and assist in the development of future objectives and policy mechanisms for universal service.

Criticisms of the TUSO

The TUSO is a blunt and inefficient policy instrument

It is untargeted

In Australia, and in other countries, a USO is viewed as a one-size-fits-all policy to ensure universal availability to a *baseline* level of telecommunications services (Coutts 2015; Lateral Economics 2001; OECD 2006). The TUSO in Australia is not means-tested and is not restricted to low-income households. The policy also covers high-income households that could potentially access these services without the need for a subsidy. It has also been suggested that the vast majority of Australians are unaware of the existence of the TUSO, let alone the need or justification for the policy (CCC, sub. DR121).

Box 3.7 Selected participants' criticisms of the TUSO

Optus (sub. 4):

The [TUSO] remains rooted in principles more applicable to the analogue era of telecommunications. It is predominantly focused on the delivery of fixed voice handsets and voice calls over fixed line copper connections. The widespread deployment and use of mobile, data and broadband services now render it increasingly inappropriate. (p. 3)

TPG Telecom (sub. 38):

The concept of taxing fledgling companies trying to make a profit in an environment where they are competing against a powerful and wealthy incumbent seems to be antithetical to sensible competition policy, particularly when that money is then handed to the powerful and wealthy incumbent to support it in supplying its core business of telecommunications services. (p. 1)

The Australian Competition and Consumer Commission (ACCC, sub. 40):

... a universal service regime of some kind will continue to be important to ensure that essential communications services are available, accessible and affordable for all Australian consumers no matter their circumstances ... However, we consider that current arrangements relating to the provision of universal voice services could be improved, and that additional measures to address affordability and accessibility issues for some end-users may be required. (p. 1)

Vodafone Hutchison Australia (Vodafone, sub. 46):

The [TUSO] is an opaque, inefficient, inflexible and outdated model which delivers poor outcomes for consumers at the cost of substantial distortions to competition. A scheme which guarantees \$6 billion over 20 years to Telstra, for legacy copper and payphone infrastructure without any serious scrutiny of cost, let alone a cost-benefit analysis, is clearly not the solution in an evolving telecommunications market. (p. 3)

The Australian Communications and Media Authority (ACMA, sub. 49):

The ongoing transformation from a relatively stable telecommunications sector to the dynamic characteristics inherent in today's telecommunications sector poses a challenge to the effectiveness and relevance of a static USO regime ... Given past and continuing shifts in the communications sector, the existing USO mechanism — and many of the related interventions intended to achieve the objectives of availability, affordability and accessibility — are no longer fit-for-purpose. (pp. 17–18)

Coutts Communications (sub. DR114):

[The TUSO] ... is expensive, is over regulated, distorts the industry and fundamentally fails to meet the needs of regional and remote citizens it is intended to protect. (p. 1)

The Competitive Carriers' Coalition (CCC, sub. DR121):

The CCC has long argued for the reform or repeal of the TUSO, on the basis that it is unnecessary, uncosted, harmful to competition, and based on the delivery of outmoded technology. (p. 1)

nbn (sub. DR159):

Given the changes to the Australian telecommunications landscape, including ... the introduction of the nbn, the time is right to reconsider the operation of the [TUSO], and ensure it is brought up to date with the changed realities of industry structure and consumer behaviour. (p. 1)

Further, Lateral Economics (2001), a consultancy firm that reviewed the TUSO, concluded that USOs were wasteful because people have different preferences. Not everyone will necessarily want or value access to a telephone service. Inquiry participants also emphasised the importance of choice and flexibility in developing an effective universal service regime (RDA Northern Territory, sub. 10), particularly given the heterogeneous

telecommunications needs and demands of different individuals and communities (Broadband for the Bush Alliance, sub. 6). This factor has become more important as consumer preferences for a fixed voice service have diverged with the growing availability of substitute communications technologies (chapter 2).

It distorts market signals and is anticompetitive

The current universal service provider (Telstra) noted that the TUSO was not designed as an instrument to deliver competition (sub. 30). The TUSO has in fact been criticised by some participants as being anticompetitive (for example, Coutts Communications, sub. 5; Vocus, sub. 33; TPG Telecom, sub. 38). Opponents of the TUSO claimed that it distorts the telecommunications market by diverting productive resources and suppressing market signals. Without market signals there are limited incentives for telecommunications service providers to reduce costs or to determine the most efficient way to deliver a service, especially in remote and regional Australia. It also reduces incentives to invest in better technologies. Inquiry participants highlighted the importance of promoting innovation (Carers NSW, sub. DR72) and the potential benefits to consumers and the wider community of encouraging the development of disruptive telecommunications technologies (BAL Consulting, sub. DR62; National Farmers' Federation, sub. DR129).

The subsidy may also place an unnecessary burden on taxpayers and some industry players. As it stands, the current levy is not imposed on large multinational companies (such as Google, Facebook and Microsoft) that benefit from the network infrastructure funded by the TUSO in supplying substitute Over-the-Top (OTT) communications services (chapter 2).

Many competing carriers advocated for a more contestable TUSO. They claimed that the TUSO should not be specific to a single operator. Despite the growing presence of competing carriers in regional Australia, these carriers are not able to bid for the current TUSO but they are required to help fund it. The ACCC (sub. DR152) suggested that the TUSO could be improved by incorporating a competitive process to select a universal service provider in areas outside of nbn's fixed-line footprint. The potential for competitive tendering is considered further in chapter 7.

Telstra's competitors also claimed that the TUSO is effectively a tax on competition, and is not consistent with 'a level playing field' (Fletcher 2015). Under the current TUSO, the most profitable operator receives 100 per cent of the benefit, which results in significant market distortion (Coutts 2015). Some participants suggested that the TUSO subsidy has allowed Telstra to entrench its competitive position and protect itself from competitors (Vocus, sub. 33; Vodafone, sub. DR150). The Competitive Carriers' Coalition (sub. DR121) argued that the industry levy imposes an unfair burden on telecommunications providers in early stages of development, often long before they have achieved profitability. Telstra is the only available provider for 46 per cent of fixed-line services in regional areas (CIE 2015). This has resulted in households with only Telstra services, such as those in regional areas, paying a premium of between \$450 and \$650 for

fixed-line services per year (CIE 2015). Vodafone (2015) contended that the TUSO is another reason why Australia has less investment, less innovation and higher prices in telecommunications.

Many industry participants (for example, Optus, sub. 4; Vodafone; sub. 46) conjectured that Telstra's funding level was far in excess of the likely cost of the TUSO. If true, Telstra is over-compensated, and the TUSO is not competitively neutral. Modelling conducted by Frontier Economics (commissioned by Vodafone) produced estimates of the economic rent received by Telstra through TUSO funding, ranging from \$729 million to \$2.2 billion over the length of the TUSOP Agreement (Vodafone, sub. DR150). As the methodology used in calculating the universal service subsidy under the current TUSO is not transparent, its effect on competitive neutrality also lacks transparency.

The TUSO is outmoded

Voice over copper is outdated and new technologies should be encouraged

Other evidence adds further weight to concerns surrounding the continued viability of the TUSO. For example, some technologies supporting the TUSO are out of date. While public safety was originally a key motivator for the TUSO (ACMA, sub. 49) (and remains important today), technological progress has created an increasing reliance on digital technologies to enable markets to function efficiently and for social inclusion.

Many participants viewed the current TUSO as outdated and diminishing in relevance (box 3.7). As noted earlier, the current TUSO policy is theoretically technology-neutral, as any technology can be used to provide the *standard telephone service*. However, Telstra is contractually required to fulfil its copper continuity obligation in areas outside of the NBN fixed-line footprint. This policy effectively maintains copper services in these areas for the life of the 20-year TUSOP Agreement.

In addition, the provision of payphones is guaranteed by the TUSO, despite being considered an outdated technology by many (TPG Telecom, sub. 38; Vodafone, sub. 46) and consistently falling demand for these services. Notably, Telstra (sub. DR123) questioned whether or not the obligation to provide payphones under the TUSO is delivering value to the Australian community. Vodafone (sub. DR150) argued that since TUSO funding is fixed for the life of the Agreement, Telstra has an incentive to shut down as many TUSO services as possible in order to receive the highest possible subsidy per service.

Most participants considered copper to be an outdated technology and one where the costs of maintenance are likely to increase over time. The TUSO, they noted, has historically been provided over copper because that was once the only technology available. In light of the superior technologies now available, they questioned why copper would continue to be required outside of nbn's fixed-line footprint. Other technologies considered outdated, such as the Digital Radio Concentrator System (DRCS), also continue to be used to fulfil the

TUSO in some remote areas of Australia (Crouch and Davies 2013). Telstra's fixed radio network has been described as unreliable and near the end of its life (RTIRC 2015),⁴² and repairs can take a long time and require 'cannibalising' other services, since the required parts are no longer manufactured (Great Northern Telecommunications, sub. 2; Isolated Children's Parents' Association (Qld), trans., 2 February 2017; Bruman Rigging and Recovery Pty Ltd, trans., 2 February 2017). As well as the limited availability of parts, participants suggested that the technology utilised in fulfilling the TUSO is hindered by a lack of available personnel trained to undertake repairs (Camp, sub. DR131).

Most participants (for example, TIO, sub. DR91; RDA Central West, sub. DR103) advocated for a technology-neutral approach to universal service, in theory and in practice. Participants did not favour entrenching a specific type of technology in any universal service arrangement given the rapid evolution of telecommunications technologies. They also argued that any future policy should be agile enough to incorporate these changes.

Consumers want the TUSO to cover a lot more

For many participants, landlines are no longer considered sufficient to meet basic telecommunications needs. According to Pavlidis and Hawkins for example, the TUSO is:

... a 20th century legislative instrument operating in a very different 21st century digital environment — an environment in which access to a fixed line home phone cannot provide the connectivity necessary for full economic, social and community participation. (2015, p. 31)

This divide between consumer expectations and the *standard telephone service* has grown as substitute communication services have multiplied. According to Goggin (2015, p. 12), there is now a 'yawning gulf' between the basket of communications services that people expect and the voice-only service safety net provided by the TUSO. Yet consumers are demanding more from their telecommunications services, including reliable and widespread mobile phone coverage with extensive data and a choice of providers. Some inquiry participants therefore suggested that a broader definition of the *standard telephone service* is required (Coutts Communications, sub. DR114).

Many participants were of the view that the TUSO should include better mobile coverage as this service is becoming increasingly ubiquitous. A number of participants (including Bourke Shire Council, sub. DR83; Wimmera Development Association, sub. DR105; Coutts Communications, sub. DR114; Victorian Farmers Federation, sub. DR125) proposed that the TUSO, or TUSO-funding, should be used to expand mobile coverage, notwithstanding that full mobile coverage of Australia's landmass would be uneconomic and prohibitively expensive (with current technology).

The ACMA (2011a), as part of their 'Broken Concepts' report, asserted that the communications standard had changed. The new standard is 'connectivity' to the digital economy, and access to a fixed voice service alone may not meet this new standard.

⁴² The fixed radio network consists of the DRCS and the high capacity radio concentrator (HCRC).

Some participants advocated that the TUSO should change its focus to ‘people, places and things,’ and not just to the place of residence. Connecting people highlights the increasing dependence that people have on mobile communications, especially smartphones. BAL Consulting (sub. DR62, p. 2) asserted that more than half of Australians will rely exclusively on mobile services for voice calls in the ‘2020–2025 timeframe’. Mobile connectivity, participants claimed, promotes productivity and safety. Mobile services also enable some of the most vulnerable Australians to communicate. As already noted, people with no fixed address do not directly benefit from the current premises-based TUSO or NBN policies (although many use mobile devices connected to free WiFi services), and fixed-line technologies may be unsuitable for people who require ‘on-the-go connectivity’ due to their work or living arrangements (Victorian Farmers Federation, sub. DR125).

An emerging use of mobile services is the ‘internet of things’ (chapter 2). The growth of autonomous vehicles and other machine-to-machine communications are areas of growing demand, particularly for ‘smart-farming’ techniques in the agricultural sector. Internet of things communications often rely on mobile connectivity to operate.

The TUSO does not currently include any provision for internet services. According to Thomas (2015), broadband services are increasingly thought of as essential as they enable consumers to carry out many work, home and lifestyle activities. Some participants argued that broadband access should be considered as important as other essential services such as water and power (Wamboin Communications Action Group, sub. DR151). For many people, internet access is more important than a voice service. In particular, young Australians and people with disability often rely on internet communications. Many participants advocated for the inclusion of some form of access to a minimum amount of data as part of a future policy (for example, Gregory, sub. 9; ACCC, sub. 40; de Ridder, sub. 56; ACCAN, sub. DR124) (chapter 5).

Broadband internet is viewed as a key driver of productivity and economic development. The agricultural sector regards a fast and reliable internet service as critical to managing a modern farm (National Farmers’ Federation, sub. 31). Many participants (including Gregory, sub. 9) claimed that data services are becoming even more important with the Australian Government’s Digital Transformation Agency developing an online platform for government services. Some have advocated for access to online government services to be guaranteed as part of a universal service policy (Cape York Digital Network, trans., 2 February 2017, Gregory, sub. DR122), or provided free of charge (CAYLUS, sub. 25; de Ridder, sub. 56; BIRRR, sub. DR143).

It should address other aspects of universality

Another concern with the current TUSO is that it does not do enough to support other objectives of universal services — such as accessibility and affordability. ACCAN stated that ‘[w]hatever form a future USO takes it’s clear that [it] must provide accessible and affordable telecommunications for all Australians’ (2015, p. 2).

As already noted, the current TUSO does not directly aim to address telecommunications access and affordability. In practice, however, ensuring affordability for customers has been an implicit objective of the TUSO. For example, Telstra (sub. 30) noted:

... we must price [*standard telephone service*] access at a level our customers can reasonably afford. We have delivered this through national pricing of our fixed voice product suite which has ensured that the price paid by customers in regional and remote areas is the same as that paid by customers in metro areas. (p. 10)

Despite this, consumer advocacy groups considered that more should be done to improve telecommunications affordability (ACCAN 2016a; Thomas 2015). The South Australian Council of Social Services (sub. DR85) argued that telecommunications affordability issues will not simply be dealt with through the tax-welfare system or the open market. Some participants suggested that free public open access WiFi be considered as part of a USO (Coutts Communications, sub. 5; Barcoo Shire Council, sub. 41; Swinburne Institute for Social Research, sub. 45). ACCAN (2016a) proposed that eligibility for the Telephone Allowance be broadened to include all people who are on the lowest payments of income support, such as Newstart and Youth Allowance recipients. Indeed, as ACCAN (sub. 48) noted:

Affordability of telecommunication[s] services is currently addressed in Australia in two ways; through the carrier licence conditions on Telstra that requires it to ‘offer products and arrangements to low-income customers (the low income package)’ and the Commonwealth Telephone Allowance. (p. 20)

The TUSO does not address the specific needs of some users. For example, the policy does not tailor services to remote Indigenous communities, or provide fixed voice services for pre-paid customers. Pre-paid services are seen by some as a solution to reducing the risk of very large telephone bills that sometimes occur in remote Indigenous communities because of service sharing, and some advocated for pre-paid services to be included as part of a future TUSO (Broadband for the Bush Alliance, sub. 6; Ninti One, sub. 16). On the other hand, pre-paid mobile services can be significantly more expensive than contract services, sometimes referred to as the ‘poverty premium’.

Digital empowerment is also a barrier to the take-up of telecommunications services. Some people lack the confidence and ability to utilise these services and require additional training and support. Some participants recommended that a future universal service policy be explicit in addressing digital inclusion (Carers NSW, sub. DR72; AgForce, sub. DR149). However, while digital literacy supports are not currently available under the TUSO, they are part of the broader policy landscape supporting universal services (chapter 4).

At present, the consumer safeguards available through the CSG only apply to the *standard telephone service*. Consumers do not have the same guarantees for mobile or internet services, or for OTT communications services that can substitute for a *standard telephone service*. Some users (for example, RDA Wheatbelt, sub. 55) regarded service reliability of mobile and broadband as vital, particularly in regional and remote areas where it is

necessary for personal safety and to operate a business. Without guaranteed reliability, these users said they were hesitant to adopt new technologies or to have confidence in telecommunications services. Carrier groups, however, expressed concern about increasing regulation on services other than the *standard telephone service*. Additional regulation, they argued, would hamper investment in these services and lead to market inefficiencies. These issues are discussed in further detail in chapters 5 and 9.

The TUSO runs in parallel with other government programs

The current TUSO runs in parallel with other government programs — in particular, the NBN and the Mobile Black Spot Program. However, many participants regarded these other programs as delivering more important telecommunications services to regional and remote Australia (for example, Victorian Farmers Federation, sub. 32; RAI, sub. 50; Northern Territory Government, sub. 59).

Macquarie Telecom (sub. 27) argued that since there is no shared underlying policy reasoning between current telecommunications policies, the various regulatory tools exist to achieve overlapping outcomes and result in inefficient spending. The approach of governments in this area was described by participants as uncoordinated (RDA Northern Territory, sub. DR115) while others criticised the ‘ad hoc’ and ‘lagging’ nature of spending (RAI, sub. 50). This issue was also raised by the CCC (sub. DR121), who argued:

... a succession of other State and Federal policies and programs have sought to address market failures and poor competitive outcomes. The TUSO has either duplicated or run counter to these interventions. (p. 2)

The Remote Area Planning and Development Board (sub 12) proposed the development of a ‘national strategy’ to deliver a dynamic digital network as an alternative to the ‘patchwork collection’ of current telecommunications policies, while the National Farmers’ Federation (sub. 129) supported conducting a stocktake of all programs related to the TUSO and its objectives.

The NBN can also deliver voice services

As noted in chapter 2, the NBN is expected to provide the infrastructure for broadband services to all premises across Australia that wish to access that service. Once the NBN is rolled out, broadband will effectively be universally available to those who desire it (at least at a wholesale level). Retail service providers will have open access to this infrastructure to deliver retail services over the NBN, which are also capable of providing voice services.

Arguably, the need for the TUSO will decline significantly once Australia fully transitions to NBN infrastructure. Consequently, many participants viewed the need for the TUSO as transient. OptiComm (sub. 13, p. 4) suggested that nbn should fulfil the role of ‘universal wholesale only infrastructure provider of last resort’ and be compensated through TUSO

funding. However, some participants raised concerns about the capabilities of NBN infrastructure to deliver a *baseline* voice service outside of its fixed-line and fixed wireless footprints. These issues are considered in detail in chapter 6.

Better mobile coverage also lessens the need for the TUSO

The TUSO does not deliver the *standard telephone service* over mobile technologies (except in very limited circumstances).⁴³ However, mobile coverage is now extensive in terms of population coverage. This in turn also makes the TUSO less relevant for most people. Yet, some participants argued that many regional and remote areas are capable of receiving limited or no mobile signals, and that the requirement for the TUSO remains in these areas (Bourke Shire Council, sub. DR83; Longmire, sub. DR84). Other taxpayer-funded initiatives, such as the Mobile Black Spot Program, aim to improve mobile coverage in regional areas. But these programs are funded separately from the TUSO. Infrastructure Australia (2016) recommended that the Government consider phasing out the TUSO and instead divert the funding to further improve mobile coverage.

In addition to the perceived duplication of measures to promote universal availability of telecommunications, these measures appear to be largely viewed in isolation. Some participants argued that there was not enough consultation on where coverage of these services intersect and where gaps remain (RAPAD, sub. 12; Macquarie Telecom, sub. 27).

The TUSO lacks transparency and accountability

A long-term and opaque contract

The TUSO is also commonly criticised for its lack of transparency and accountability, as reflected by a number of submissions to this inquiry (for example, Communications Electrical Plumbing Union, sub. DR106, NSW Farmers' Association, sub. DR108; ACCAN, sub. DR124; Vodafone, sub. DR150). As noted, there is no information on the scope of Telstra's TUSO services or the associated costs. Some stakeholders rightly argued that this hinders debate, and with it, the necessary scrutiny to evaluate the effective use of public funds. De Percy commented:

[It's] fairly obvious that [the TUSO] needs to be more transparent ... If you wanted to make sure this was actually a transparent solution to the problem of providing service to everyone, then you would expect to be able to know exactly who couldn't get service and who was being funded through the USO ... Part of the problem is this [has] rarely, if ever, been the case. (De Percy, cited in Whigham 2016, p. 1)

Similarly, the NSW Farmers' Association (sub. DR108) commented that:

⁴³ For example, Telstra may provide customers with mobile handsets to deliver the *standard telephone service* on an interim basis. This typically occurs in circumstances where nbn has accepted responsibility for delivering infrastructure to a new estate but there is a delay in its delivery (Telstra, sub. 30).

... the lack of transparency and accountability in the current [TUSOP Agreement] renders the current agreement ripe for reform. The lack of any requirement for reporting on services provided or costs incurred is particularly vexing, and must be changed. (p. 6)

Some participants also questioned why, given the rapid change in technology, the Government has locked in a 20-year contract (the TUSOP Agreement) to provide TUSO services. The ACMA (sub. 49) highlighted how the dynamic nature of today's telecommunications sector poses a challenge to the effectiveness of a static TUSO regime, while a number of participants highlighted the need for 'flexibility' and the need for universal service policies and related definitions to be able to change over time (Barcoo Shire Council, sub. 41; National Farmers' Federation, sub. DR129; Cotton Australia, sub. DR133). This concept was also reflected by AgForce, who argued for the establishment of a 'transparent and adaptable' agreement that is regularly reviewed and 'made available for scrutiny' by the public (sub. DR149, p. 4). The TUSOP Agreement extends well beyond the NBN infrastructure rollout period, and the fixed annual funding does not appear to align with the decreasing demand for fixed-line and payphone services. According to Raiche (2015):

The outcome looks to be a nonsense. The Government owned NBN Co is charged with implementing Government policy of providing broadband transmission capacity that is accessible to all Australians within a few years. Yet Telstra is charged with maintaining its copper network for twenty years. (p. 133)

As already noted, funding for the current TUSOP Agreement increased significantly from the previous TUSO agreement (table 3.1). For some participants, this increase occurred without justification and it now includes an additional \$100 million per year in taxpayer funding.

A 20-year Agreement is anachronistic in the context of such a dynamic service sector. While there are review points embedded, the scope for substantially changing the nature of the obligation appears limited (chapter 9). There is a need for more regular and independent review of the TUSO and related consumer safeguards. This was also raised by both ACCAN (sub. DR124) and the National Farmers' Federation (sub. 129).

The benefits of the TUSO are not factored into its costs

Some competing carriers suspected that Telstra's TUSO is effectively more narrow in scope than its intended design. These carriers also contended that it does not account for the benefits that Telstra gains in providing these services, and therefore does not reflect the real net cost.

This criticism is often applied to payphones. The TUSO subsidises Telstra's provision of payphones, but every year Telstra reduces the total number of payphones that it operates. Competing carriers stated that the payphones provide Telstra with revenue-generating advertising opportunities (OptiComm, sub. 13; Vodafone, sub. 46). Using standard rates for advertising space on Telstra payphones, Vodafone (sub. DR150) estimated that these

could provide Telstra with potential revenue of up to \$165 million per annum. In addition, Telstra uses some of its payphones to deliver WiFi hotspots (Telstra Air) made available only to its customers (with other customers having to pay for the service). These hotspots are said to further increase Telstra's competitive advantage by enabling its customers to use additional bandwidth and hence avoid some of the spectrum limitations of Telstra's mobile network. Critics also stated that Telstra's WiFi services reduce competition (Macquarie Telecom, sub. 27) and give Telstra a competitive advantage for State and local government tenders that seek to provide public WiFi hotspots.

As already noted, there are likely to be other less tangible benefits to being the designated TUSO provider, including increased brand awareness and market ubiquity. OptiComm (sub. 13) highlighted how the TUSO had assisted Telstra in gaining a competitive advantage in regional and remote markets, due partly to the visible presence of its logo on payphones, vans and business premises in these areas. Vodafone (sub. 46) identified the benefits regarding economies of scale and scope in regional telecommunications investment enabled by the TUSO, which have been valued and considered as part of universal service policies internationally but ignored in Australia.

Are there any positives about the TUSO?

The TUSO is highly valued by some users

Despite the criticisms outlined above, a number of participants, particularly those living or running businesses in regional and remote Australia, highlighted the benefits they receive from the TUSO (box 3.8). Following the draft report, the Commission received a significant number of submissions arguing for the retention of landlines and the TUSO, which underpins the provision of these services.

A key issue raised by many of these participants was the reliability of telecommunications services. Copper was viewed as a known and trusted technology that is highly reliable and therefore critical particularly in times of emergency (Brindley, sub. DR66; Bellingham, sub. DR71; Twist, sub. DR75). These participants expressed strong concerns that any winding back of the TUSO would jeopardise their sense of security currently underpinned by having guaranteed access to a fixed-line voice technology. That said, copper services delivered to regional and remote locations are also subject to reliability concerns, which are likely to become more acute over time as the technology ages and becomes progressively more expensive to maintain.

Box 3.8 Selected participants' views in support of the TUSO

Telstra (sub. 30):

At this time, the [standard telephone service] obligation should remain in place as delivered under the [TUSOP Agreement] ... consumers, communities and businesses nation-wide value the voice telephone service and would suffer personal, social and economic detriment if their basic right was revoked, no matter what other changes may be made to the obligation. (p. 4)

Australian Communications Consumer Action Network (ACCAN, sub. 48):

... the continuation of guaranteed access to voice services for all premises. This should ensure a high quality, reliable voice service with enforceable connection and fault repair timeframes for all premises. Where this can be delivered over other technologies, it should be. (p. 8)

The Telecommunications Industry Ombudsman (TIO, sub. 52):

We recommend retaining the current universal service obligation for standard telephone services and improving benchmarks for connections and fault rectifications, so that each person in Australia, no matter where they carry out business or reside, has reasonable and reliable access to a standard telephone or equivalent service ... (p. 3)

Blacket (sub. DR78):

It is extremely beneficial for my family and community living in a rural and remote area to have a fixed landline phone. Our standard telephone service is vital for our access to education, running our Agribusiness and contact to emergency services. (p. 1)

Longmire (sub. DR84):

... a [TUSO] for access to landlines is still very much required. This is especially so in rural and remote areas where there is limited mobile signal strength (one-two bar signal strength) or no mobile services, and with regard to people experiencing homelessness and requiring some form of pay-phone access. (p. 3)

The Isolated Children's Parents' Association of Australia (sub. DR126):

... ICPA (Aust) views the TUSO as absolutely essential, given the reliance on fixed phones across so much of Australia, particularly in remote areas. Suggestions that the TUSO is no longer necessary because of mobile phone availability, advanced technology and the nbn, ignore the reality of the technological gap experienced by residents of isolated areas. (p. 1)

The Rural, Regional and Remote Communications Coalition (sub. DR130):

There should be no degradation in the current voice service that users receive. The delivery of voice services needs to be clearly articulated, with the Universal Service Obligation and Copper Continuity Obligation remaining until a suitable alternative arrangement is in place. (p. 1)

Better Internet for Rural, Regional & Remote Australia (BIRRR, sub. DR143):

The [TUSO] should continue to ensure that all Australian consumers and businesses have baseline voice services that are at least equivalent to the standard offered under the existing TUSO. Standard telephone services must be maintained until such a time that baseline service needs are exceeded using alternate Broadband technology. (p. 3)

A common theme present throughout their submissions was a comparison of the performance of landlines relative to satellite and mobile alternatives. These participants argued that the TUSO and associated consumer safeguards have ensured high levels of reliability and short repair times, including for premises located in regional and remote areas (Turner, sub. DR81; Newton, sub. DR119), although other participants noted serious outages (of several weeks or more) of TUSO services (ICPA Queensland, sub. 14; TIO,

sub. 52; Donecker, sub. DR64). Many submissions also suggested that the technologies currently used to deliver the TUSO are relatively resilient to power outages and extreme weather conditions when compared to other technologies, such as the NBN *Sky Muster* satellite (chapter 6). According to these participants, the reliability and quality of voice communication enabled by the TUSO is required for those living outside urban centres to run businesses (Moffatt, sub. DR93), receive distance education (Isolated Children’s Parents’ Association (Qld), trans., 2 February 2017), and maintain guaranteed access to emergency services (Northcliffe Community Resource Centre, sub. DR70; Croydon Shire Council, sub. DR102; Washpen Bush Fire Brigade, sub. DR142).

However, the strong desire to maintain landlines expressed by these participants is influenced by a number of factors. For instance, some of these participants emphasised the need for a landline because of the lack of quality mobile coverage in rural and remote areas. Other submissions argued for the importance of maintaining copper due to various concerns regarding satellite technologies, with some focused on issues with nbn’s Interim Satellite Service (appendix B). Poor experiences with these services may have unduly led to concern with the quality of the service offered over nbn’s Sky Muster satellites (chapter 6). Some stakeholder concerns regarding the removal or winding back of the TUSO may therefore dissipate as mobile coverage is improved, the NBN infrastructure rollout is completed and the Sky Muster satellites have been fully calibrated and activated to their expected reliability.

Participants also highlighted the importance of the TUSO in ensuring the provision of payphones. Despite falling usage, payphones may be important in areas with no mobile coverage and where residents are unable or unlikely to take up mobile phones (Moree Plains Shire Council, sub. DR128) or satellite-based internet services (RDA Northern Territory, sub. 10) due to affordability issues. While total payphone numbers declined during 2015-16, there was a 2.6 per cent increase in the number of Telstra-operated payphone sites, meaning payphones were available from more locations (ACMA 2016d). Payphones can also serve as a ‘last resort’ for access to telecommunications (National Farmers’ Federation, sub. 31), and may be important in emergency situations (ACCAN, sub. 48; NSW Farmers’ Association, sub. DR108) and for certain users who are vulnerable and have limited access to other telecommunications services (TIO, sub. 52).

The TUSO has ensured access to the National Relay Service and assisted those living with disability or impairment to access telecommunications services on an equitable basis. Furthermore, others suggested that the TUSO remains important in areas where no ‘viable alternative’ technology exists (ICPA Queensland, sub. 14). Northcliffe Community Resource Centre (sub. DR70) argued that the TUSO should remain until ‘other communications systems, voice and data, have been expanded and improved’. AgForce (sub. DR149) recommended that other technologies should only be considered when they are capable of meeting ‘the same service guarantees as existing arrangements’, while McLaren (sub. 18) emphasised the need for a ‘guarantee’ or ‘safety net’ for people in certain remote areas.

On balance

Notwithstanding these benefits, the TUSO also entails substantial costs, both direct and indirect. Even though universal access to a minimum level of telecommunications services remains important, the weight of evidence suggests that the costs are likely to be greater than the benefits, and that the TUSO is no longer fit-for-purpose. While Telstra has acted with goodwill in fulfilling its contractual obligations, the Commission considers that these arrangements are no longer serving the best interests of the Australian community. That said, targeted intervention will be required to ensure that regional and remote communities have access to a *baseline* telecommunications service at least cost to taxpayers.

FINDING 3.3

In addition to its declining relevance, the telecommunications universal service obligation (TUSO) has serious deficiencies. It is a blunt instrument with a one-size-fits-all approach to universal service provision. Telstra's contractual obligations under the agreement with the Australian Government lack transparency and accountability. The basis for its funding (a total of around \$3 billion in net present value terms over 20 years to 2032) is unclear and disputed.

While landlines are still highly valued by some, particularly those in regional and remote areas currently with no mobile coverage, the TUSO is based on outdated technology.

Overall, the TUSO is no longer serving the best interests of the Australian community.

The current TUSO is subject to a contract (the TUSOP Agreement) between the Australian Government and Telstra until 2032. However, considering the range of concerns and problems outlined above, the Commission considers that the TUSO should be wound up and universal service policies reformed to reflect policy, market and technological realities. Recognising this, the design characteristics of a potential future telecommunications universal service policy in Australia are considered throughout the remainder of the report. The timing of these reforms, and other relevant transitional considerations are discussed in chapter 9.

RECOMMENDATION 3.1

The Australian Government should wind up the telecommunications universal service obligation by 2020 in line with recommendations 9.1 and 9.2.

4 Other policies and programs

Key points

- Australia has a number of policies and programs outside of the telecommunications universal service obligation that support universal service objectives. Fundamentally, these measures are aimed at ensuring that telecommunications services are available, accessible and affordable in geographical areas or for cohorts of users that may otherwise be uneconomic to serve.
- The Commission's conservative estimate is that the Australian Government allocates at least \$1 billion per year to universal telecommunications services. Not included in this estimate is the Australian Government's sizable investment in National Broadband Network (NBN) infrastructure (with a commitment of \$29.5 billion to date) or the expected ongoing costs of supplying non-commercial services over NBN infrastructure.
 - The Bureau of Communications Research estimated that the net losses involved in servicing NBN fixed wireless and satellite premises to 2040 were approximately \$9.8 billion in net present value terms. This is equivalent to a subsidy of \$1260 per fixed-wireless premises per year and of \$1320 per satellite premises per year.
- A number of consumer safeguards and services are in place to support telecommunications *availability*, *accessibility* and *affordability*. These safeguards do not apply consistently across all providers and all telecommunications services. Safeguards mainly cover the *standard telephone service*. The declining reliance on this service means that current safeguards are becoming less relevant to consumers.
- The numerous policies and programs supporting universal service objectives lack integration. The effectiveness of these would be enhanced by taking a more coherent and whole-of-sector perspective when allocating funding and developing policies and programs that assist with the provision of universal telecommunications services.
- The Australian Government, in consultation with State and Territory Governments, should conduct a stocktake of all telecommunications programs that have universal service objectives, with a view to improving their efficacy and cost-effectiveness. The Government should also audit telecommunications infrastructure across Australia with a view to using and efficiently expanding these networks.

In addition to the telecommunications universal service obligation (TUSO), Australia has a wide range of policies and programs broadly designed to support universal service objectives. These include infrastructure-related programs and services to expand telecommunications availability and a variety of consumer safeguards and services to support service quality, accessibility and affordability.

These programs, while distinct from the *standard telephone service* and payphones components of the TUSO, are interrelated. Collectively they aim to provide affordable

access to telecommunications services and tend to target regional and remote areas that may be high cost and uneconomic to serve. Some programs also aim to meet specific needs of disadvantaged segments of the Australian community, such as people on low incomes, older Australians, people with disability and remote Indigenous communities.

Programs are delivered through a variety of means, including government funding of consumer subsidies, government funding of providers to supply a particular service, and contractual obligations and regulation through carrier licencing requirements and legislation. Most programs are delivered by the Australian Government, although State, Territory and local governments also provide additional telecommunications services within their jurisdictions. Co-contribution and industry funding are features of some of these programs (and sometimes the major source of funding).

The Commission's conservative estimate is that the Australian Government allocates at least \$1 billion per year to telecommunications programs broadly associated with supporting universal service objectives (table 4.1). This estimate does not include the Government's equity funding in National Broadband Network (NBN) infrastructure (with a commitment of \$29.5 billion to date), or the costs of supplying fixed wireless and satellite services over NBN infrastructure in non-commercial areas. Of this \$1 billion per year, around \$835 million is funded directly through general government revenue and \$215 million from the Telecommunications Industry Levy.

This chapter describes the main policies and programs outside of the *standard telephone service* and payphones components of the TUSO that support universal service objectives. It does not attempt to include all such initiatives or assess the merits of each program. Section 4.1 describes the main programs that relate to telecommunications infrastructure and service availability. Section 4.2 discusses consumer safeguards and services to address service quality, accessibility measures for customers with specific needs and measures to improve telecommunications affordability. Section 4.3 identifies initiatives that aim to improve access to government services through telecommunications. Section 4.4 concludes with the Commission's views on how, collectively, these policies and programs could be better organised to support universal service objectives.

4.1 Telecommunications infrastructure and service availability

Government intervention in telecommunications is largely targeted at improving the availability and quality of telecommunications infrastructure, particularly in regional and remote Australia. This includes universal wholesale broadband infrastructure through the NBN, expanding mobile coverage through the Mobile Black Spot Program, and local initiatives, such as community WiFi. It also covers the availability of public safety services, such as the Emergency Call Service.

Table 4.1 Programs that address telecommunications universal service objectives
Includes GST^{a,b}

<i>Program</i>	<i>Indicative annual funding</i>
	\$m
Telephone Allowance	611 ^c
Standard telephone service USO	253^d
Mobile Black Spot Program	48 ^e
Payphones USO	44^d
Programs to support digital inclusion	29 ^f
Emergency Call Service	22 ^d
National Relay Service	22 ^d
Voice only Customer Migration	17 ^g
Remote Indigenous telecommunications programs	5 ^h
Total	1 051

^a Excludes equity funding of NBN infrastructure and non-commercial services in fixed wireless and satellite areas. Also excludes funding by State, Territory and local governments. ^b Figures in this table are subject to rounding to the nearest million. ^c \$45 m for the Telephone Allowance plus \$566 m for the telephone component of the Pension Supplement. ^d Includes the Telecommunications Industry Levy contribution. ^e Assumes an Australian Government contribution of \$242 m over five years. ^f \$112.2 m over four years for the 'Inspiring all Australians in digital literacy and STEM' measure plus \$1.03 m for Broadband for Seniors. ^g \$165 m over 10 years. ^h \$14.7 m over three years from 2015-16 for telecommunications-related parts of the Remote Australia Strategies Programme.

Sources: Department of Communications and the Arts (2016m, 2016p); Department of Education and Training (2016b); Department of the Prime Minister and Cabinet (pers. comm., 30 June 2016); Department of Social Services (pers. comm., 13 July 2016); Liberal Party of Australia (2016); Productivity Commission estimates based on unpublished data from the Department of Social Services.

The National Broadband Network

In April 2009, the Australian Government established NBN Co Limited (nbn), a government business enterprise, to build and manage NBN infrastructure. The NBN will provide a broadband service (with voice capability) to all premises across Australia, on request, at a capped wholesale price, regardless of location. According to the Department of Communications and the Arts (DoCA, sub. 58):

The Government has made a commitment to ensuring that, to meet Australia's economic and social needs, all Australians have access to very fast broadband as soon as possible, at affordable prices, and at the least cost to taxpayers. This commitment is being delivered by the rollout of the National Broadband Network. (p. 2)

The NBN includes three types of broadband infrastructure: 'fixed-line' (that will be available to around 92 per cent of premises), 'fixed wireless' to 5 per cent of premises, and satellite to the remaining 3 per cent of premises — generally in the more remote parts of

Australia. At 30 March 2017, nbn had declared more than 4.5 million premises ‘ready for service’ and around 2 million premises were receiving a service (nbn 2017d). The rollout is currently scheduled to be completed by 2020.

The NBN operates as a wholesale-only network that delivers broadband to retail service providers that purchase access to this network through nbn’s 121 points of interconnection. Retail service providers can acquire access to any or all of these points of interconnection to deliver broadband services to their customers. Providers are able to configure these services in a number of ways to enable them to differentiate and compete — such as on price, download speeds, data limits and customer service (nbn, sub. 47).

nbn’s capped pricing is designed to encourage retailers to provide a nationwide broadband service as nbn subsidises the much higher cost to deploy, connect and maintain fixed wireless and satellite broadband infrastructure (nbn, sub. 47). The Bureau of Communications Research (BCR 2016a) estimated the net losses involved in servicing fixed wireless and satellite premises to 2040 were around \$9.8 billion in net present value terms. This is equivalent to a subsidy of \$1260 per fixed wireless premises per year and \$1320 per satellite premises per year.

The Australian Government has also directly funded the supply of fibre-optic transmission network infrastructure in regional locations with the objective of enhancing the competitive supply of these networks and to support NBN infrastructure (box 4.1).

Box 4.1 Regional Backbone Blackspots Program

In April 2009, the Australian Government announced the Regional Backbone Blackspots Program. This program allocated \$250 million to fund the construction of fibre-optic transmission links (or ‘backbone’) across Australia. The Government selected six priority locations in regional Australia where supply of existing transmission network infrastructure was deemed uncompetitive. Locations included Geraldton, Victor Harbor, South West Gippsland, Broken Hill, Emerald and Longreach, and Darwin.

The program provided over 6000 kilometres of government-owned, open-access transmission network infrastructure across mainland Australia. Program objectives were to enhance the competitive supply of transmission links to provide better service outcomes for consumers in regional areas. It also aimed to deliver economic stimulus and to contribute infrastructure for the National Broadband Network.

The transmission network routes were completed by January 2012, with the contractor Nextgen Group responsible for operating and managing the network until 2017.

Sources: ANAO (2012); Nextgen Group (2016).

The Australian Government is working with nbn to improve the accessibility of public interest services in NBN satellite areas (Fifield 2015). Satellite broadband is limited in capacity and this can constrain access to public services that are delivered by broadband in these areas. Satellite users currently have their broadband data allowance capped during both peak and off-peak periods to manage the limited satellite capacity. Internet service

speeds slow (to as low as 128 kilobits per second) once customers reach their monthly data allowance.

An additional data allowance is available to eligible students in these areas who study via distance education. The Sky Muster Educational Service enables access to a dedicated broadband capacity of 50 gigabytes per month per eligible student that is outside of their home broadband quota (nbn 2016q).⁴⁴ Prices and subsidy arrangements differ by jurisdiction and are set by retail service providers in consultation with nbn and State and Territory Governments (BIRRR 2016). The Australian Government has directed nbn to develop products to improve access to assist remote health delivery and other community services (Fifield 2015).

nbn's provision of non-commercial broadband infrastructure and its nationwide wholesale price caps seek to ensure affordable access to broadband services for regional and remote Australia. Without these provisions, most customers in these areas could not access broadband at an 'affordable' price. However, in the (largely urban) fixed-line footprint, heavy users of the NBN can be charged prices well in excess of their connection and service costs. These higher tariffs cross-subsidise services for its regional and remote customers (as well as for customers who want only a basic level of NBN services), and aim to deliver a commercial return to nbn (Potter and Mason 2016; chapter 5).

The Australian Government initially intended to retain full ownership of nbn during the rollout, with funding coming from Government equity (Dalzell 2011). The total value of Government's investment in the NBN is currently capped at \$29.5 billion which is expected to be fully utilised by 2016-17 (Fifield and Cormann 2016a; nbn 2016b). The Government announced in November 2016 that it would loan a further \$19.5 billion to nbn on commercial terms. The Government expects that this loan will be re-financed on external markets in 2020-21, once nbn has sufficient cash flows to support private sector debt (Fifield and Cormann 2016a). The NBN is covered in more detail in appendix B.

The Mobile Black Spot Program

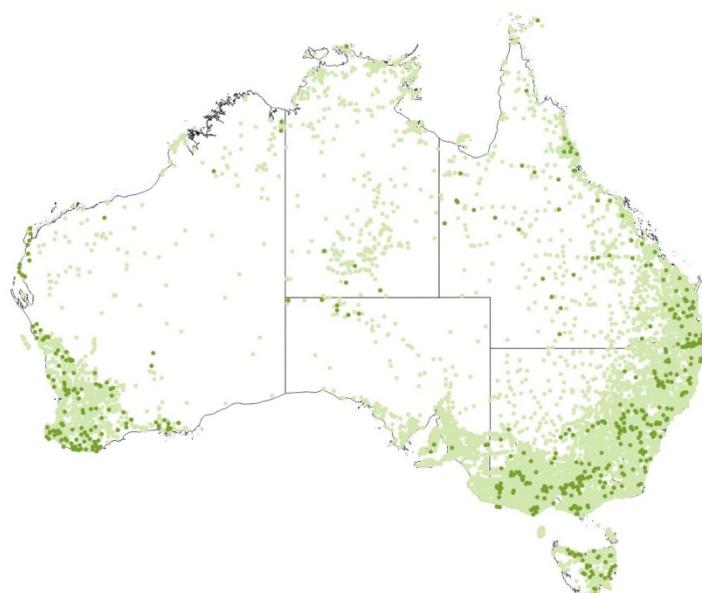
Programs expanding mobile coverage may be also seen as promoting universal services. One such example is the Mobile Black Spot Program that seeks to extend mobile coverage and competition in regional and remote Australia.

The Mobile Black Spot Program is an Australian Government initiative that consists of mobile network operators bidding for funding to provide a base station in 'black spots' — areas with inadequate mobile coverage. The program was announced following the 2013 federal election in response to the mobile coverage issues in regional and remote Australia raised in regional telecommunications reviews (RTIRC 2008, 2012). The program also sought to improve mobile coverage along major transport routes, in small communities and areas prone to natural disasters (Liberal Party of Australia and The Nationals 2013).

⁴⁴ Available for up to three eligible students per household.

The first round of the program was finalised in June 2015. It featured \$110.9 million of funding from the Australian Government, \$87.3 million from State and Territory Governments, and \$1.7 million from local governments, businesses and community organisations. Telstra was selected to build 429 base stations with a co-contribution of \$165 million, and Vodafone Hutchison Australia (Vodafone) was selected to provide the remaining 70 base stations with a co-contribution of \$20 million (figure 4.1). The rollout will occur over a three-year period and will collectively provide new handheld coverage to 68 600 square kilometres, new external antenna coverage to over 150 000 square kilometres, and new handheld or external antenna coverage to over 5700 kilometres of major transport routes (DoCA 2017).

Figure 4.1 Mobile Black Spot Program
Funded base stations (round 1)^a and reported black spot areas^b



^a Dark green areas show the 499 base stations funded in round 1 of the Mobile Black Spot Program.
^b Light green areas show locations with poor or no mobile coverage as nominated by members of the public. Non-coloured areas are therefore more likely to indicate unpopulated parts of Australia rather than areas of good mobile coverage.

Source: Productivity Commission estimates based on DoCA (2015b).

The second round of the program includes \$57.3 million of Australian Government funding, as well as \$53.5 million from State Governments, and a further \$0.5 million by local governments, businesses and community organisations. Funding will provide 266 new and upgraded base stations, which includes ‘small cell’ sites to service isolated communities (DoCA 2017; Optus, sub. DR146).⁴⁵ Industry co-contributions include

⁴⁵ Small cell sites refer to satellite technology that can deliver services for mobile connectivity over small coverage areas. Optus were awarded 49 small cell sites in the second round of the Mobile Black Spot Program, while Telstra will install 250 small cells following the announcement of the first round of the

\$63.7 million from Telstra to build 148 of these base stations, \$36.4 million from Optus for 114 base stations, and \$1.6 million from Vodafone for 4 mobile base stations. The rollout will commence in 2017 and aims to collectively provide new and upgraded handheld coverage to over 17 700 square kilometres and new mobile coverage to over 1900 kilometres of major transport routes. New external antenna coverage is expected to be provided to over 52 300 square kilometres (DoCA 2017).

As part of the 2016 federal election campaign, the Government announced a further \$60 million funding for a third round of the program (Liberal Party of Australia 2016). The competitive process for the third round is expected to commence in early 2017 (Turnbull 2016). The total Australian Government funding commitment for the program to date is \$220 million.

Proposed base stations were selected according to the new coverage they would provide, the benefit of that coverage and whether it was in a ‘priority location’. Also important was the value of the co-contribution they attracted from applicants, State and Territory Governments and third parties, as well as the cost of provision, and commitments by other mobile network operators to use the new base station.

Under the program, the average costs on a per unit basis have increased between the first and second rounds of funding (table 4.2). The cost to government under both rounds exceeded 50 per cent of the total cost of funded projects and have increased over the two rounds. These per unit costs and costs to government are likely to increase further with future rounds as the program pushes out into non-commercially viable areas.

Under program rules, the mobile network operator selected to build each station must provide competitors with the opportunity to co-locate and provide input into the station’s design to facilitate the potential sharing of new infrastructure. However, it is unclear whether these infrastructure sharing requirements have been effective (chapter 7).

On the whole, mobile network operators support the Mobile Black Spot Program as a way of improving mobile coverage in regional Australia. Optus has claimed that it can improve carrier network coverage as providers want to connect outlying black spots to denser parts of their networks (Optus, trans., 1 February 2017, p. 14). Stakeholder views of the Mobile Black Spot Program and the program’s merits are assessed in chapter 7.

program. Optus said that small cells were more cost-effective to service small communities but provided a lower coverage range (2-3 km) than a more traditional mobile facility (10-30 km) (sub. DR146).

Table 4.2 Outcomes of the Mobile Black Spot Program^a

	<i>Units</i>	<i>Round 1</i>	<i>Round 2</i>
Total cost	\$m	385.0	213.0
Australian Government	\$m	110.9	57.3
State and local government and third parties	\$m	89.0	54.0
Mobile network operators	\$m	185.0	101.7
Base stations built (new and upgraded)	no.	499	266
New coverage to major transport routes	km	5 700	1 900
New external antenna coverage to regional Australia	km ²	150 000	52 300
New or upgraded handheld coverage	km ²	68 600	17 700
Cost per base station built	\$	771 543	800 752
Cost per km of transport route	\$	67 544	112 105
Cost per km ² of external antenna coverage	\$	2 567	4 073
Cost per km ² of handheld coverage	\$	5 612	12 034

^a There is overlap between coverage types which should be treated as collective mobile coverage.

Source: Productivity Commission estimates based on DoCA (2017).

Community WiFi initiatives

In addition to the national telecommunications infrastructure programs described above, there are some State, Territory and local government initiatives that aim to improve telecommunications access. In particular, large-scale free public WiFi has become an increasingly popular service to encourage public internet access and to support tourism and urban renewal across central locations of towns and cities (ACMA 2014c). Some examples include:

- AdelaideFree — this WiFi network is a jointly-funded initiative by Adelaide City Council and the South Australian Government. It provides free wireless coverage in outdoor areas across the central business district and North Adelaide (Adelaide City Council 2016)
- CBRfree — a free public WiFi service that provides outdoor coverage in town centres, with the aim of establishing Canberra as a digital city (ACT Government 2016)
- Perth WiFi — a free WiFi service for basic internet browsing covering the central business district and Northbridge area (City of Perth 2017)
- Tasmanian Government Free Wi-Fi — a free WiFi service provided in various towns, cities and key tourism locations in Tasmania (Tasmanian Government, sub. 57)
- Victorian free public Wi-Fi pilot — free WiFi is available in train stations and other public locations in the Melbourne central business district and in central parts of Ballarat and Bendigo (Victorian Government 2016)
- Goulburn Free WiFi — free WiFi in Goulburn's central business district. Bandwidth is supplied by local businesses donating spare capacity from their existing broadband

plans. The project was launched independently in 2013 by a community action group and is now partially funded by Goulburn Mulwaree Council (Public WiFi in Australia 2013; The Goulburn Group 2015).

Smaller scale WiFi facilities are also being provided in community venues, public transport and in regional towns and more remote areas (ACMA 2014c). Specific programs, including community WiFi facilities for remote Indigenous communities are described later in the chapter.

Emergency services

Public safety is a key rationale underpinning universal availability of telecommunications services. The provision of telecommunications to access emergency services can be critical, especially to regional and remote communities most at risk of natural disasters (chapter 5).

Emergency services are often time critical, and communications technology is important to enable the rapid and efficient exchange of information (PC 2015). To enable effective two-way interaction with the community, emergency service organisations require communications services that are widely available, secure and interoperable. They rely on their own radio networks for most of their communications; however, there is a trend towards information being increasingly digitised and carried over data services.

Free calls to emergency services are another feature of universal access policies and programs. The *Telecommunications (Emergency Call Service) Determination 2009* requires carriage service providers to provide free calls to emergency services from standard telephone and mobile services. It also requires carriers to provide the most precise information on the emergency caller's location which, since May 2016, includes cell tower (or better) location information. This capability has also recently been expanded to identify the location of emergency callers that use payphones.

The Emergency Call Service is an operator-assisted service that connects callers to an emergency service organisation (ambulance, fire and police). Calling the service is free of charge from any fixed, mobile or conventional 'handheld' satellite phone, as well as most managed VoIP services (ACMA 2015c). The service is operated under government contract to 'emergency call persons'. This currently includes Telstra for Triple Zero and 112 calls, and Australian Communication Exchange (the National Relay Service provider) for calls made to the 106 text service for people who have a hearing or speech impairment. The service is funded to a total of \$22 million per year through general government revenue and the Telecommunications Industry Levy (DoCA 2016p).

The Australian Government has recently reviewed the Emergency Call Service to explore ways the service can be improved and adapt to new technologies (DoC 2015b). That review recommended enhancements to improve caller identification capabilities and to transition services to an internet protocol-based environment (DoCA 2016o). The

Government has sought expressions of interest from providers for the future provision of the Triple Zero Emergency Call Service. In a separate process, it has also sought technology solutions to provide accurate location-based data for emergency calls made from mobile phones (Fifield 2016).

In 2015-16, there were around 8.4 million calls to Triple Zero and 112 emergency service numbers (ACMA 2016d). The majority of these calls originated from mobile phones (69 per cent), rather than fixed-line services (31 per cent). Public payphones accounted for almost 203 000 emergency calls in 2015-16 (2 per cent) (ACMA 2016d). There were 100 genuine calls to the 106 text emergency service in 2015-16, although more than 1000 genuine emergency calls were also transferred by the National Relay Service to emergency service organisations via the Triple Zero emergency service number, mostly through captioned relay (ACMA 2016d).

Infrastructure audit

Australian telecommunications infrastructure is owned by a number of agencies across all levels of government, and by the private sector. Owners include public safety agencies, the Department of Defence, nbn, electricity and transport service providers, mobile network operators, access infrastructure and transmission infrastructure owners, and other businesses (such as mining companies).

There is a lack of publicly accessible information about existing telecommunications infrastructure held by the public and private sector. This has limited the scope for infrastructure sharing and led to a degree of duplication and higher costs. However, the extent of this problem is difficult to assess in the absence of a comprehensive telecommunications infrastructure audit.

More comprehensive public information could improve infrastructure planning and coordination and provide the opportunity to improve telecommunications investment by ‘piggy-backing’ major works to lower costs (RTIRC 2015). As noted by Vodafone (trans., 1 February 2017):

Whenever you’re digging a road for gas infrastructure, why aren’t you thinking about whether you could lay communications fibre and exponentially lower costs than if you were just doing it alone? So I think there’s a role for multiple levels of government and the industry to just constantly think, ‘I’m about to do this, what are the opportunities to maximise the public benefit, particularly to maximise the reach of infrastructure in regional Australia?’ (pp. 43–4)

The Commission endorses the Regional Telecommunications Independent Review Committee’s (RTIRC’s) recommendation (2015, p. 40) that public data and information about any infrastructure that might be of assistance to investors in telecommunications be collected and published. This might include ‘dark fibre’ or towers with a power source in other sectors such as gas, water and electricity. It could be undertaken by either Infrastructure Australia (as recommended by RTIRC) or another government agency with the capability and expertise. The need for better information on telecommunications

infrastructure — including a nationwide audit of existing infrastructure — is discussed later in the chapter.

4.2 Consumer safeguards and special needs services

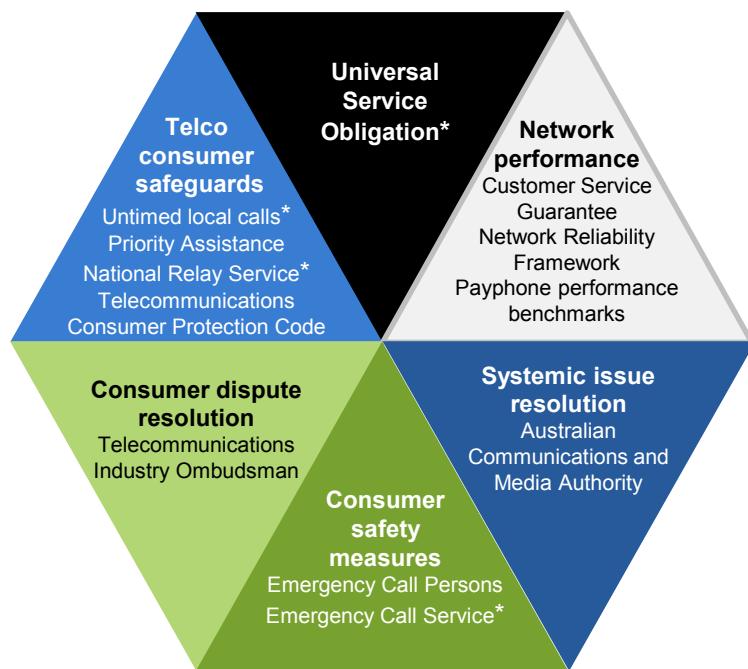
Consumer safeguards are in place in a number of areas of the telecommunications sector (figure 4.2). These include the following.

- Availability safeguards — designed to assist consumers by setting quality standards for service provision, ensuring timely maintenance of the infrastructure required to provide these services, and facilitating the independent resolution of disputes between consumers and service providers. Such safeguards largely affect the quality of telecommunications services provided and promote the provision of universal services.
- Accessibility safeguards — include measures to address telecommunications access for customers with special needs, such as people with disability. Governments and community organisations also deliver services that have accessibility objectives, including training programs to improve digital literacy, and facilities to improve telecommunications access for remote Indigenous communities.
- Affordability safeguards — include untimed local calls, discounts and subsidies to improve telecommunications affordability for low-income groups.

The Australian Communications and Media Authority (ACMA) specifies further consumer safeguards objectives, including the safety, privacy and security of communication services and the effective operation of these services (sub. DR157).

These safeguards apply with respect to the delivery of telecommunications services, and are provided through a variety of means, including legislation, contractual obligations, carrier licence conditions and direct subsidies. Coverage of consumer safeguards varies by carrier service provider and by the services they deliver. In particular, Telstra has a number of specific carrier licence conditions in addition to its legislative and contractual obligations under the TUSO. Most safeguards relate to the delivery of the current *standard telephone service* (and can also apply to other carriage service providers). Other examples include calling line identification, Priority Assistance (for those with a life threatening medical condition) and service performance standards and benchmarks under the Customer Service Guarantee (CSG) safeguard.

Figure 4.2 **Telecommunications safeguards**



^a Initiatives that have an asterisk are funded through the Telecommunications Industry Levy.

Source: ACMA (sub. 49, p. 4).

Other safeguards and forms of consumer protection include:

- funding the Australian Communications Consumer Action Network (ACCAN) — Australia's peak body for consumer representation in communications
- government regulators of telecommunications services and consumer and competition law, including the ACMA and the Australian Competition and Consumer Commission (ACCC)
- Commonwealth legislation ensuring competition in telecommunications markets and general Australian Consumer Law protections when buying goods and services — including the *Competition and Consumer Act 2010* (Cth), the *Telecommunications Act 1997* (Cth) and the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth)
- the Telecommunications Industry Ombudsman — an independent body providing dispute resolution services free of charge for consumers and small business who have complaints regarding their telecommunications service
- the Telecommunications Consumer Protection Code — an industry code developed by the Communications Alliance that sets out rules regarding telecommunications advertising, billing, payment methods, complaint handling and the changing of service providers.

The *Regional Telecommunications Review 2015* (RTIRC 2015, p. 52) identified that the consumer safeguards relating to the *standard telephone service* (in particular, the CSG) are increasingly irrelevant given the evolution of the telecommunications market.

While some participants also viewed the current consumer safeguards as outdated, they are still important to many consumers, particularly in regional and remote Australia, who often consider that their services would be reduced in the absence of such safeguards. As such, some participants favoured an expanded application of consumer safeguards to ensure that all consumers are able to access a reliable and adequate telecommunications service, regardless of technology type (box 4.2).

In response to the *Regional Telecommunications Review 2015*, the Government has foreshadowed a review of Australia's telecommunications consumer safeguards (Australian Government 2016b). According to DoCA (sub. 58):

The Government is proposing that reform of telecommunications consumer safeguards is undertaken in parallel with the Productivity Commission's inquiry. That reform will focus on, amongst other consumer protections, affordability and accessibility as important safeguards. We therefore do not consider that broader consumer safeguards should be addressed by this Productivity Commission inquiry. (p. 5)

Consumer safeguards are discussed further in chapter 5.

Telecommunications performance standards

As noted in chapter 3, performance requirements and protections are set out in legislative instruments under the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth) and secondary instruments, such as the CSG.

Customer Service Guarantee

The *Telecommunications (Customer Service Guarantee) Standard 2011* aims to protect residential and small business customers from a poor telephone service (ACMA 2016b). It sets out performance requirements for carriage service providers for connections, fault repair and appointment keeping for the *standard telephone service*. Customers can be financially compensated by the provider if these minimum performance standards are not met. Compensation payments under the CSG totalled \$16.17 million for 2015-16 (ACMA 2016d).

Box 4.2 Participants' views on consumer service guarantees

TPG Telecom (sub. 38):

... the mandated Customer Service Guarantee (CSG) arrangements are unworkable and unnecessary, at least insofar as they affect carriers other than Telstra. ... Customer service will be a competitive point of differentiation for such carriers and, as such, mandating a particular [CSG] has the disappointing effect of removing that area as a competitive differentiator. (p. 2)

The ACCC (sub. 40):

It is important that consumers continue to be protected by clear performance standards and reducing or removing such protections may disproportionately impact vulnerable consumers and those in regional, rural and remote areas. (p. 9)

Internet Australia (sub. 43):

There is an existing technical standard for the provision of a standard telephone service. That standard is, however, increasingly irrelevant for three reasons:

- The Standard was not set for the use of [internet protocol] technology
- It applies only to the provision of a standard telephone service — not to the many other ways Australians are communicating, including [voice over internet protocol] services.
- It does not reflect the existing split between infrastructure providers and retail service providers. (p. 3)

ACCAN (sub. 48):

The current CSG only protects the [*standard telephone service*]. This is out of step with changes in consumer usage patterns, which are now overwhelmingly towards mobile and broadband based communication. The NBN will significantly address the lack of access to infrastructure, but guaranteed service connection, fault repair and reliability remains an issue. (p. 16)

Bebbington (sub. DR107):

The CSG standard should apply to all Telecommunication providers of landline services and should be extended to provide standards for mobile voice and broadband services across all technologies. (p. 7)

NSW Farmers' Association (sub. DR108):

... regularly hears of situations where farmers have gone without a landline service for well beyond the time periods allowed for under the current USO and associated consumer safeguards. In the experiences of Association members, the current USO and the accompanying consumer safeguards seem to provide little recourse in the event of an issue with their landline. (p. 5)

Telstra (sub. DR123):

One of the fundamental challenges with the major consumer telecommunications safeguards, the [CSG], is its implicit assumption of retailer control of the underlying infrastructure. The introduction of the NBN ... which prohibits vertical integration of superfast networks, has meant that retailer control over the underlying infrastructure is no longer possible. (p. 4)

ICPA Australia (sub. DR126):

... some form of guarantee of repair and service must be maintained, particularly for customers living in rural and remote areas who cannot simply take their phone or internet modem/equipment to the provider's shop to instigate repair or replacement. (p. 5)

Pastoralists' Association of West Darling (sub. DR162):

Telephone services must be subject to a service obligation governing their provision to anyone who requires a standard telephone service, and a service guarantee to ensure timely repair and maintenance as required. Accordingly, the TUSO must be retained, and the CSG extended to all standard telephone connections in Australia. (p. 7)

The CSG Standard applies only where the provider offers a CSG service to a customer's location. This Standard covers the supply of a *standard telephone service* (including where retail service providers offer a voice service over the NBN fixed-line footprint)⁴⁶ but it does not cover mobile phone or internet services (ACMA 2016e). Providers are required to inform customers of their obligations and the customer's entitlements under the CSG Standard. Part 5 of the CSG Standard enables customers to waive their rights under the CSG (either in writing or orally), perhaps in exchange for lower prices for their phone service. Unlike other providers, Telstra, as the TUSO provider, is prohibited from having its customers waive their CSG rights.⁴⁷

Retail service providers can claim exemptions from the CSG Standard in some circumstances where service provision is affected, such as extreme weather events. Exemptions decreased in 2015-16, in part reflecting the transition to NBN services (ACMA 2016d). As a wholesale-only provider, nbn is not required to comply with the CSG timeframes and so does not claim service provision exemptions. This has reduced providers' ability to apply for exemptions, and, in addition to widespread wet weather in 2015-16, led to a 176 per cent increase in CSG-related compensation payments from the previous year (ACMA 2016d).

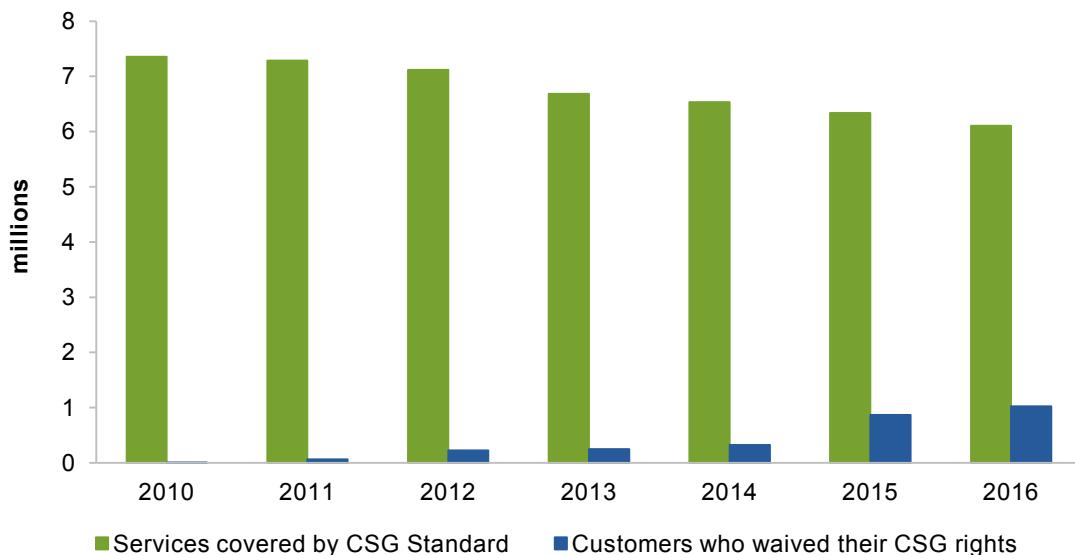
Consistent with the decrease in fixed-line telephone services in operation, the number of services subject to the CSG Standard decreased from 7.36 million services in June 2010 to 6.11 million services six years later (figure 4.3). Further, the number of people who waived their rights under the CSG Standard increased significantly during the same period.

The increase in CSG waivers reflects the growth in VoIP customers who generally elect to waive their rights, and are often required to waive them in order to receive a VoIP service. Some participants noted that they had little choice but to agree to waive the CSG to receive a service, including Telstra's Next G wireless link — a mobile service that is used to emulate fixed-line voice services (ICPA Yaraka Isisford Branch, sub. DR104; ICPA New South Wales, sub. DR117; ICPA Australia, sub. DR126; Pastoralists' Association of West Darling, sub. DR162). The increase in waivers also represents the growing market share of companies that request waivers. For instance, TPG and iiNet (now a subsidiary of TPG) routinely request CSG waivers for their services which accounted for 90 per cent of all CSG waivers in 2015-16 (ACMA 2016d).

⁴⁶ Under current commercial and statutory conditions, the CSG Standard cannot be offered over NBN fixed wireless or NBN satellite networks (nbn 2016n; chapter 9).

⁴⁷ Under section 120, part 7(A) of the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth).

Figure 4.3 Fewer services are covered by the Customer Service Guarantee (CSG) Standard
2010 – 2016



Source: ACMA *Communications Report* (various years).

Under the Standard, guaranteed timeframes for connection and fault repair can differ depending on customer location and whether infrastructure is readily available. New connections that are close to infrastructure must be made within five working days in urban centres, but within 15 working days in minor rural and remote areas (table 4.3).

The *Telecommunications (Customer Service Guarantee — Retail Performance Benchmarks) Instrument 2011* also applies to qualifying carriage service providers. These providers are required to meet performance standards of at least 90 per cent on measures of connections, fault rectifications and appointment keeping across urban, rural and remote areas.⁴⁸ Each of the four qualifying carriage service providers exceeded these performance standards in 2015-16 (ACMA 2016d).

⁴⁸ Qualifying providers had 100 000 or more CSG services at the last day of the preceding financial year. Telstra is required to meet equivalent payphone fault repair benchmarks under the *Universal Service Obligation (Payphone Performance Benchmarks) Instrument 2011*.

Table 4.3 Customer Service Guarantee Standard timeframes
Number of working days

	<i>In-place connection</i>	<i>New connection close to infrastructure</i>	<i>New connection not close to infrastructure</i>	<i>Fault repair</i>
Urban	2	5	20	1
Major rural	2	10	20	2
Minor rural	2	15	20	2
Remote	2	15	20	3

^a ‘Urban’ is communities with 10 000 or more people, ‘major rural’ is communities with between 2500 and 10 000 people, ‘minor rural’ is communities with between 200 and 2500 people, ‘remote’ is communities with up to 200 people.

Source: ACMA (2016d).

Network Reliability Framework

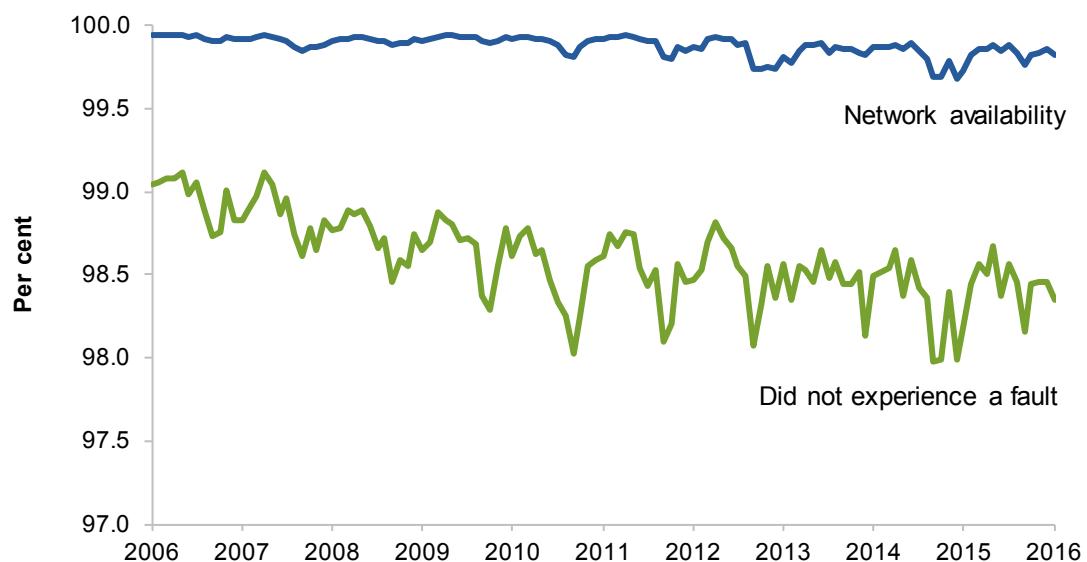
A complementary performance safeguard to the CSG is the Network Reliability Framework. This framework applies only to CSG-attracting services supplied by Telstra and is contained in Telstra’s Carrier Licence Conditions (ACMA, sub. 49). Its objective is to improve the reliability of poorly performing parts of this network, particularly in regional and rural Australia (ACMA, sub. DR157). The framework has three levels of operation. Level 1 requires Telstra to report to the ACMA at a national level on its network availability and the percentage of services that do not experience a fault. Levels 2 and 3 require Telstra to identify, report and remedy faults at the ‘cable run’ and individual service levels. Levels 2 and 3 prioritise repairs on CSG services that experience frequent faults and prescribe timeframes for monitoring the cable runs and services (ACMA, sub. DR157, pers. comm., 22 February 2017).

At a national level, there has been a slight but steady decrease in the overall performance of Telstra’s (mainly copper) fixed-line network.⁴⁹ The percentage of CSG services with no faults in a given month fell from 99.05 per cent in June 2006 to 98.35 per cent a decade later (figure 4.4). Network availability (measured as the percentage of time in a month that services are available and not awaiting repair) was also down slightly from a national monthly average of 99.94 per cent in June 2006 to 99.82 per cent a decade later (ACMA 2016d), and availability is worse on average in non-urban areas than in urban areas. The average time taken for Telstra to restore fault-affected services was 76 hours in 2015-16 (66 hours in urban areas and 90 hours in non-urban areas) (ACMA 2016d).

⁴⁹ Telstra is not required to report on reliability by the type of technology used.

Figure 4.4 Increased faults on Telstra's fixed-line network

Telstra's fixed-line services, network availability and services with no faults in a given month, 2006 – 2016^a



^a Annual tick marks shown at June each year. 'Network availability' refers to the average percentage of time in a month that services are available and not awaiting repair. 'Did not experience a fault' refers to the percentage of Customer Service Guarantee services that did not experience a fault during the month.

Sources: Productivity Commission estimates based on ACMA (2016d) and ACMA unpublished data from Telstra's monthly reports.

Priority Assistance

Priority Assistance is a customer status that entitles those with life-threatening medical conditions to have priority connection and fault repair for their telephone service. It provides these users with an ongoing heightened level of service reliability so they are able to call for assistance at any time (ACMA 2016i, sub. DR157). The ACMA has special rules telephone companies must meet for these customers. Customers identified as requiring Priority Assistance are entitled to connection to, or fault repair of, a fixed-line telephone service within 24 hours in urban and rural areas and 48 hours in remote areas (ACMA 2016i). nbn, in its fixed-line footprint, also aims to provide these same connection and fault rectification times for customers with diagnosed life-threatening medical conditions (nbn 2016m).⁵⁰

⁵⁰ Under current commercial and statutory conditions, Priority Assistance cannot be offered over NBN fixed wireless or NBN satellite networks (nbn 2016n; chapter 9).

Telstra offers Priority Assistance as part of its carrier licence conditions.⁵¹ Telstra can also supply Priority Assistance over a fixed-line NBN service (ACMA, sub. DR157). However, it is not obliged under its carrier licence conditions to meet Priority Assistance requirements over NBN infrastructure (nbn, sub. DR159). Other carriers can also provide these services in line with the code developed by the Communications Alliance, but are not obliged by regulation to do so.⁵² At 30 June 2016, there were around 211 000 Priority Assistance customers (ACMA 2016d). The ACMA states that the continuing demand for this service indicates that it remains important to customers with serious medical conditions (sub. DR157).

FINDING 4.1

A number of telecommunications consumer safeguards apply only to the provision of the *standard telephone service* and only to some service providers. The declining reliance on the *standard telephone service*, the increasing proportion of consumers agreeing to waive these safeguards (in particular, the Customer Service Guarantee), and the deployment of NBN infrastructure make the relevance of these safeguards questionable.

Programs to improve telecommunications accessibility

People with specific needs can face barriers to accessing telecommunications services. Programs to improve accessibility include telecommunications solutions for people who are hearing or speech impaired, or who have other forms of disability that require additional equipment or support. Participants to this inquiry were generally supportive of existing programs that make telecommunications more accessible for people with disability (box 4.3).

The Australian Government is currently reviewing accessibility issues relating to telecommunications services. This includes future service options and technologies available for people with disability (DoCA 2016a). Rapid improvements in digital technology have led to a range of new services (or applications on handsets) that offer substantial improvements to those provided by traditional services such as the National Relay Service.

⁵¹ Outlined in the *Carrier Licence Conditions (Telstra Corporation Limited) Declaration 1997* (s.19). Priority Assistance also applies to satellite and VoIP phone services that are supplied by Telstra over its infrastructure in fulfilment of the TUSO (Telstra 2014a).

⁵² In 2015-16, iPrimus was the only provider to voluntarily offer Priority Assistance in line with industry code ACIF C609:2007 *Priority Assistance for Life Threatening Medical Conditions*, although this service is now limited to its existing Priority Assistance customers (ACMA 2016d).

Box 4.3 Participants' views on accessibility programs

McLaren (sub. 18):

Not all users will be able to use increasingly sophisticated and new devices (eg. handsets, computers, tablets) for the purpose of making telephone calls. Traditional or specialised devices and services for these users will need to continue to be provided. (p. 6)

Australian Communication Exchange (sub. 22):

The National Relay Service (NRS) provides a unique service to the community and, as such, deserves stand-alone consideration within this review of the [TUSO]. There is no other program or policy alternative and the function and offerings of the NRS are not well understood outside the deaf and hearing/speech impaired communities, increasing the risk that its value and importance could be underplayed or considered only in terms of raw expenditure. (pp. 2–3)

Telstra (sub. 30):

We consider that [the Disability Equipment Program], in combination with the National Relay Service ... has done a good job in delivering reasonable [*standard telephone service*] access to Australians with a disability. (p. 11)

TPG Telecom (sub. 38):

TPG considers that a cost benefit analysis of the National Relay Service is warranted to ascertain whether it should still be a mandated service and whether there might be a better way to meet the special needs of the group. For example, it may be simpler for the Government to mandate that business of a certain size have an online interaction tool under which specific questions can be asked and answered. (p. 2)

nbn (sub. 47):

Such [accessibility] programs will continue to be needed to ensure that these services are provided and funded. The nature of such programs may change over time as new technology solutions emerge, and is important that whatever regulatory intervention is put in place to support these programs is flexible enough to respond to evolving technology options and consumer needs. While the introduction of nbn-based broadband may introduce additional options to meet these needs, a specifically targeted program will ensure that appropriate services continue to be provided and funded. (p. 18)

ACCAN (sub. 48):

There is a clear need for greater intervention to ensure that all Australians with disability can access and benefit from our increasingly ubiquitous connected society. The current range of ad-hoc programs and services are not providing the necessary safety net. ... In 2011 ACCAN recommended the development of a national Disability Telecommunications Service (DTS). We envision a DTS as a one-stop agency for communications information, equipment provision, training and support. This would alleviate many of the barriers to accessing communications for those consumers with disability who are unable to receive funding packages from the [National Disability Insurance Scheme]. (p. 23)

BIRRR (sub. DR143):

The National Relay service is an important Federal Government initiative, which uses a wide variety of electronic communication media to ensure the very best user experience. (p. 51)

National Relay Service

The National Relay Service is an Australia-wide telephone service for people who have a hearing or speech impairment. Established in 1995, the Australian Government contracts for the provision of this service to provide consumers with an alternative means of

communication equivalent to voice telephony, such as a teletypewriter service (National Relay Service 2016).

The service is available at all times at no extra cost to the user. Recent additions have been made to the service, including video and text message relay and captioned telephony (Australian Communication Exchange, sub. 22; DoCA 2016a).⁵³ Approximately 821 000 successful inbound calls were made using the National Relay Service in 2015-16 (DoCA 2016i, 2016j, 2016k, 2016l). However, the number of individual users of this service is unclear. DoCA (2016a) noted that the number of individual users was previously estimated at between 5000 and 10 000 but it had experienced increased demand due to recent innovations in the service. Connelly (2015) stated that these innovations, particularly since captioned telephone headsets were introduced in 2011, have dramatically increased the number of users of the service and call minutes relayed, and have correspondingly increased its costs.

While demand for the National Relay Service has increased, Telstra noted that the traditional consumer segment for the service is increasingly choosing to use mainstream digital communications technologies to meet their needs (Telstra 2016d). Optus also stated that it is not clear how many National Relay Service users rely solely on these services or what barriers prevent them from accessing mainstream communications (Optus 2016b).

The annual funding allocation for the National Relay Service is currently \$22 million (including delivery of an outreach service), with funding sourced from general government revenue and the Telecommunications Industry Levy (DoCA 2016p).

Disability Equipment Program

The Disability Equipment Program provides affordable access to specialised equipment for people with disability to communicate by telephone (DoCA 2016a). Telstra provides this program to meet its obligations as the universal service provider under the *Telecommunications (Equipment for the Disabled) Regulations 1998*. This program interacts with the National Relay Service and serves a similar purpose to the TUSO, by ensuring that all Australians have equitable access to a basic voice service or equivalent.

The program is available to Telstra retail customers, or associates of Telstra customers, who have a disability or impairment and cannot use a standard telephone handset. Equipment can include large button telephones, extension ringers, visual alerts and teletypewriters. The products are charged at the same annual rental fee as a standard rental telephone handset, currently \$36 per year (Telstra 2016e).⁵⁴

⁵³ ACCAN (sub. 48) notes that the video relay service is currently only provided on a limited basis. The National Relay Service also does not provide services specific to deafblind consumers or relay languages other than English (chapter 7).

⁵⁴ Optus provides a similar program for its customers with disability in Optus-cabled areas of Sydney, Melbourne and Brisbane (DoCA 2016a)

Telstra noted a decreasing reliance on the Disability Equipment Program as customers move away from fixed-line telephone services in favour of mobile and internet-based communications (Telstra 2016d). In particular, they observed a drop in new users of teletypewriters under this program and attrition of existing users. Telstra stated that it had provided less than 2500 teletypewriters since 1997 and around 100 of these units were being returned every year (Telstra 2016d). However, Printacall Communications Technology — the sole supplier of teletypewriters to the Australian market — claimed that teletypewriters are still important, particularly for older customers who tend not to adapt to new technologies (sub. DR109).

National Disability Insurance Scheme

The National Disability Insurance Scheme is a government-funded program that supports people who have a permanent or significant disability. The scheme is being rolled out nationally from 2016 and is available to Australians who access it before the age of 65.

Support options include organising appropriate equipment and services for people with disability to meet their goals in education, employment, health, and wellbeing (DSS 2016b). Communication devices may be available to participants under this scheme, but it does not include funding for the ongoing costs of internet or telephone services (DoCA 2016a). The National Disability Insurance Scheme will not provide disability equipment to people who do not qualify for funding, such as those with episodic disability or who are over the age of 65 (ACCAN, sub. 48). The Commission is reviewing the costs of the National Disability Insurance Scheme to inform the final design of the full scheme. The final report of that review is due to Government in September 2017 (PC 2017b).

Digital literacy programs

Universal access to telecommunications services also depends upon the community's capacity to use them. For instance, older Australians and low-income groups can face particular barriers to the take up of new technologies. Governments, community groups and businesses deliver a range of programs to improve digital literacy to reduce the risk of some users being excluded from these technologies.

National Innovation and Science Agenda

In recognition of the importance of digital literacy, the Australian Government's National Innovation and Science Agenda contains the 'Inspiring all Australians in digital literacy and STEM' measure. A key focus of the program is students identified as being at risk of 'falling behind in the digital age' (Department of Education and Training 2016b, 2016a). The program includes (amongst other initiatives):

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- an updated school curriculum focusing on digital technologies, including a grants program for innovative methods for driving enhanced digital literacy in schools, and assisted by a free online course for primary and early secondary teachers
 - national computing and coding challenges for students
 - support for partnerships between science, technology, engineering and mathematics (STEM) professionals in industry and schools.

Total funding for the program is \$112 million over four years, commencing from July 2016. The providers of certain aspects of the program, such as the Early Learning STEM Australia pilot, will be determined through a competitive tender process.

Broadband for Seniors

The Australian Government funds the Broadband for Seniors program to improve older Australians' access to the internet so that they can participate and share in the benefits of the digital economy. Broadband for Seniors was established in 2008 and provides people aged 50 years and over with free access to computers, the internet, and basic training to gain skills and confidence to use these technologies. Training is delivered by volunteer tutors in a friendly, face-to-face environment in small groups or individually. It includes topics such as how to email and use social media and the internet, and how to stay safe online. Broadband for Seniors kiosks are provided in around 1500 locations across Australia, including community centres, libraries, retirement villages and aged care facilities (DSS 2016a).

Funding for Broadband for Seniors was \$1.03 million in 2015-16, down from \$5 million per annum in the initial years of the program. Additional funding in 2013 was used to provide touchscreen computers and a one-off training grant of \$2000 per kiosk to assist with the delivery of cyber-security training. No further funding has been allocated beyond 2016-17 (DSS, pers. comm., 13 July 2016).

Other digital literacy programs for older Australians

Other digital literacy programs for older Australians include the following.

- Improving the digital confidence and skills of senior Australians — during the 2016 federal election campaign, the Australian Government announced that it would allocate \$50 million to improve the digital literacy of older Australians and improve their safety online (Turnbull, Fifield and Porter 2016). A digital inclusion and online safety strategy will be developed and will complement existing programs. The package will also include training and small technology grants (DSS, pers. comm., 13 July 2016).
- Digital Literacy for Older Victorians Program — a Victorian Government program providing four grants of up to \$40 000 for the delivery of digital literacy training programs tailored to the needs of 'older learners' in the community (Victorian Department of Education and Training 2014).

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- Tech Savvy Seniors — Telstra has partnered with the New South Wales, Victorian and Queensland Governments to provide free online training sessions, reference guides and face-to-face training to older Australians through public libraries and community colleges (Telstra 2016a; Telstra, pers. comm., 31 August 2016).

Digital literacy for all Australians

In recognition of the importance of digital literacy for all Australians, a number of government and community organisations across Australia offer free or low cost internet training and services:

- Internet facilities and training are available in public libraries, Australian Neighbourhood Houses and Centres, computer clubs and other community organisations across Australia. For example, LINC Tasmania is a Tasmanian Government initiative to provide public access internet and computer facilities and adult literacy support (Tasmanian Government, sub. 57)
- Go Digi is a program designed to help individuals and communities improve their digital skills and confidence, funded by Infoxchange and Australia Post. The program partners with local governments and community organisations to provide online digital training and mentoring and aims to support more than 300 000 Australians. The program will target older Australians, Indigenous and Culturally and Linguistically Diverse communities as well as small business and regional and remote Australians (Go Digi 2014)
- Forward IT is a South Australian Government website designed to help individuals and businesses learn how to use the internet safely (South Australian Department of State Development 2013).

Remote Indigenous telecommunications programs

Remote Indigenous communities are often identified as a group with unmet needs in relation to universal telecommunications services (Broadband for the Bush Alliance, sub. 6). Participants to this inquiry stated that these communities often face unique challenges and different needs that require tailored government intervention (box 4.4). Indigenous Remote Communications Association (IRCA) noted in its submission to the *Regional Telecommunications Review 2015*:

In general, Remote Indigenous communities have different needs, household make-up, socioeconomic conditions, environmental challenges, and usage patterns to other households in Australia. More community-wide and regional solutions are needed such as WiFi sharing to enable pre-paid services using mobile devices and shared models of access across a region. Very mobile populations are less likely to be house or office-based. (IRCA 2015, p. 5)

Box 4.4 Participants' views on programs for remote Indigenous communities

Swinburne Institute for Social Research (sub. 45):

Various government programs, including *Networking the Nation* and [Remote Indigenous Public Internet Access] were designed to address the infrastructure void in remote Australia, with varying degrees of success. The result of these programs is an uneven patchwork of infrastructure and programs across remote Australia, resulting pockets of digital exclusion and inclusion. One positive consequence of these various experiments is that there is a great deal of knowledge amongst Indigenous organisations as to how to better meet the needs of remote-living Indigenous Australians, yet the [TUSO] provides no assistance for these organisations to do so in a sustainable manner. (p. 3)

nbn (sub. 47):

nbn has, within its overall policy mandate, implemented a number of initiatives which provide the means for RSPs [retail service providers] to address the needs of specific groups. For example, nbn allows RSPs to relax the general rules for [nbn's Ethernet Bitstream Service] — in which one connection may be used by one household only — to permit certain locations to set up local Wi-Fi networks from a single nbn™ network termination device. This arrangement can be valuable in some remote Indigenous communities, where the model of one nbn™ connection per premises may not meet the needs of people living there. RSPs can then choose how to offer and bill the retail services they deliver in these situations. In addition, nbn is currently developing, in consultation with the Government, specialised Satellite services to meet the distance education needs of remote communities. (p. 18)

ACCAN:

In ensuring that we have connected consumers it is important when addressing market failures that the solutions presented are appropriate to meet consumers' needs and give them control and choice. For example, Indigenous consumers have specific preferences for services which limit the take up of services that are made available but do not meet these preferences. (sub. 48, p. 10)

Communities, such as Ngaanyatjarra, often experience queues for the community public payphone, where an increased number of phone lines is required to meet the demand. (sub. DR124, p. 9)

Indigenous Remote Communications Association and Desert Knowledge Australia (trans., 8 February 2017):

... there's a community payphone program in small communities of under 50 people, and that's been quite a successful program, again with a robust phone with a satellite backhaul, and that's for satellite and terrestrial backhaul, but that has now been WiFi enabled and given people access to both a phone and WiFi delivery. (p. 47)

In recognition that telecommunications services may not be available, accessible or affordable in many remote Indigenous communities, governments — often in partnership with community organisations and businesses — have provided a range of projects with the aim of supporting universal service objectives in these areas. Some examples include the following.

- Indigenous Advancement Strategy — the Department of the Prime Minister and Cabinet (PM&C) funds telecommunications infrastructure, training and support services in remote Indigenous communities under the Remote Australia Strategies Programme (PM&C, pers. comm., 30 June 2016). Initiatives include:
 - Remote Indigenous Community Telecommunications — the Australian Government is providing more than \$8 million over three years from 2015-16 to maintain around 245 community payphones and 301 WiFi telephones in remote

Indigenous communities. The phones are generally in areas with less than 50 permanent residents that are not covered by the TUSO (chapter 3). Telstra provides free line rental for most community payphones. Activ8me is contracted to maintain and monitor both community payphones and WiFi telephones

- ... Community payphones have pre-paid card facilities
- ... WiFi telephones are solar powered and provide VoIP. Calls to any fixed-line number are free and pre-paid phone cards can be used for calls to mobile, international and 13 numbers (Activ8me 2016). The Australian Government provides up to 20 gigabytes of free data per month per WiFi telephone
- Remote Indigenous Internet Training activity — the Australian Government is allocating almost \$7 million over three years from 2015-16 to provide remote Indigenous communities with internet access, training and/or essential internet infrastructure to address barriers to access. This includes trialling a community access WiFi model in five locations in 2016 in conjunction with nbn.
- Other related Indigenous community projects in telecommunications include:
 - inDigiMOB — this project establishes a network of Indigenous mentors living in remote Northern Territory communities to provide on-the-ground training and support in digital literacy, cyber safety and internet access for local community members. The project is funded by Telstra and coordinated by IRCA (IRCA 2016)
 - Central Australian Youth Link Up Service (CAYLUS) computer rooms — provides access to internet facilities in remote Indigenous communities (CAYLUS 2015).

Affordability measures

Australia has a number of measures to address telecommunications affordability and support universal service objectives. These are achieved through welfare payments for particular groups of telecommunications consumers, price discounts, tax concessions and other subsidies to help targeted consumers afford telecommunications services. Participants' views of current affordability measures are highlighted in box 4.5.

Telephone Allowance

The Telephone Allowance is designed to help people on income support with the costs of maintaining a telephone and a home internet service. The allowance is available to older Australians, people with disability and carers on income support. It is paid in addition to the recipient's main income support payment. The Telephone Allowance has been available since 1992, where it replaced a similar telephone rental concession voucher scheme available to eligible pensioners (Daprè 2006).

Box 4.5 Participants' views on affordability programs

Telstra (sub. 30):

We also consider that the current Low Income Measures Assessment Committee (LIMAC) has provided a good model to take into account the needs of low income customers when designing our products. Given the benefits that competition has delivered and diversity in service offerings in the marketplace, the government could consider extending the LIMAC model to other major carriers on an opt-in basis. (p. 11)

The ACCC (sub. 40):

While such [affordability] measures help to address important social objectives, they can also have implications for competition. For example, requiring a single RSP [retail service provider] to provide basic services for low income consumers can create market distortion. In contrast, demand side interventions which enable low-income consumers to choose a plan from any RSP based on their needs and preferences may be less distortionary. (p. 8)

Internet Australia (sub. 43):

The remaining mechanism to assist people on low incomes is the 'Low Income Measures' licence condition on Telstra to develop products and arrangements to 'address the needs of low income customers' by Telstra's Low Income Measures Assessment Committee (LIMAC), and report annually to the Minister on their work. LIMAC has been very successful in developing programs and products such as HomeLine, InContact, Bill Assistance and PhoneCard Assistance. (p. 4)

ACCAN (sub. 48):

ACCAN does not believe the current arrangements adequately address affordability barriers and need to be re-examined. Affordability measures going forward should be retail service provider independent to give consumers choice in their provider. (p. 21)

Carers NSW (sub. DR72):

At the moment, the telephone allowance is contained within the Pension Supplement, which recipients of the Carer Payment receive. However, Carers NSW emphasise that maintaining subsidies via the tax-welfare system will only be appropriate with continued government commitment for the Telephone Allowance to remain amidst ongoing moves to create 'budget savings' by abolishing supplements and allowances, like the Energy Supplement in the Budget Savings (Omnibus) Bill 2016. (p. 2)

SACOSS (sub. DR85):

... the [Telephone Allowance] is inadequate and poorly targeted and ... the amount of some income support payments is simply not enough to live on. (p. 5)

Funding is available in two tiers depending on a person's circumstances.

- A basic telephone service rate of \$28.20 per quarter is available to some welfare recipients with parental responsibilities, partial work capacities, or who are aged over 60 but not receiving a pension. It is not available to most people on unemployment-related payments unless they meet these age, dependent children or partial work capacity criteria.
- A higher rate of \$42 per quarter is available to recipients of the Disability Support Pension who are under 21 years of age, without children and who have a home internet service connected (DHS 2016b). Other pensioners (and recipients of the Bereavement Allowance and Carer Payment) automatically receive this higher rate as part of their Pension Supplement. The Pension Supplement also includes the Pharmaceutical Allowance, Utilities Allowance, and Goods and Services Tax Supplement (DHS 2016a).

Eligibility for the allowance is assessed when a person makes a claim for certain income support payments. Around 400 000 people received the basic telephone service rate in September 2016, and a further 3.4 million received the higher rate as part of their Pension Supplement (unpublished data from DSS).

While there is no separate funding appropriation for the Telephone Allowance, the Commission estimates that it cost around \$611 million in 2016. This includes \$45 million for the basic rate and \$566 million for the (higher rate) Telephone Allowance component of the Pension Supplement (Productivity Commission estimates based on unpublished data from DSS). The Telephone Allowance is non-taxable and is indexed annually in line with the consumer price index (as noted in chapter 2, prices of telecommunications services have been falling over an extended period).

The Telephone Allowance, together with the Utilities and Pharmaceutical Allowances, was identified as a potential area for reform in the 2015 McClure Review and the 2009 Pension Review (DSS, pers. comm., 13 July 2016).

- The 2015 McClure review (DSS 2015) identified that the Telephone Allowance contributes to covering general costs of living. The review recommended ‘moving to a simpler and more coherent system’ (p. 92) where general costs of living should be covered by the main payments.
- The 2009 Pension Review (Harmer 2009) also recommended that the structure of pensions could be simplified by integrating supplementary payments into the base rate of pensions (p. 92). From September 2009, the value of the Telephone Allowance was rolled into the Pension Supplement.

User discounts

Telstra’s carrier licence conditions include the maintenance and resourcing of a Low Income Measures Assessment Committee (LIMAC) that represents consumer advocacy groups that work on behalf of low-income Australians. As part of this condition, Telstra introduced the Access for Everyone program in 2002.

In 2015-16, the Access for Everyone program provided fixed-line home telephone service discounts to around 885 000 pensioners (Telstra, pers. comm., 31 August 2016). The program also includes other fee exemptions, low-cost telephone service plans, and bill assistance for low-income customers and those in financial hardship (Telstra 2016b). According to Telstra, the Access for Everyone program has delivered \$107 million in benefits in 2015-16, and around \$2 billion in total value to low-income customers since 2002 (Telstra, pers. comm., 31 August 2016). In its 2013 report to the Minister for Communications, the LIMAC noted that the assistance provided under the Access for Everyone program had declined. While this was attributed to pensioners opting for bundled services offering better value, it was unclear whether it was also influenced by the growing customer preference for mobile over traditional fixed-line telephones (Pavlidis and Hawkins 2015).

Tax breaks

Under income tax legislation, primary producers are able to claim a deduction over 10 years for capital expenditure incurred in installing a telephone line on, or extending to, land on which a primary production business is undertaken (ATO 2016a). Persons who have lived or worked in a remote or isolated area of Australia may also be entitled to a zone tax offset (ATO 2016b). However, as noted by RDA Northern Territory, the zone tax offset is not designed to address telecommunications affordability (sub. DR115). The base amount for this rebate has not been updated since 1993-94 (Hicks 2001).

Community initiatives to support affordability

Some not-for-profit organisations have measures to provide affordable telecommunications products and services to low-income groups. Initiatives mostly target internet access and include the following.

- Infoxchange technology support programs (Infoxchange 2016), such as:
 - GreenPC — which provides computers to low-income families and community organisations
 - Wired project — which provides affordable internet and skills training in social housing around Melbourne
 - iPads in Aged Care program — funded by Gandel Philanthropy to connect aged care residents with technology.
- Mobile phone charging stations — YFS, a not-for-profit organisation, will receive \$55 000 from the Queensland Government's Dignity First Fund to provide eight secure mobile phone charging stations for people experiencing homelessness in the Logan region (de Brenni 2016).
- The Smith Family's Tech Packs — which provide disadvantaged families with affordable, refurbished computers and internet access. The Smith Family partners with corporate organisations to fund the program and computer refurbishing organisations that provide hardware and technical support for the families (The Smith Family 2016).

4.3 Telecommunications for government service delivery

Telecommunications plays an important role in the Australian Government's delivery of public services. It affects the way consumers source information and access services such as health, education and social security. Government service delivery continues to adapt to new technologies. Many services are now delivered on digital platforms, partly in response to the growing demand and expectation for government to deliver public services online (DTA 2017). This demand will likely intensify with increased consumer adoption of internet-based technologies and the rollout of the NBN.

Participants have highlighted that remote Australia is not receiving the accessible, affordable and reliable telecommunications that are needed to deliver core government services online (box 4.6).

Box 4.6 Participants' views on telecommunications for government service delivery

SACOSS (sub. DR85):

As government moves more and more interactions online, then it is reaping savings while transferring the cost of accessing government information and services onto telecommunications users. This has implications for affordability and also, where those websites are seeking input to government policy (eg. via this Productivity Commission inquiry), for the right and ability to participate in the democratic process. (p. 7)

RDA Central West (sub. DR103):

Minimum service specifications are required to guarantee access for all Australians to a range of core services, including Government Services, e-learning and online education, telehealth delivery and emergency services. This is pertinent given that these core services are progressively moving online and losing 'shopfronts' in rural and regional areas. Communities expect to be able to have ready access to Government Services either online or over the phone, and there are significant equity implications for those people into the future who cannot access Centrelink, Medicare or the ATO due to unreliable or inaccessible telecommunications. (p. 3)

ICPA Yaraka Isisford Branch (sub. DR104):

High latency voice services are not suitable for the provision of Distance Education lessons ... Given that it is mandatory to educate one's children, irrespective of location, the government has an obligation to provide a telecommunications service which allows for the best possible delivery of lessons via distance education (p. 9)

BIRRR (sub. DR143):

Agencies such as the [Australian Taxation Office], Centrelink and Medicare must maintain an alternative to online services for those living in remote areas until such a time that equitable access to broadband is reached. (p. 52)

Australian Medical Association (sub. DR147):

... the utilisation of telehealth and telemedicine in rural and remote Australia remains patchy and is not used to full potential, because of no, or inadequate internet access. As noted in the Regional Telecommunications Review report, the ability of hospitals and clinics to support remotely located clinicians and patients via video conferencing and remote monitoring could be severely limited in areas serviced by satellite, which may not be able to consistently and reliably deliver the necessary capacity and technical capability. (p. 2)

Wamboin Communications Action Group (sub. DR151):

... the draft report talks about the benefits of tele-health, distance education and other broadband benefits that are meant to help regional and rural Australia, it is in fact only those metropolitan network users who can actually make use of these services without facing the high delays present on the satellite service. (p. 9)

RDA Far North (sub. DR153):

The current systems also pose challenges for regional education via School of the Air and other virtual classroom based systems. Students and teachers experience regular service drop outs, latency and capacity issues, which is challenging for the student, their families, educators and fellow students. (p. 4)

Online government services

Digital Transformation Agency

The Digital Transformation Agency (formerly the Digital Transformation Office) was established in 2015 as an executive agency of the Australian Government. The agency is tasked with bringing all government services to a single online platform so that these services are ‘simple, clear and fast’ (DTA 2017). It is responsible for coordinating and managing the Government’s information and communications technology policy and procurement functions (DTA 2017).

The Digital Transformation Agency works with government agencies to help transform services and aims to drive the digital delivery of these services from start to finish. The objective of the agency is to improve the government service experience of Australians by making government webpages easier to find and use. For instance, it will streamline webpages so that people can access them with low bandwidth broadband connections and with low monthly data usage. The agency is also in charge of the technical operation of the *myGov* portal.

myGov

A range of Australian Government services can be accessed online via *myGov*. Introduced in 2013, *myGov* provides a secure web portal for users to link government services to a centralised account. Features include receiving service messages and enabling users to update their details in one place, rather than for each service. Participating member services are growing, and currently include services relating to health and aged care, taxation, social security, public housing and job search (Australian Government 2016a; chapter 5).

Public service delivery to regional and remote Australia

Regional and remote Australia is characterised by isolated and sparsely populated communities. It is often not viable for governments to supply these regions with local public infrastructure, such as schools and hospitals. Instead, many public services are delivered remotely through telecommunications technology.

Telehealth

Telehealth is the use of telecommunications technology to provide health services over a distance (DoH 2015). This includes using telecommunications to transmit health information to diagnose and treat health conditions. It also allows for medical training and educational support to remote health workers so they can remain in these areas to complete their training. The Australian Medical Association also proposed that improvements in

technology that provide for telehealth solutions can enhance the likelihood that health workers will choose to work long term in rural areas. And, more broadly, that it improves health outcomes for regional and remote Australia (sub. DR147).

Video-conferencing is becoming a common means of delivering telehealth in regional and remote Australia (and also for urban patients who have limited mobility). It reduces the need for patients to travel to major cities to receive medical advice (DoH 2015). Users of telehealth include the following.

- The Royal Flying Doctor Service (RFDS) — a not-for-profit aeromedical health organisation that delivers primary health care and 24-hour emergency services to regional and remote Australia. The service conducts 44 regular fly-in fly-out clinics per week (RFDS 2016). In 2015-16, it conducted around 62 700 remote telehealth consultations (RFDS, pers. comm., 26 October 2016). The majority of its consultations are conducted over telephone using satellite and mobile technology, although the RFDS is trialling new technology (including video consultations) that could provide a better diagnosis and help it decide which calls require a personal visit by a doctor or nurse.
- Western Australian Emergency Telehealth Service — a telemedicine service to support clinicians in regional and remote sites by linking them via videoconferencing equipment to a specialist emergency workforce. The service aims to improve access to timely medical advice for emergency patients in regional areas and to improve the knowledge and skills of regional clinical staff (WACHS 2016).
- Northern Territory telehealth trial — a trial to provide telehealth services to clinics in the Katherine, Barkly and Central Australian regions from specialists in Alice Springs, Darwin and Katherine. An evaluation of the trial found that telehealth consultations increased from approximately 200 per year to more than 1000. The trial was also found to have delivered savings of over \$1.1 million over 18 months through reduced travel costs (Giles and Elferink 2016; Broadband for the Bush, sub. 6).

Distance education

Students in isolated parts of Australia often rely on telecommunications services for their education. State and Territory Governments provide distance education to students who cannot attend mainstream schooling. Eligible students include children in remote areas and those who cannot attend school due to medical reasons or other commitments.

Educational services are provided through online resources as well as telephone and videoconferencing. However, while the internet is increasingly being used to deliver distance education, the use of this service is contingent on broadband speeds.⁵⁵ Some government initiatives for distance education include the following.

⁵⁵ ICPA Australia stated that the minimum download speed required to effectively participate is 2 megabits per second download and more than 1 megabit per second upload (sub. 11).

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- School of the Air — a distance education service for children in remote communities that is delivered by all State and Territory Governments except Tasmania and the ACT. The service is available mostly for primary school students but can also include secondary school and adult education courses. It covers the same curriculum as other schools in the same jurisdiction and is delivered by high frequency radio transceivers and, increasingly, by videoconferencing via broadband (Australian Government 2016c).
 - School of Distance Education ICT Subsidy Scheme — a Queensland Government initiative that offsets the cost of computer equipment and internet for eligible students enrolled in a School of Distance Education. Annual subsidies include a \$250 hardware subsidy to assist with computer equipment and a \$500 broadband internet subsidy to assist with the ongoing costs of broadband services (Queensland Government 2016).

4.4 Supporting universal service objectives

As the preceding discussion shows, there is a patchwork of initiatives that broadly aim to support universal service objectives. Despite the commonality of the issues being addressed, and the overlapping nature of some of these policies and programs, there does not appear to be an integrated and coherent approach to their provision.

This issue was raised by Rennie et al. (2016) in relation to policies targeting telecommunications in remote areas:

The field of remote communications is characterized by an episodic sequence of programs and reviews, each with different emphases and developing in different ways ... [M]any of these have funded the establishment of facilities, but not their ongoing operation. (p. 40)

This lack of coherence, combined with the scope for duplication and the distortions created by various policy decisions over time, has inevitably led to relatively high public costs of service provision. Some of these programs may also reduce incentives to seek and adopt innovations that could benefit customers. Furthermore, many consumer safeguards in place to support these objectives do not cover telecommunications services outside of the *standard telephone service* and require further review (chapter 9).

FINDING 4.2

The telecommunications universal service obligation is only one of several policies and programs that subsidise the provision and use of telecommunications services across Australia and across different cohorts of users. Conservatively (and excluding the NBN), at least \$1 billion per year is spent on such programs. Australians would benefit from a more integrated approach to meeting universal service objectives in telecommunications.

As noted in chapter 3, some participants to this inquiry stated that there is significant crossover between the TUSO and other policies and programs. Some suggested that these other programs can act as a substitute for the TUSO (Optus, sub. 4) and that there is a blurring of the role of the TUSO with programs that sit outside of it, such as Indigenous community phones in remote areas (Cape York Digital Network, sub. 17).

This potential overlap in programs suggests that there is scope for rationalisation of telecommunications policies and programs in Australia to provide increased consistency, while still targeting specific locations and customer groups. The Australian Government should identify all of these programs and consider what programs work best in different circumstances.

Efficiency gains could be achieved by taking a more coordinated and whole-of-sector perspective when allocating funding and developing policies regarding universal access to telecommunications. As noted by Eckermann, James and de Ridder (sub. DR141):

A quite different endgame might emerge if the States and Commonwealth looked at the overall portfolio of needs and networks that are being funded in rural and remote areas rather than continuing with the current ad-hoc, uncoordinated and piecemeal approach ... (p. 2)

The Commission considers there is scope for greater information gathering and sharing between governments about these programs and existing telecommunications infrastructure. Information gathering should include:

- a stocktake of telecommunications policies and programs that share universal service objectives in all jurisdictions, coordinated by the Department of Communications and the Arts and completed by mid-2018
- a nationwide audit of telecommunications infrastructure, undertaken by an Australian Government agency that has capability and expertise in this area.

Ongoing information sharing could be facilitated through a low-key network of officials. Participating officials should either be involved in relevant government programs or be from government business enterprises and agencies that own or are engaged with telecommunications infrastructure such as nbn, the Department of the Prime Minister and Cabinet, the Department of Defence and public safety agencies. As well as offering scope for more efficient allocation of public funding and expanding telecommunications networks, another benefit of an officials' network is the opportunity to share knowledge about the relative effectiveness of different types of programs.

Participants to this inquiry were generally supportive of a stocktake of telecommunications programs that share universal service objectives. ACCAN noted that it will help to ensure that objectives are being met and that a reformed TUSO is streamlined with other programs to meet the needs of consumers (sub. DR124). Optus argued that more transparency of programs with universal service objectives would allow for greater assessment of the effectiveness of services delivered and would highlight any cases of duplication across policies and programs (sub. DR146). Moore said that the stocktake should occur sooner than what was proposed in the draft report (sub. DR68), while the ACMA suggested that it

could be undertaken as part of the Government's foreshadowed consumer safeguards review (sub. DR157).

RECOMMENDATION 4.1

The Australian Government should, in consultation with State and Territory Governments, conduct a stocktake (by mid-2018) of all telecommunications programs that share universal service objectives with a view to rationalising these programs and improving their efficacy and cost-effectiveness.

The Australian Government should also work with State and Territory Governments to audit existing telecommunications infrastructure — including fibre networks — with a view to using and expanding these networks efficiently.

5 Universal service: objectives and scope

Key points

- There are several posited rationales supporting the development of a telecommunications universal services objective. These revolve around: enabling markets to function well; facilitating economic growth, regional development and social inclusion; providing access to emergency services; and enabling access to online government services.
- As some of these rationales result in community-wide benefits, commercial incentives to provide these services may be inadequate. Australia's extended areas of low population density that are high-cost to service also make a market presence unlikely. However, any policy consideration of a universal service objective must weigh its community-wide benefits and costs.
- The objective of a universal telecommunications service should be modernised — to provide a *baseline* broadband and voice service to all premises in Australia, while having regard to its *accessibility* and *affordability*. This reframed objective should be implemented once National Broadband Network (NBN) infrastructure is fully rolled out.
- Stipulating the scope of a universal service objective as a *baseline* (or minimum) quality of service recognises that there are material costs to the community in the provision of universal broadband and voice services to *all* Australian premises. *Baseline* standards should be set to meet the basic needs of most Australians. Particular needs — as well as any gaps in the *availability* of *baseline* services to meet basic needs — are better addressed through targeted measures.
- Expressed in functional terms, a *baseline* broadband and voice service should be one that delivers both a reliable and an intelligible service, especially in emergency situations.
- Quality settings for voice services diverge from the settings for broadband services, at both the wholesale and retail level. There is also a complex and opaque mix of regulatory instruments and contractual arrangements governing these settings.
- These divergent settings should be streamlined into a coherent and transparent set of technical *baseline* standards across wholesale and retail providers. *Baseline* standards should be determined prior to commencing the Australian Government's foreshadowed review of consumer safeguards. The Government's proposed Statutory Infrastructure Provider legislation could be used to enact them in regulation for wholesale providers. The equivalent standards for retail providers could be established in the Telecommunications Consumer Protection Code. These *baseline* standards should apply once the NBN infrastructure is fully rolled out.
- The Australian Communications and Media Authority should regularly review and adjust the *baseline* in a manner that balances the benefits of a higher *baseline* standard with the costs imposed on the broader Australian community.

Telecommunications has progressed from the 19th century invention of the telegraph — where messages were few and far between — to 21st century ubiquitous connectivity, that allows instantaneous long-distance voice conversations and large amounts of data to be sent around the other side of the world in just seconds.

Australia's current telecommunications universal service obligation (TUSO) was developed at a time when the *standard telephone service* was the dominant technology. However, the TUSO has barely evolved relative to considerable changes in technology, consumer preferences and Australian Government policy and is no longer fit for purpose (chapter 3).

This chapter adopts a ‘blank sheet’ approach to considering the rationales for government policy in this area and, consequently, the framing of any revised policy objective for universal telecommunications services. It: identifies possible rationales for establishing universal service policy objectives (section 5.1); outlines some principles to guide the development of any future policy objective (section 5.2); proposes a revitalised policy objective (section 5.3); and concludes with a discussion of standards for a *baseline* service quality (section 5.4).

5.1 Possible rationales for a universal service policy objective

Communication between people, governments and business is central to a well-functioning economy and society, and telecommunications services provide the vital technological foundation for this communication. Telecommunications services:

- are a key enabler of efficiently functioning markets — thereby facilitating economic growth and regional development
- provide access to emergency services — with spillover benefits for public safety
- facilitate social inclusion — which feasibly enhances societal wellbeing
- enable access to online government services and supports associated data collection — which potentially improves productivity.

In the absence of market failures,⁵⁶ a competitive market generally delivers the efficient quantity and quality of (telecommunications) services at prices that reflect the least cost of production (nbn, sub. 47, attachment). However, where market failures are present, this might not occur. In such cases there is a possible justification for government involvement. Nonetheless, while there is value in communication and some functions may be regarded

⁵⁶ Market failure typically occurs when: a market is adversely affected by monopolistic behaviour; if the production of a good or service has positive or negative ‘spillover’ effects on the broader community (resulting in either under- or over-production of that good or service); or if the good or service is a ‘public good’, such that a person cannot be excluded from using the good or service and where its use by one person does not reduce availability to other people (for example, fresh air and knowledge).

as ‘essential’ to everyday life, there is also a cost involved in providing infrastructure to make telecommunications universally available. Hence, whether government should intervene depends on whether the benefits from doing so outweigh the costs of intervention.

Aside from market failures, governments may establish a universal service objective in an otherwise competitive market for social policy, equity or income and wealth redistribution reasons. These other rationales are canvassed below.

Fundamentally, determining the scope of a policy objective for universal services becomes a question of how much can, and should, be required of providers beyond what they would provide on a commercial basis. Given that governments often directly or indirectly subsidise the provision of universal service, another question is how much taxpayers are willing to pay to provide telecommunications services (beyond the level that people and businesses are able or willing to pay for themselves). This is especially pertinent in the context of what alternative (and potentially higher value) uses there are for scarce taxpayers’ funds and in the context of incentive effects on future private investments.

Telecommunications enables markets to function well

The foundation condition needed for markets to set prices, allocate resources and distribute goods and services is a payment system (currency and an associated financial system). To enhance the *efficiency* of modern markets a number of additional foundations are required. These include: a legal system that defines property rights and enables participants to form and enforce contracts; regulatory oversight to ensure consumers have protection and choice; a transport infrastructure to enable the flow of inputs and outputs between suppliers and purchasers; and a telecommunications system to enable suppliers to connect with customers in real time and facilitate efficient transport logistics and payment systems.

One of the features of telecommunications networks is the presence of *positive network effects*: the more users, the more value is derived by those (new and existing) users.

This is a feature of all infrastructure networks (such as electricity grids and transport highways) — where the more electricity grids or roads are connected, the more effective is the network. However, like all networks, the greater the use the more likely is congestion (and negative network spillovers typically arise from congestion). This is not to say that congestion does not feature in telecommunications networks (chapter 2) but this problem normally occurs at a much higher level of capacity than, say, a road network.

Positive network effects reflect increasing returns to scale. For example, the more people connected to a telephone system or a digital platform the more valuable is the system or platform likely to be to each user. This relationship gives rise to network providers introducing incentives for more users to adopt the device which gives access to their network through, for example, fee waivers and discounts to users for signing up other users

to the network. Incentives to join telecommunications networks have also arisen from other sources (for example, Ahlfeldt, Kourtoumpis and Valletti 2015; The Economist 2016).

The role for governments in the presence of ‘network effects’ is generally focused on enabling competition to flourish and facilitating standards to ensure compatibility (inter-operability) between networks (Farrell and Klemperer 2007).

These positive network effects differ from positive community-wide spillovers arising from the use of telecommunications itself (see below). This is because network effects benefit users rather than the broader community of non-users (that is, non-related third parties) (Liebowitz and Margolis 1994).⁵⁷

This raises the question of whether the benefits to existing users (and so their willingness to pay) increases with the expansion of the network provided by a service provider. If the benefits to existing network users of providing access to the last remaining portion of possible customers are high, then there will be an incentive for the market to provide this service to these possible customers, sharing the additional costs across all users. But if the benefits to existing network users are low, then providers will look to new customers to pay for the actual costs of providing them with a service. However, these costs may not be affordable for many of these potential customers.

In situations where the benefit to existing users from expanding the network is not evident there is often a call for government to act to ensure that unserved customers are provided with some level of service. However, there are community-wide costs from government filling this market gap. While telecommunications services enable modern markets to function more efficiently, markets in many areas will still continue to operate with this type of market gap, although not as efficiently as they may have otherwise.

Telecommunications can support economic growth

Telecommunications networks — like transport and electricity networks — are important to support economic growth and, with this, growth in employment and incomes that benefit the broader community.

Different telecommunications technologies have consistently found small positive effects on economic growth, affecting the incomes of consumers and the productivity of businesses (box 5.1).

⁵⁷ In markets where the full benefits and costs to society are not ‘internalised’ into the price of the good or service, the market may be inefficient, although the alternative (government intervention) may be even less efficient.

Box 5.1 International evidence on the effect of different telecommunications technologies on economic growth

Fixed-line telephones

Roller and Waverman's (2001) analysis using data from 21 Organisation for Economic Co-operation and Development (OECD) countries spanning 1970–1990 showed a significant positive link between fixed-line telecommunications infrastructure and economic activity controlling for two-way causality and country 'fixed effects'. The relationship to growth was found to be stronger once a critical mass was reached. Similarly, a study of 29 Asian countries over the period 1981 to 2006 found clear evidence of non-trivial positive links between telecommunications and economic growth (Levendis and Lee 2013).

Mobile technologies

The positive effect of mobile technologies on economic growth also seems clear. For example:

Waverman et al. (2005) used data on 92 countries from 1980 to 2003, and found that mobile telephony has a positive and significant impact on economic growth,^[a] and this impact may have been twice as large in developing countries compared to developed countries. In a study examining the effect of mobile phones on GDP per person for 120 developed and developing countries, Qiang et al. (2009) also found a larger positive effect from increased mobile phone penetration than fixed-line penetration. (Ward and Zheng 2014, p. 6)

Broadband networks and services

According to Beltrán and Katz (2015), a fairly extensive international literature provides empirical support for the claim that constructing, and expanding broadband networks and services generates a small positive effect on economic growth.

- In their analysis of data from 25 OECD countries between 1996 and 2007, Czernich et al. (2009) found that a 10 per cent increase in broadband penetration raised GDP growth per person by 0.9–1.5 percentage points.
- Koutroumpis (2009) studied 22 OECD countries over 2002–07 and found that a 10 per cent increase in broadband penetration yielded a 0.25 per cent increase in GDP growth.

Information and communication technologies (ICT)

The contribution of ICT on economic growth is generally small but statistically significant (Cardona, Kretschmer and Strobel 2013).

- In a study of 102 developing and developed countries spanning 1996–2005, Vu (2011) found that the effect of ICT on economic growth was highest for internet penetration, then mobile phones and then fixed-line phones.
- A review of studies by Kretschmer et al. (nd) concluded that the effect of investments in voice telephony and data showed that a 10 per cent increase in investment in:
 - voice telephony (mobile and fixed networks) caused a 1.6 per cent increase in output growth
 - data (internet/broadband) resulted in an increase of between 0.45–1.6 per cent increase in output growth.
- Stanley et al. (2015), in a meta-regression analysis of 58 studies, also found minor effects from internet adoption. They suggested that its effects were contingent on the level of development, type of ICT (landline vs computers) and the interaction between them.

^a The results showed that 10 or more mobile phones per 100 people would increase GDP per capita growth by up to 0.6 percentage points (Houpis, Serdarevic and Vetterie 2016).

Much of this literature has focused on the methodological complexities of sorting out the direction of causality between telecommunications and economic growth.⁵⁸ A range of studies have found a two-way causal relationship between telecommunications infrastructure and economic growth, with one study (Lam and Shiu 2010) suggesting that the effect of telecommunications on economic growth is larger in countries that have liberalised this sector (Ward and Zheng 2014). In their examination, Levendis and Lee (2013) (described in box 5.1) found that, regardless of whether telecommunications was modelled as exogenous or endogenous, telecommunications (measured as the number of phone lines per household) had a positive impact on a country's economic growth rate.

A key determinant of economic growth is productivity growth. Dynamic Business (2016) reported that in a survey conducted by Telstra, 41 per cent of small and medium businesses in Australia stated that the National Broadband Network (NBN) boosted their productivity. Previously, the Commission (PC 2004) found that the acceleration in the use of information and communication technologies (ICT) in the 1990s raised the rates of growth in Australia's labour and multifactor productivity. However, while those estimates suggested that the acceleration in use of ICT contributed a relatively small amount to Australia's 1990s productivity acceleration, these estimates (especially the gain in multifactor productivity) were high by international standards. In particular, ICT was estimated to have contributed to around one to two tenths of the total acceleration in productivity growth (PC 2004). There is some evidence that the contribution of ICT to productivity growth in the United States was more substantial, as labour productivity in the ICT-using market sector accelerated by 3.5 per cent per year between the periods 1990–1995 and 1995–2001 (Draca, Sadun and Van Reenan 2007). However, the effect of ICT was not ubiquitous as labour productivity in the ICT-using market sector decelerated by 0.1 per cent in Europe in the same period. While some argue that the differences arose from greater capacity in US relative to European businesses to change their business models to take advantage of improvements in ICT, empirical attribution of productivity growth to particular sources is challenging (PC 2016b).

Universal availability together with digital literacy skills are pre-requisites

Broadband is a key enabler of innovative activity which, in turn, drives economic advancement. However, achieving these outcomes relies on ubiquitous connectivity.

For example, in its study on *Digital Disruption*, the Commission (PC 2016b) pointed out that the extent of the benefits of technological innovation achieved through digital disruption rest on three types of enabling technologies — the internet and its supporting infrastructure, cloud computing, and sensor technologies — all of which rely on internet connectivity. The diffusion of digital technology through an economy is more rapid when

⁵⁸ Sorting this out is important because if telecommunications systems enables economic growth, then subsidising telecommunications infrastructure investments may make sense. If, however, economic growth facilitates telecommunications investment, then subsidies are inefficient and more costly (Levendis and Lee 2013).

the underlying infrastructure is in place, with diffusion over years rather than decades. Katz (2014) listed the requirements for widespread diffusion of digital technologies as:

- affordable — so that it is scalable
- ubiquitous — reaching most of the population
- accessible — by both fixed and mobile technologies
- reliable — able to deliver digital content at speed.

The Commission also observed that data derived from the ‘internet of things’ (and all its many applications) require ubiquitous availability of broadband services (PC 2016a).

Moreover, the availability of broadband services alone, without effective skills to use it, does not necessarily deliver economic benefits (Evangelista, Guerrieri and Meliciani 2014; Cradduck, sub. 28), especially at the firm level. For example:

- Deloitte Access Economics (2016) recently found that more than 90 per cent of small and medium sized businesses (SMBs) were not taking full advantage of digital tools and many businesses identified skill inadequacies as a barrier
- in their examination of the effect of broadband adoption on firms’ productivity, Fabling and Grimes (2016) found that, generally speaking:

... prior studies have largely concluded that, while firms with standard broadband connections tend to have relatively high productivity, broadband adoption has no identifiable causal impact on firm productivity. (p. 2)

The Deloitte Access Economics (2016) study mentioned above also found that those SMBs that took advantage of digital tools experienced a range of economic benefits. When compared to SMBs with ‘basic’ levels of digital engagement, SMBs with ‘advanced’ levels⁵⁹ were:

... 1.5 times more likely to be growing revenue, are 8 times more likely to be creating jobs, are 7 times more likely to be exporting, and are 14 times more likely to be innovating by offering new products and services, compared to businesses with basic levels of digital engagement. (Digital Industry Group Incorporated, sub. DR135, p. 3)

A range of studies have shown that *how* investments in potentially transformative technologies are adopted can make a difference to firm and aggregate productivity growth. In their review of the literature on the productivity and ICTs, Draca et al. (2007) concluded that productivity gains from ICT investments were greater in firms that were better managed and/or changed their strategies and management practices to harvest the potential gains from new technologies. More recently, and consistent with previous literature, Fabling and Grimes (2016) examined the effect of ultrafast broadband (UFB) on firm productivity in New Zealand and found that although there was no significant impact of UFB adoption on labour and multifactor productivity:

⁵⁹ According to the results of that study, about 23 per cent of SMBs had ‘basic’ levels of digital engagement and 9 per cent had ‘advanced’ levels.

... firms making concurrent investments in organisational capital specifically for the purpose of getting more from their ICTs appear to experience higher productivity growth Firms making their joint (UFB-organisational) investment decisions are significantly more likely to report other positive outcomes from the ICT investments, consistent with the identified relationship with productivity being causal. (p. ii)

The importance of adequate digital literacy skills in attaining an accessible universal service more broadly is discussed in section 5.3.

Telecommunications can also facilitate regional economic development

Universal availability of telecommunications also enables regional development *within* a country. Without access to reliable communications, regional-based businesses struggle to flourish on both national and international markets (Bandias and Vemuri 2005; PC 2016b; Gulf Savannah Development, sub. DR111; RDA Townsville and NW Queensland, sub. 23; South Burnett Regional Council, sub. 35). Further, the Mid West Development Commission (sub. DR167) stated that ‘global competitiveness is key to regional success’ (p. 4) and the RDA Central West (sub. 42) said ‘a lack of telecommunications connectivity is a headwind for increased productivity, new business development and economic growth’ (p. 1).

Digital delivery of services enhances opportunities for regionally-based businesses to compete. But it also means that city-based and international businesses can have greater reach into the regions, which could compel less competitive regional business to either lift their game or close. Such pressures and opportunities can improve the allocative efficiency of the economy.

In an early US study, Greenstein and Spiller (1996) found that investment in telecommunications infrastructure resulted in a substantial proportion of growth in consumer surplus and business revenue in local US telecommunications services. More recently, in China (a large country with a range of less developed regions and a liberalised telecommunications service) Ward and Zheng (2014) found that in the less developed western regions of China, the effect of mobile services on economic growth was relatively smaller while the effect of fixed services was relatively larger. However, diminishing marginal returns were also apparent as regions developed over time. Finally, in the context of the Asian region, Levendis and Lee’s (2013) findings (outlined in box 5.1) are germane.

Participants also illustrated a range of benefits from universal telecommunications for regional development (box 5.2).

Box 5.2 Participants' views on universal services for regional development

Various benefits arise from improved connectivity in regional and remote areas

The Regional Australia Institute (RAI, sub. 50) said there was a range of economic and social benefits for regions flowing from the universal availability of telecommunications:

Improving access to telecommunications in regional Australia ... is about the national interest in efficient provision of services and improving access for communities to health, education and economic opportunities that can reduce disparities in social and economic outcomes between the city and the bush. (p. 6)

The NSW Farmers' Association (sub. DR108) noted that modern telecommunications diminished the hurdles created by the distance between Australia's districts:

Access to reliable, fast internet connectivity has become as essential for the Australian economy and society as voice services were in the 20th century. This is especially the case in regional, rural and remote Australia where telecommunications can help to overcome the tyranny of distance that is presented by geographic isolation. (p. 2)

Regional Development Australia Wheatbelt (RDA Wheatbelt, sub. 55) proposed there were productivity benefits from expanding connectivity:

Increasingly agribusiness management and marketing Apps are becoming available and are decreasing time lags in crucial decision making processes in areas such as pest and disease management and/or achieving optimum commodity prices. As with the Internet, mobile phones are increasingly viewed as a critical component of productivity in agriculture. (p. 2)

RDA Wheatbelt (sub. DR77) also pointed out that 'access to efficient digital technologies is an underpinning theme in the ongoing economic development and growth' (p. 2) in each of the nine Western Australian *Regional Blueprints* (West Australian Department of Regional Development 2017).

The Australian Medical Association (sub. DR147) suggested that providing equitable access to adequate telecommunications services — especially for country-based general practitioners, hospitals and health services — would also help to align the currently observed lower life expectancies and outcomes in leading indicators of health of people living in regional rural and remote areas of Australia to their counterparts living in major cities. As good health is a key enabler of development (as well as mobility) these improvements would assist regional economic development and market functioning.

The Northern Regional Development Australia Alliance (sub. 34) commented:

... the USO, which was once all about basic service standards for human safety, should now additionally and equally be about basic service standards to underpin sustainable communities and economies. (p. 3)

Just as there are barriers from a lack of connectivity

On the flip side, when connectivity is unreliable it may act as a 'deterrent to attracting and retaining businesses in communications and local regional areas' (Northern Tasmanian Development Corporation, sub. DR136, p. 2). In a similar vein, the Country Women's Association of NSW (sub. DR101) said:

The digital age is well and truly upon us, but unfortunately, many of our country communities are not seeing the benefits. A lack of connectivity, particularly mobile coverage and data services, results in barriers to growth for our farmers and small business operators as well as barriers to a quality education for our students; and barriers to health services for our entire community. (p. 1)

Regional planning policy has recognised these potential benefits, not just to regional areas but also to cities that are struggling to manage congestion. For example:

Regional planning [is] attempting to encourage a more harmonious distribution of residents away from large congested metropolitan areas. This rationale is based on the existence of externalities: noninternalized congestion externalities in large cities; social benefits from maintaining a rural habitat (Laffont and Tirole 1999 cited in Ockerby and Wongsosaputru's analysis for nbn (sub. 47, attachment) pp. 8–9)

Similarly, the World Bank (2016) recently highlighted the importance of 'digital dividends'. According to the World Bank, these dividends include the economic benefits (like economic growth and job creation) that result from telecommunications investments. It argued that:

By reducing information costs, digital technologies greatly lower the cost of economic and social transactions for firms, individuals, and the public sector. They promote innovation when transaction costs fall to essentially zero. They boost efficiency as existing activities and services become cheaper, quicker, or more convenient. (p. 5)

The lower transactions costs from cheaper and superior telecommunications services also encourage innovative activity in the university sector by making international collaborations across basic and applied research easier and less costly. In the Australian Government's *National Innovation and Science Agenda* (PM&C 2015), the NBN was listed as a key infrastructure supporting increased university and industry research collaborations, both in Australia and worldwide. Suitable intellectual property arrangements can also support these types of collaborations (DIIS and IP Australia 2015; PC 2016c).

The quality of telecommunications services in different locations may also affect regional development. Drawing on evidence from Kohen and Spandonide (2016) and Lane et al. (2016), the National Rural Health Alliance (sub. DR89) stated:

The delivery of high quality telecommunication services offers potential gains for rural and remote communities in terms of improved access to education, health and business opportunities; but if the services available do not provide the quality and reliability required, such potential gains may be significantly diminished. (p. 3)

Given the potentially sizable cost to the public purse of universal services, the question then becomes: what is the optimum level of public investment in telecommunications infrastructure to support broader economic growth, innovation and economic activity, especially in regional areas?

Telecommunications is important for personal and public safety

Various participants submitted that reliable universal access to telecommunications was necessary on private and public safety grounds (box 5.3), especially in remote and regional areas of Australia. The Australian Communications and Media Authority (ACMA, sub. 49)

noted that public safety was a key rationale underpinning the policy to provide reasonable access to voice telephony services.

Box 5.3 Some participants' views on telecommunications and safety

Yaraka Isisford Branch Isolated Children's Parents' Association (sub. 19):

Reliable telecommunications comes back to three words: '**SAFETY OF LIFE**'. (p. 9)

Isaac Regional Council (sub. 26):

The vulnerability of satellite based services to climatic conditions is further exacerbated in northern Australia with the tropics' distinct and often intense wet season. ... In areas with no mobile coverage this would significantly impact community safety if no 'landline' service was available. (p. 7)

Australian Communications Consumer Action Network (ACCAN, sub. 48):

The essentiality of communication services today can be seen by what they are used for; *in life threatening situations for personal safety and security* ... (p. 11)

The Tasmanian Government (sub. 57):

The importance of reliable telecommunications was highlighted in Tasmania during the recent spate of natural disasters. (p. 2)

Bellingham (sub. DR71):

Human safety should always be first and foremost in decision making. (p. 1)

Glasson (sub. DR97):

With medical services up to 200kms away, the Royal Flying Doctor Service is the lifeblood of the bush but is no help if contact can't be made. (p. 1)

The Australian Medical Association (sub. DR147):

... telecommunications access is critical for all Australians and a few minutes can make all the difference in a life and death situation. (p. 1)

Wakelin (sub. DR160):

We need reliable and economic telecommunications for our safety, our health, our businesses and our viability as a community and without mobile and internet services and unreliable land lines we are more vulnerable now than any time in our past fifty years. (p. 1)

Camp (trans., 8 February 2017):

Now, we accept that there's consequences associated with choosing to live and work here in remote Australia, and we do not accept having to put our health and safety at risk by having inadequate and reliable access to a suite of telecommunications services, nor do we believe that most Australians would think that that would be acceptable. (p. 60)

Gardiner (sub. DR177):

In the website of the WA Royal Automobile Club, wheatbelt deaths are stated to be 6 times higher than the average for Australia and 13 times higher than that occurring in WA's metropolitan area. What's more, nearly 2/3rds of the wheatbelt deaths occurred in daylight. What is the essential difference between the characteristics of Perth Metropolitan and the regional wheatbelt areas? The answer has to be the ability to have medical assistance to stabilise any injury. Medical doctors calls the time by which this must be done as the 'golden hour'. I recognise that distance is an issue, but the most important is the communication from the accident point to the base from where medical help can be obtained. (p. 1)

While some of the benefits of ready access to emergency management services can be viewed as mostly 'private' in nature and a matter of personal choice, others may provide

spillover benefits for public safety. That is, the existence of communication links provides benefits to people beyond those involved in supplying or purchasing the service. For example, the availability of telecommunications services enhances the safety of the general public in cases where they may face significant danger from death, injury or property damage as a result of disasters (including floods and fires) and criminal behaviour (including child abuse, domestic violence, and terrorism and espionage activities).

The proliferation of new technologies has dramatically improved people's capacity to contact emergency services beyond that which was practical in the recent past. New technologies — such as the 406 Mhz band personal locator beacons and the larger emergency position indicating radio beacon used on ships — also provide a means of indicating distress and precisely guiding rescuers directly to the individual without embarking on expensive search and rescue operations. There are also alternatives such as the HF Royal Flying Doctor Service (RFDS) channel or HF/VHF maritime and aviation channels, and applications on mobile phones (such as Emergency +) allow emergency calls that also report latitude and longitude to emergency services.

As the level of telecommunications services provided by the market is generally considered to be less than optimal from a public safety perspective, free (to the user) calls to emergency services and full roaming on mobile networks for emergency calls have been longstanding regulatory requirements and expectations across fixed and mobile telephony services in many countries (Attorney-General's Department 2012; chapter 4).

Telecommunications can facilitate social inclusion

Telecommunications can also reduce social isolation and facilitate social inclusion (Eardley, Bruce and Goggin 2009; Garcia Calvo 2012). Indeed, the explanatory memorandum to the Telecommunications Bill 1996 (Cth) (which introduced Australia's TUSO) explained that the fundamental purpose of the TUSO was:

... to safeguard access to a minimum level of essential telecommunications services for all persons in Australia. This recognises the fundamental importance of telecommunications in supporting effective participation in Australian society. (cited in nbn, sub. 47, p. 12)

Others (for example, Cremer et al. 2001) have argued that telecommunications is a necessity for a functioning democracy in order to achieve objectives such as social inclusion. The World Bank (2016) also contended that access to telecommunications services narrows the 'digital divide' (by lowering social exclusion and enhancing social inclusion) and enables participation in political affairs.

The twin notions that accessing internet services is essential for a flourishing modern economy and that such access narrows the 'digital divide' underpinned the UK Government's announcement (Cameron and Whittingdale 2015) of a legal right for its citizens to request a connection to broadband with speeds of 10 Mbps to premises, no

matter where they live. These notions continued to be evident in Ofcom's (2016b) strategic review of digital communications.

The UK House of Commons Culture, Media and Sport Committee also found a compelling case to expand its current universal service obligation (USO) from telephony to broadband:

... given the vital role it plays in people's lives through facilitating interactions with friends and family, and commercial and public services. (cited in Rathbone 2016, p. 13)

Participants' views (including some practical examples) on the role of universal services in promoting social inclusion are outlined in box 5.4.

Further, without enabling employees in remote areas to be socially connected, employers may not be able to attract them (even if their economic value is high) (ICPA Queensland, sub. 86). For example, the Balranald Shire Council (sub. DR112) said:

... Governments are increasingly encouraging people to move outside the major cities to ease housing and traffic congestion in these areas. To make it attractive to people to come to areas such as our Shire, reliable telecommunication services going forward will continue to be essential. (p. 2)

Adequate telecommunications also facilitates volunteering in local community organisations. As Camp (trans., 8 February 2017) explained:

My husband and I are involved in the community in several organisations locally, regionally, further afield. ... Many of the meetings, including local government, when the wet season impedes our road access, are all held by teleconferences. (p. 60)

In many remote parts of Australia, access to education — which is essential for social and geographic mobility (PC 2014a) — is primarily through interactive distance learning enabled by multicast and satellite technology employed by the School of the Air.

It is also well known that social isolation affects suicide rates (Hickie and Player et al. 2016 cited in Davey 2015) and health more generally (Yang et al. 2016 cited in Lewis 2016). Indeed, the National Rural Health Alliance (sub. DR89) argued that:

Generally, there are greater vulnerability and challenges facing people living in rural and remote Australia. Poor access to adequate and affordable digital services will only serve to deepen these vulnerabilities and challenges. (p. 2)

Visitors and tourists can also be deterred when telecommunications services are lacking. For example, the Flinders Ranges Council (sub. 29) submitted:

The lack of the 'safety net' of having the access people are used to and have come to rely on discourages visitation or foreshortens stays ... (p. 1)

In their analysis undertaken for NBN Co Limited (nbn), Ockerby and Wongsosaputro (sub. 47, attachment) pointed out that accepting a social inclusion justification implies that the welfare cost of social exclusion is exceeded by the incremental cost of supplying the telecommunications network to non-commercial areas. Where so, targeting taxpayer

assistance to supporting infrastructure in non-commercial areas (or specific groups of users in commercial areas) is sensible from both a cost–benefit and cost-effectiveness perspective.

Box 5.4 Selected participants' views on telecommunications and its link with social inclusion

The Isolated Children's Parents' Association of Australia (ICPA Australia, sub. 11):

The dependence on reliable telecommunication services increases with geographic isolation. ... inhabitants of rural and remote areas often have no regular face-to-face access to services, and are becoming more reliant on telephone and data to facilitate access to a variety of services for health, education, business and social needs.

The need for a standard telephone service is particularly vital for students who have no reasonable daily access to face to face schooling due to geographic isolation and who therefore study via distance education. (p. 1)

Limestone Coast Local Government Association (sub. 24):

The continued provision of telecommunication services to rural and regional Australia is considered essential for continued quality of life being connected to the wider community. Whilst we recognise that an individuals' choice to live in a remote community comes at a cost — we do not necessarily believe that an essential service such as telecommunications should be compromised due to the technology that is available to be deployed today. (p. 2)

The Australian Competition and Consumer Commission (ACCC, sub. 40):

A universal service regime should ensure that consumers are able to access essential communications services in order to promote social inclusion ... by helping to ensure that all individuals are able to access services necessary for them to fully participate in social, economic and political life. (pp. 1–2)

Bannister (trans., 30 January 2017):

Without a group of like minds, this isolation can become a real issue. One of the most tragic statistics is gifted rural boys are one of our highest statistics for youth suicide, and it's wrong. ... So some of the choice to move away is related to the peer group, you know, the size of the group as well as the like minds, but some of it is related to access to communications technologies at home. (pp. 16–17)

ICPA Australia (sub. DR126) also cited a member from the Gulf of Carpentaria who described a range of practical social inclusion benefits through universal telecommunications, including:

... Folk from the cities think the RFDS is just for emergencies, but that is far from the truth. They are also at the other end of the phone for everyday health issues. Have you any idea what it's like for a new Mum alone on the station with her tiny baby? The baby has a fever and she's fearful. The Flying Doctor gives her reassurance and the support she needs. (p. 2)

Washpen Bush Fire Brigade (sub. DR142):

Future generations are not interested in living in areas that lack basic infrastructure and easily accessible services. To do so leaves them feeling out of touch and excluded. (p. 2)

Polson (sub. DR145):

Telephone communication is ... one of the ways of alleviating the isolation many people with [electromagnetic hypersensitivity] are forced to endure. (p. 1)

... and enables access to online government services while supporting data collection

Another potential benefit of ubiquitous connectivity is through its effect on the cost of government service provision. For example, the UK House of Commons Culture, Media and Sports Committee (2016) inquiry report stated:

A core justification for establishing a USO lies in the social and economic benefits it could deliver, such as cheaper and more efficient Government and public services, and the likely consequent productivity and growth to follow. For example, by 2020 digital services such as ‘tele-medicine’ are likely to be more prevalent — where patients monitor their own conditions through home-based or wearable devices connected to the internet, which could reduce the need for referrals to acute centres. Clearly, broadband offers an opportunity to overcome geographical constraints by providing more services remotely. (p. 12)

As part of its Digital Transformation Agenda, the Australian Government allocated \$95.4 million in its 2015-16 Budget to establish the Digital Transformation Office (DTO). The DTO’s mandate is to ‘redesign services to be digital by default’ and ‘ensure that all new and redesigned government services are simpler and easier to use and can be completed from start to finish online’ (Turnbull 2015, p. 1). In addition, \$159.3 million was allocated to: implement a Digital Service Standard; design and deliver more online services for individuals; and implement a simpler and more efficient grants administration process across Government. Tudge and Taylor (2016a) provided an example of the potential efficiencies from improved digital government services.

Australians’ use of online Australian Government services — through the *myGov* portal — has grown strongly in recent years (Tudge and Taylor 2016b). The number of logins almost doubled from 7.5 million to 14.2 million over 2015-16 and 130 million letters from Centrelink, Medicare, Child Support and the Australian Taxation Office were sent to users’ *myGov* inbox between 2014 and 2016, ‘saving both time and money’ (Tudge and Taylor 2016b, p. 2).

The Australian Government’s recent elevation of the DTO to an agency, with additional responsibilities including the *myGov* portal (chapter 4), reinforces this trend to making access to Government services more user-friendly and digital by default.

The Regional Australian Institute (RAI, sub. 50) outlined some fiscal and other benefits from increased efficiency in public services from universal access to internet services.

Improving internet and mobile in regional areas creates new opportunities for Government and businesses to provide essential services in more efficient ways (i.e. tele-health and distance education) and for globally competitive businesses to access national and international markets from a variety of locations. A recent report by Deloitte Access Economics identified that 40 per cent of an estimated 811 million transactions at federal and state levels, are still completed using traditional measures (face-to-face, post and over the phone). If the proportion of transactions that were completed using traditional methods was reduced from 40 per cent to 20 per cent over a period of ten years, Government would save around \$17.9 billion in real

terms (lifetime present value terms). A further \$8.7 billion would be saved by the public in time, convenience and out-of-pocket costs. (p. 9)

Other participants also pointed to the importance of universal services in accessing online government services (box 5.5). In addition to cost savings to the government from delivering its services online, users benefit in terms of time, travel cost, and convenience.

Box 5.5 Selected participants' views on telecommunications and access to online government services

The Central Australian Youth Link Up Service (CAYLUS, sub. 25):

The Federal government's plans to further reduce direct service delivery and make access to government services primarily via internet (Digital Transformation Office) makes it imperative that there is good quality, affordable access to internet services across remote regions. (p. 3)

The National Farmers' Federation (sub. 31):

The issues associated with regional connectivity ... have limited the ability of regional Australians to participate in modern day delivery of Government services. For example, the *etax* section of *mygov* requires continuous connection to lodge returns. (p. 15)

The South Burnett Regional Council (sub. 35):

Our Council is in a position where if we do not continue to partner in the development of basic telecommunication infrastructure we will be unable to develop to take advantage of the trend for businesses to require a global connection. ... The issues highlighted above don't even touch on consumers 'outside of business' who use telecommunication to ... access government services. (p. 2)

The Northern Territory Government (sub. 59):

Many government services to the community are now almost exclusively provided online and governments are moving to 'digital by default' positions. This has enabled ease of access for members of the public who need these services, but makes it more difficult for people in remote areas to access necessary services where there is no online infrastructure no traditional government to client interfaces, eg customer service centres. (pp. 2–3)

Shire of Cuballing (trans., 14 February 2017):

Even our own shire and our relationship with our community is moving more to that electronic, digital communication. ... people are choosing to ... pay their rates increasingly by electronic transfer. That's now becoming the norm ... we're increasingly using Internet services such as Facebook and our website to put out news and communicate with our communities, SMS as well. (pp. 32–35)

The Commission's inquiry into *Data Availability and Use* (PC 2016a) also highlighted some of the major community-wide gains that unlocking data availability and use could generate across a wide range of public and private sector functions. The inquiry's draft report argued that Australia's health sector exemplified the types of foregone opportunities due to impediments and distrust around data availability and use. For example, opening up health data can help:

- governments and researchers to anticipate and prepare for community and individual health needs
- governments to improve the provision of health services
- empower individuals in managing their own health records.

In turn, the potential gains from digital data availability and use relies on widespread and reliable internet connectivity.

Equity arguments

Historically, the principle of equity in the availability and accessibility of a telecommunications service for all Australians has been an enduring cornerstone of policy. Another long-standing policy centres on equity in pricing — that is, uniform pricing achieved via the cross subsidisation of prices for different groups of consumers.

Numerous participants argued that there were strong equity grounds to provide a universal service of the *same quality* to all who reside in Australia, irrespective of where they live (for example, Great Northern Telecommunications, sub. 2; Tennant Creek Regional Economic Development Committee, sub. 3; Northern Territory Government, sub. 59; South Australian Government, sub. 60; Bradshaw, sub. DR94; Burke Shire Council, sub. DR116; Newton, sub. DR119; Rural, Regional and Remote Communications Coalition sub. DR130).

Further, range of participants (for example, Camp, sub. DR131; BIRRR, sub. 143; Australian Medical Association, sub. DR147; Kerin Physio, sub. DR166) argued for equity in *price* along with equity in *quality* and *availability*. In particular, the Broadband for the Bush Alliance (sub. 6) suggested that, as a lack of competition in many regional areas caused higher prices, lower quality and less choice than in metropolitan areas:

... in these circumstances we believe it is neither fair nor reasonable to expect these consumers to pay more for their telecommunications. (p. 8)

And Rea (sub. DR113) argued:

The exorbitant cost of supplying a reliable telephone and minimum data service (of 20 mBits) to remote Australia should be spread evenly across the population, so that ALL Australians truly do have access to the same priced internet services and have 99.9% reliable phone access. Spreading the cost to all Australians would only be perhaps a 3-5% increase in the average metropolitan costs, and in the scheme of things insignificant to ensure the Health & Safety of rural and remote Australians, the unknown and (most of the time) unthanked custodians of the great land of Australia. (p. 1)

However, Middleton and Park (2014) suggested that the long-standing policy of equity in *pricing* across all Australians may no longer be considered as high a policy priority as equity in *availability*:

The competition regulator [the ACCC] recently allowed competition to the NBN in urban centres, meaning that the ability to generate revenues in urban centres to support the cross-subsidization that allows for uniform pricing may be under threat. (p. 10)

Similarly, some participants questioned whether universal services of an equivalent quality for all should be provided at the same *price*. For example:

-
- the RAI (sub. 50) contended that ‘regional Australians need guarantees that their level of access will remain comparable to the urban areas’ (p. 4), albeit at an affordable price
 - Moree Plains Shire (sub. DR128) submitted that the price of telecommunications was a secondary consideration for businesses
 - the National Farmers’ Federation (sub. DR129) said ‘while the cost of data does not need to be the same across all geographical areas and technologies, the minimum amount deemed necessary should be available to all consumers’ (p. 8)
 - others felt that, in the context of health and education service delivery, prices needed to be affordable for all communities and households (for example, Burke Shire Council, sub. DR116; ICPA New South Wales, sub. DR117).

Some participants considered that an equity-based rationale, based on the equivalence of *quality* as well as price for all was ‘unreasonable’, as adopting this would require city-based users to cross-subsidise those users who choose to live in rural and remote areas of Australia. For example, Coutts Communications (sub. 5) stated:

In my view, it is unreasonable for users in regional and remote locations to expect exactly the same service quality and price (including usage) as those living in cities irrespective of the cost of provision. (p. 8)

From an economic viewpoint, when a uniform price is used as a single policy instrument to meet the dual objectives of ubiquitous availability *and* affordability, distortions are almost inevitable. These distortions were summarised by the Vertigan Panel in the context of its discussion of uniform pricing of the NBN (box 5.6). Effectively, uniform prices benefit wealthy households in high-cost regional areas (who would obtain the service at below cost), while imposing a disguised tax on low-income households in low-cost metropolitan areas (who would pay charges at above cost). These considerations led the Vertigan Panel to recommend a move away from uniform pricing towards cost-based wholesale pricing, with subsidies targeted directly to those consumers who find nbn’s service unaffordable. In its study on *Liberalisation and Universal Access to Basic Services*, the Organisation for Economic Co-operation and Development (OECD) and the World Bank (2006) found that this type of cross-subsidisation of prices was ‘... evidently unsustainable in a competitive market’ (p. 10).

The decision of where to live is largely — but not always — a matter of personal choice, with a range of underlying factors influencing this decision (PC 2014). Many factors — such as proximity to family and friends, property prices, wages, career prospects, commuting times, climate, quality and availability of infrastructure, financial and human capital endowments, and lifestyle — influence people’s location (and mobility) decisions. People choosing to live in regional or remote areas typically place a different value on each of these factors than a person choosing to live in a metropolitan area. Hence, a person is likely to stay put if there are net benefits from doing so and vice versa. As with any such decisions, constraints and trade-offs are inherent.

Box 5.6 Distortions arising from uniform pricing of NBN infrastructure

The Vertigan Panel (2014) outlined the distortions arising from uniform pricing of NBN infrastructure in the following way.

Affordability is intended to ensure all Australians can access high-speed broadband services, should they choose to do so, without undue financial sacrifice. Traditionally, this goal has combined vertical equity (that is, the objective of ensuring that irrespective of income level, all households can afford the service) and the geographical dimension of horizontal equity (the objective of ensuring households can access a given service on similar terms, regardless of where they are located). With both objectives being pursued by a single instrument (the uniform national price), substantial distortions are likely to result.

Thus, the uniform price could benefit wealthy households in high cost regional areas (who would obtain service at less than cost), while imposing a large, but disguised, tax on low income households in low cost metropolitan areas (who pay charges well above costs). Rather than advancing social equity, this would undermine it. Indeed, the uniform national pricing of access to telephony in Australia had exactly this effect for most of the 20th century, providing a large transfer to owners of agricultural land at the expense of poorer consumers in the urban areas.

At the same time, since demand for telecommunications usage (though less so basic access) is relatively price elastic, the uniform price can lead to allocative inefficiency (that is, some consumers who value the service at less than the attributable cost of its provision consume it, while some who value it at more than attributable cost do not). The distortions are then magnified if the fact that prices do not properly signal costs blunts the incentives for efficiency, as neither consumers nor regulators are necessarily aware of underlying costs and hence may have difficulty in observing the potential to secure productivity gains.

Last but not least, price distortions both provide a policy rationale for impeding competition (so as to protect cross-subsidies) and by encouraging ‘cherry picking’ can distort whatever competition emerges. This readily translates into a form of taxation by regulation that lacks transparency, weakens accountability, and achieves its objectives at unnecessarily high cost. (p. 98)

That said, for some people there may be no easy or practical choice. For example, some adults who have grown up in remote, rural and regional locations may have social and relational ties (including caring responsibilities). The benefits of maintaining these ties may be sufficient to inhibit their mobility. Further, housing price differentials between metropolitan areas and their existing location may swamp any pecuniary and non-pecuniary benefits from relocating. Ideally, governments should not impose policies to inhibit mobility — some of these issues are addressed in the Commission’s (2017a) *Transitioning Regional Economies* initial report.

Most children do not have a direct choice about where they live and, hence, their parents’ and even forebears’ decisions can be seen as having spillover consequences for them, especially if they are raised in locations with limited access to education and/or health services. As education and health are key enablers of mobility, improving the accessibility of education and training, and health services — for example, through the School of the Air, and ehealth and tele-health services — particularly in disadvantaged regions, supports geographic labour mobility and has broader efficiency and wellbeing benefits (nbn 2016a; PC 2014a).

For Indigenous Australians living in remote communities, choosing to move away may involve significant costs such as loss of cultural connections and access to native title. To prove a continuous connection to their traditional land, native title claimants need to:

... prove continuity in the acknowledgment and observance of traditional laws and customs and the continued existence of the rights and interests which derived from those laws and customs from sovereignty through until the present day. This imposes a significant forensic burden on native title claimants. (ALRC 2014, p. 29)

While access to telecommunications services means that some workers are able to undertake long-distance commuting or telecommuting (instead of permanently relocating for employment), to the extent that this benefit is private there is no case for taxpayer subsidies to support this choice. However, the presence of spillovers may change this conclusion. Even so, for government intervention to be justified, the costs to the community need to be outweighed by any community-wide benefits.

The Commission's view is that while ubiquitous availability as a policy objective can be seen as enabling equity in availability for all Australians on a geographic basis, it does not necessarily imply that service levels (beyond a minimum) and prices should be equal between commercial and non-commercial service areas for all Australians. Accordingly, the Commission separates its proposed policy response to a geographic availability objective from accessibility and affordability considerations (chapter 7). This approach (which is consistent with Tinbergen 1956) aims to minimise potential distortions by ensuring that, for each and every policy objective, there should be at least one policy tool.

The case for government intervention

A competitive telecommunications market is likely to deliver universal services and hence enable most users to enjoy many of the above-mentioned benefits.

However, other benefits (notably those classified as positive spillovers) may be under-provided by the market — also known as a 'market failure'. In addition, Australia's geography and population density patterns mean that, in some geographic locations, a retail market may be absent (because of non-commerciality) — the so called 'market gap'. As the particular needs of some consumers (for example, people with disability) may not be able to be provided on a commercial basis, this also generates a 'market gap'.

While there are potential community-wide benefits from universal services, they do not necessarily provide a case for government involvement. These community-wide benefits need to be juxtaposed against the community-wide costs of achieving them. Further, the policy that maximises net benefits to the Australian community is generally the most economically efficient option.

These costs are direct and indirect. For example, the direct cost of the current TUSO is around \$300 million per year, with an implicit *standard telephone service* subsidy per premises of potentially up to \$2800 per year (chapter 3).

There are also indirect costs arising from the distortions that government intervention in a market inevitably creates. For example, taxes imposed on service providers — like the Telecommunications Industry Levy (TIL) — or a subsidy funded from general government revenue distorts the allocation of resources from the perspective of both service providers and consumers (chapter 8).

Leaving that issue aside, to the extent that the current TIL over-compensates Telstra for the cost of providing the TUSO, further economic distortions are created in the form of competitive non-neutrality. This occurs when one entity operating in an economic market is given undue competitive advantages or disadvantages over other entities (OECD 2014). Such distortions within an industry can create inefficiency, introduce entry barriers, reduce innovation, and lower the intensity of competitive pressure in the market (OECD 2016).⁶⁰

Further, to the extent that the TUSO encourages the continued provision of, and investment in, voice-only services, it can reduce the investment in data services (which include voice).

Generally, if an option is deemed to be economically efficient, it must also be cost-effective (where cost-effectiveness means that for proposals with the same or similar benefits, the least cost proposal is the most cost-effective). But the converse is not always true. This is because:

... a cost effectiveness study cannot by itself demonstrate a conclusive case (on grounds of economic efficiency) for or against the appropriateness of a proposal, because it is concerned only with possible alternative unit costs, and not concerned with whether the total costs exceed or are exceeded by the total of prospective benefits. The beneficial effect, although achieved as cheaply as possible, may not be worth the cost — that is, it may not contribute to economic efficiency. (PC 2013c, p. 9)

5.2 Some guiding principles

The Commission has established some key principles to guide its assessments for developing a new universal service objective. Internationally, there are some guiding principles used to establish objectives (box 5.7) and formulate policies for universal services (Batura 2016; Xavier 2006). The approaches adopted by other countries are set out in appendix C. The Commission has drawn on these principles and approaches, as well as the perspectives expressed by inquiry participants.

At the core of the guiding principles for policy development used internationally is a reliance on market forces to deliver universal services (including the mobile sector). This is because market forces encourage:

⁶⁰ The Australian Government Competitive Neutrality Complaints Office, within the Productivity Commission, receives and assesses complaints and provides advice to the Australian Treasurer about unfair competition in the public sector.

... network development and modernisation, lower prices, greater attention to customer choice, and the flexibility to facilitate accelerated market diffusion of services, even to niche areas once considered uneconomical. (Xavier 2006, p. 33)

Consequently, the Commission considers that the role of policy and regulatory frameworks in a competitive telecommunications market is best directed towards strengthening market forces and targeting policy to areas of ‘market failure’ and ‘market gaps’.

Several participants expressed views on potential guiding principles for developing universal service objectives, which collectively reflect most of the guiding principles used internationally.

Box 5.7 Setting the objectives — principles used in the European Union and Canada

Universal service objectives in most countries share at least three guiding principles (appendix C). Those objectives are: based on economic and social rationales; clearly defined and encompass the three elements of universality (*availability, accessibility* and *affordability*); and subject to regular review.

Universal service objectives in most OECD countries are based on economic and social rationales (appendix C). For example, in the European Union (EU), Directive 2009/140/EC stated that:

... the Internet is essential for education and for the practical exercise of freedom of expression and access to information. (s.4)

Another example is Canada, where the Canadian Radio-television and Telecommunications Commission (CRTC 2016c) recently established the following universal service objective:

Canadians, in urban areas as well as in rural and remote areas, have access to voice services and broadband Internet access services, on both fixed and mobile wireless networks. (p. 2)

Universal service objectives in most OECD countries are also clearly defined in terms of availability, accessibility and affordability (appendix C). For example, in the EU, the universal service is defined as:

... a defined minimum set of services of specified quality which is available to all users regardless of their geographical location and, in the light of specific national conditions, at an affordable price. (Article 2.1.g of Directive 97/33/EC)

The scope of services delivered through a universal service policy tends to be subject to regular review (appendix C). For example, in the EU, the European Commission is required to review the scope of universal services every three years in the light of social, economic and technological developments (Garcia Calvo 2012).

The importance of considering economic and social rationales when developing a universal service objective was highlighted by several participants. Many participants supported the formulation of universal service objectives based on the three elements of universality — *availability, accessibility, and affordability*. Others also pointed to the need for regular reviews of the universal service objective.

In the light of these views and the principles used internationally, the guiding principles adopted by the Commission are that a universal service objective should be:

- founded on clearly-specified and evidence-based economic and/or social policy rationales
- based on clear definitions of universal access and service and their scope
- specified in the form of measurable user outcomes
- subject to review.

5.3 What should be Australia's policy objective?

A common goal of a universal service policy in many countries is to guarantee every resident, at a minimum, basic telecommunications services at an affordable price (appendix C).

Most participants suggested objectives of a similar nature. Many also considered that the scope of a universal service should not be limited to voice telephony but be expanded to broadband, especially given the Government's commitment to NBN infrastructure. In addition, other components underpinning a future objective and its scope were put forward by various participants (box 5.8).

The World Bank's infoDev and the International Telecommunication Union (infoDev and ITU 2016) also specified some desirable characteristics of a universal service broken down into the three elements of a universal service (table 5.1).

A new universal service objective

Broadband and voice services should be *available* to all premises

Given the significance of access to data for economic and social participation, the Government's sizable investment in NBN infrastructure and the extensive coverage of mobile networks (chapters 2 and 6), the Commission considers that the scope of a new universal service policy objective should be expanded to centre on the provision of broadband to all premises in Australia. This proposal was welcomed by the majority of participants.

While some participants felt that the Commission's universal service objective should specify the favoured policy response (for example, a USO), best practice is to separate the policy objective from any policy response(s).

Box 5.8 Selected participants' views on objectives and scope

Great Northern Telecommunications (sub. 2):

The objective [of a universal service policy] should be as follows: Provision of voice telecommunications service either switched or VoIP conforming to international standards; Provision of universal data service with minimum 25 Mbps download / 5 Mbps upload, with a future capability to download at 100 Mbps or greater; [and] Emergency calling and location identification. (p. 3)

Slattery (sub. 8):

... telecommunications are a necessary & basic service in a modern developed country, underpinning social connection, business capacity & opportunity in education, health services & interaction across distance with others ... (p. 1)

Internet Australia (sub. 43):

... that governments should broaden the concept of universal service to encompass access to the Internet via a suitable fast and reliable broadband connection. (p. 2)

NBN Co Limited (nbn, sub. 47) stated that as its network will provide ubiquitous broadband availability, a broadband USO is not required (p. 3). However, in relation to voice services, it proposed that:

... the definition of the [standard telephone service] supplied under the [TUSO] be stripped back to its essential features, allowing it to be delivered in a technology agnostic manner that does not impose inefficient costs. (p. 12)

The Regional Australia Institute (sub. 50):

Ensuring equitable access to relevant telecommunications should be the core objective This includes providing and maintaining infrastructure that allows people to use reasonable levels of data at an affordable price. (p. 8)

Regional Development Australia Wheatbelt (sub. 55):

... submits that the scope and objectives of the [TUSO] should be extended to include internet and mobile phone services. (p. 2)

Coutts Communication (sub. DR114):

Today a Baseline Telecommunications Service for all citizens might include a: Highly available and reliable telephone service (ie not Skype or any other [Over-the-Top] App); A basic mobile service (where reasonable); [and] Access to the Internet with a reasonable data cap. (p. 7)

Burke Shire Council (sub. DR116):

... the primary objective ... should remain the protection of the most vulnerable, including Australians struggling with inadequate telecommunications in regional and remote areas. (p. 1)

ACCAN (sub. DR124):

An overarching transparent, accountable and enforceable right should ensure that consumers can access communication services and seek redress if necessary.

That the Productivity Commission clearly states that the reformed USO baseline broadband service is capable of 25 Mbps and proportional upload speeds to all Australians. (p. 7)

While agreeing with expanding the scope to include voice and data, the Victorian Farmers Federation (sub. DR125) stated:

We believe that the standard should be technology-independent and thus not solely limited to fixed services — such as NBN would largely provide. (p. 7)

Sensis (sub. DR127) said that a freely available directory listing service be maintained as part of a universal service objective, such as those prescribed in New Zealand and the EU.

Table 5.1 Some characteristics of a universal service

Aspect	<i>Universal service</i>
Availability	Blanket coverage Private service on demand Free emergency calls
Accessibility	Simple and speedy subscription Inclusively designed terminals and services (e.g. for blind or deaf people) Assistance through the terminal (e.g. by making calls or viewing help pages for the web) Reasonable quality of service (e.g. having few dropped calls)
Affordability	Cost of average monthly usage is a small percentage of monthly gross national income per capita Options of cash, card and electronic payment Flat rate, bundles of services or low monthly subscription fee

Source: Adapted from InfoDev and ITU (2016), p. 9.

As universal service is typically a premises-based concept (infoDev and ITU 2016; chapter 1), mobile services are generally not included in the scope of universal service. Nonetheless, various participants (for example, Flinders Ranges Council, sub. DR158) considered that universal service should encapsulate mobile coverage. However, extending the scope of any universal service objective to include ubiquitous mobile coverage would be exorbitantly expensive for Australian taxpayers and the Commission does not support it.

That said, mobile services generally support the delivery of universal services. Hence, mobile coverage is an important factor in assessing market gaps (chapter 6) and the ensuing policy responses (chapter 7).

While the Commission's proposed objective encapsulates access to broadband *and* to voice services, it is clear that broadband will increasingly be the medium through which voice communication is delivered. By taking audio signals and turning them into digital data that can be transmitted in a prioritised manner over the internet, voice over internet protocol (VoIP) technology effectively provides an alternative way of making phone calls. (It is also typically much less costly than traditional phone systems and has additional functionality.)

As technologies continue to converge, it would be sensible to review the scope of universal services in future.

... subject to a *baseline* (or minimum) quality

The ACMA (sub. 49) stated 'universal service is the principle that all citizens should have access to a given standard of communications services' (p. 1).

In setting this standard, some participants argued for quality standards that reflected consumer expectations rather than a minimum level deemed to be necessary. For example, Broadband for the Bush Alliance (sub. 6) said:

A new [objective] needs to address more than the simple provision of voice services. In addition to availability it should include data and address accessibility, affordability, quality of service and equity, consistent with the holistic approach we advocate to addressing the digital divide. (p. 5)

Conversely, Infrastructure Australia (sub. 51) noted:

Governments should be mindful of the impact that minimum standards places on the costs of providing services. The standards set by government should strike an appropriate balance between service quality and service cost. (p. 2)

And Optus (sub. DR146) stated:

The new minimum safety net should be technology neutral and operate as a baseline not an aspirational standard, recognising that market pressures will ensure customer's needs for additional features are met. (p. 3)

In the future, a contestable market is expected to provide a wide range of quality–price options in response to consumer preferences.

To contain costs to the broader community, the Commission proposes to restrict the scope of a universal service to a *baseline* (or minimum) level of service. This is consistent with some international approaches. For example, as noted above, the UK Government recently announced its intention to implement a broadband USO giving people the right to request an affordable broadband connection, at a minimum speed, from a designated provider, up to a reasonable cost threshold (UK Department for Culture, Media & Sport 2016a).⁶¹ In some respects Australia's approach is not dissimilar to the United Kingdom's:

- an affordable broadband connection (notably for customers located in non-commercial areas) occurs via the requirement for a uniform wholesale price for NBN infrastructure
- minimum peak download and upload speeds are specified in the Australian Government's Statement of Expectations for nbn
- in essence, nbn is the primary designated (wholesale) provider
- setting an overall fixed budget for NBN infrastructure is not unlike setting a reasonable cost threshold for individual users. Having an overall fixed budget for building broadband access infrastructure requires nbn to set some (net) cost thresholds when choosing a technology (within its multi-technology mix) for each area

⁶¹ By way of illustration, Ofcom (2016a) estimated that with a 'reasonable' cost threshold of £5000 per connection, between 30 000 and 38 000 premises would be left unserved in their standard broadband and superfast broadband USO scenarios, respectively. This arrangement would also reduce estimated costs of the standard and superfast broadband USO by £280 million and £320 million, respectively. Alternatively, if 95.5 per cent of premises were to be covered by the USO, 140 000 premises would remain unserved and potential USO costs would be reduced by £500–570 million.

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- customers (or areas) who wish to switch their access technology from that chosen by nbn may pay to do so as part of nbn's Technology Choice Program (appendix B).

The UK Government has also proposed an explicit 'opt in' arrangement for broadband connectivity. While sensible, this is not explicitly the case in Australia's broadband infrastructure policies, even though it is implicit in making NBN services available *on request*.

Any future standards that underpin the Commission's proposed functional *baseline* for broadband and voice services should be reviewed regularly (perhaps every five years) to ensure that standards evolve with technological changes and community-wide expectations surrounding the adequacy of *baseline* services. These prospective standards should be both practical and cost-effective. Further discussion of *baseline* standards is in section 5.4.

Universal service should be *accessible* by all

In broad terms, accessibility refers to the ability of users to use telecommunications services irrespective of their personal characteristics (chapter 1). As such, accessibility is not just about physical accessibility, but also applies to users' cognitive and cultural characteristics, as well as their acquired skills, that impinge on their capacity to access standard *baseline* telecommunications services. For example:

- for people with physical or intellectual disability an accessible telecommunications service that is tailored to their particular needs enables a level of engagement with education, information, friends and governments that would not otherwise be possible
- among Indigenous people, cultural factors strongly influence the accessibility of telecommunications services, especially among those living in remote communities (McCallum and Papandrea 2009; chapter 4)
- for some people — for example, older Australians — accessibility is also tied to their digital literacy (or ability) skills (box 5.9). For example, the Northern Tasmania Development Corporation (sub. DR136) cited:

... reports of older retired households and communities facing difficulties in understanding the implications of the [NBN] technology — and being unable to deal with the administering and managing the (understandable) early difficulties of any major infrastructure of this size. (p. 1)

Digital literacy, in turn, supports digital inclusion, which has been defined as:

... based on the premise that all Australians should be able to make full use of digital technologies — to manage their health and wellbeing, access education and services, organise their finances, and connect with friends and family, and with the world beyond. (Thomas et al. 2016, p. 6)

Box 5.9 **What is digital literacy?**

According to the Australian Government Department of Education and Training's (2016b) website:

Digital [literacy] involves knowing how to use a range of technologies to find information, solve problems or complete tasks. Digital literacy is also about knowing how to act safely and respectfully online. (p. 1)

The Victorian Department of Education and Training (2014), described digital literacy as:

... the ability to effectively access, understand and use information using digital technologies, such as through computers, mobile phones, the internet, banking facilities, etc. (p. 3)

Go Digi's (2016) website suggested digital literacy involved:

... making sure everyone has the tools and knowledge they need to make the most out of technology in a way that's relevant and beneficial to them. (p. 1)

The benefits of digital inclusion are potentially sizable. For example, the Regional Australia Institute (RAI, sub. 50) pointed to the PricewaterhouseCoopers' (2009) estimation of the United Kingdom's total potential economic benefits from digital inclusion, which were estimated to be in excess of £22 billion per year (approximately \$38.2 billion). The benefits were based on several factors, including: increased efficiency in government services; better access to information about health and health services; increased digital skills in adults leading to greater employability and earnings potential; and household savings generated from shopping online.

Currently, various accessibility (and affordability) measures are required of Telstra in its role as the universal service provider, and through its carrier licence conditions (chapter 3).⁶² A range of other supports and services addressing accessibility are also outlined in chapter 4. These measures facilitate not only social but also economic inclusion and also assist people in accessing emergency services and online government services. Some participants considered that future universal service policies should explicitly address digital inclusion.

It should also be *affordable*

In addition to availability and accessibility, affordability is another key element of universality. While there are different measures of affordability, in essence it refers to the ability of someone to pay for a good or service relative to their income (box 5.10).

A range of factors affect the affordability of telecommunications services. Clearly, the price of these services is important. However, price by itself is not an indicator of affordability. What matters is how this price relates to the disposable income of individuals, and where telecommunications services fit into their hierarchy of needs (after food and shelter), which varies across individuals and their circumstances.

⁶² Although these accessibility measures are not funded in the Telstra USO Performance Agreement, some measures rely on elements of the TUSO legislation and should therefore be considered to be part of the TUSO in practice.

Box 5.10 **What is affordability?**

According to Ofcom (2014):

... a good or service is considered to be affordable for a consumer if the consumer is able to purchase it without suffering undue hardship. (p. 12)

Pavlidis and Hawkins (2015) stated:

Affordability ... is not just about monthly price but is a multidimensional issue ... we define affordability as a consumer's ability to pay for and use telecommunications without sacrificing expenditure on other essential services and items. (p. 29)

According to ACCAN (sub. 48):

Leading academics (Lewin and Milne 2010) define affordability as a consumer's ability to pay for and use telecommunications without sacrificing expenditure on other essential services and items. (p. 20)

Better Internet for Rural, Regional & Remote Australia (BIRRR, sub. DR143) defined affordability as:

... the purchase of the service does not place undue hardship on people, particularly those in low-income and other disadvantaged groups. (p. 37)

Accordingly, determining whether a *baseline* telecommunications service is affordable in practice is challenging, as it requires benchmarking prices and spending across a range of different categories of households. Some benchmarks on affordability have been suggested by the InfoDev and ITU (2016) (table 5.1). Another approach was adopted by Lewin and Milne (2010) in their assessment of the affordability of telecommunications services in the European Union. They defined a tariff package as 'affordable' if it satisfied the following two conditions.

1. It allows a household in the lowest income decile to make socially necessary use (up to 60 minutes of charged outbound calls and 1 gigabyte (GB) of data downloads per month) through sustainable expenditure (expenditure which is without detriment to other essential spending).
2. The package helps such a household readily control its expenditure on telecommunications.

However, the Lewin and Milne approach implicitly assumes that all low-income households place telecommunications in the same position in a hierarchical ordering of needs.

Other studies have measured telecommunications affordability as the average cost of average monthly usage as a percentage of monthly income, or the availability of a variety of packages and payment options such as flat rate or low monthly subscription fees for telecommunications services.

'Affordability' is also one of the indices included in the *Australian Digital Inclusion Index* (Swinburne Institute for Social Research, Centre for Social Impact and Telstra Corporation Ltd 2015). However, this index does not distinguish between 'essential' and 'discretionary' spending on digital services by households. A more robust approach would analyse the

cost of ‘essential’ telecommunications services as a proportion of household spending disaggregated by household income. In practice, however, it is difficult to disentangle ‘essential’ from ‘discretionary’ spending on telecommunications services, which in any case may change over time. Spending which might be viewed as ‘discretionary’ by some could be regarded as ‘essential’ by others. The South Australian Council of Social Services (SACOSS, sub. DR85) stated:

We agree that the distinction is subjective and arbitrary, especially when even ‘social’ uses of telecommunications are now an important (and for some primary) way of engaging with society and being part of a community. Further, we note that the essential/non-essential distinction is not one that is made in relation to other essential services: for instance, the water used in the 5th minute of a shower, or the electricity used in watching TV. (p. 4)

Nonetheless, while the *Australian Digital Inclusion Index* is a useful source of information on affordability, it may be more effective to monitor the cost of and/or spending on various types of basic telecommunications services as a share of disposable income for different household types. This approach is adopted in chapter 6.

Currently, there are a number of policies designed to ensure that telecommunications services remain affordable (chapters 3 and 4). However, these (often overlapping) policies do not appear to rest on a systematic approach to either measuring or addressing the issue of affordability. Overall, there is a range of definitional and functional outcomes underpinning the Commission’s proposed reframed universal service policy objective. The Commission envisages that the new universal service objective would be implemented once the NBN is fully rolled out. As technologies evolve over time, there may be repercussions for the scope of universal service. As these occur, the scope of universal service should be reviewed as required.

RECOMMENDATION 5.1

The Australian Government should reframe the objective for universal telecommunications services to provide *baseline* broadband and voice services to all premises in Australia, having regard to the accessibility and affordability of these services, once NBN infrastructure is fully rolled out.

To contain costs to the broader community, the *baseline* should be set to meet the basic needs of most Australians in the majority of circumstances.

5.4 How should *baseline* broadband and voice services be defined?

Having reframed the universal service objective around a *baseline* broadband and voice service to all premises, this inquiry offers a timely opportunity to consider what might be a realistic minimum or *baseline* level of service quality for broadband and voice services.

Current definitions of voice-only service quality

The quality of universal telephony services rests mainly on passing a ‘connectivity test’ for the *standard telephone service* and the reliability of that service.

- Under the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth), a *standard telephone service* is defined along functional lines, as a:

... voice telephony carriage service that passes the ‘connectivity test’, or another form of communication for end-users with a disability. The ‘connectivity test’ is passed if an end-user is ordinarily able to communicate, via that service, with other end-users with the same service. (Department of Communications and the Arts (DoCA), sub. 58, p. 1)
- Aspects surrounding the reliability of the *standard telephone service* are set out in the Customer Service Guarantee (CSG) and some other consumer safeguards (chapters 3 and 4).

As highlighted by Smallwood (trans., 14 February 2017), overlaying this is a range of international and industry codes. These include the:

- ITU’s Recommendation G.114 (ITU-T 2003) — which finds that a mouth-to-ear delay of greater than 400 milliseconds is unacceptable to customers
- Communications Alliance’s *Code C519:2004 End-to-End Network Performance for the STS* (Australian Communications Industry Forum 2004) — which specifies minimum performance for *standard telephone services* over fixed and mobile networks. The code was last confirmed in 2014 and the next review is scheduled for 2019. Table 6.4 of that code outlines acceptable propagation times for non-satellite connections and one-hop satellite connections. The code lists relevant international codes including the ITU’s Recommendation G.114.

Current definitions of broadband service quality

Broadband quality is typically defined in terms of its data transmission (upload and download speeds — measured in kilobits per second (kbps), megabits per second (Mbps) or gigabits per second (Gbps) — and the reliability (or volatility) of that throughput.

While there has been some discussion in international circles around moving towards a functional definition for broadband services (OECD 2008), to date most countries simply set targets for a minimum broadband speed (appendix C).

The Australian Government expects nbn’s network to provide peak *wholesale* download data rates (and proportionate upload rates) of at least 25 Mbps to all premises, and at least 50 Mbps to 90 per cent of fixed-line premises, as soon as possible (Fifield and Cormann 2016). While retail service providers (RSPs) are able to purchase different packages from nbn — ranging from 12 Mbps to 1 Gbps download speeds — nbn recently clarified that 25 Mbps is considered the minimum download speed necessary to achieve ‘superfast’ broadband (nbn 2017h).

Given Australia's unique geography and population density patterns, the minimum wholesale peak speed of 25 Mbps for all premises represents a relatively generous specification for broadband service quality, especially when compared with the approaches adopted internationally (box 5.11).⁶³

To enable a successful VoIP service over NBN infrastructure, nbn has established a 0.15 Mbps download and 0.15 Mbps upload committed speed channel on each of its wholesale services (chapter 6). Hence, provisioning by nbn is considered more than adequate for a voice service over the internet.

The remainder of the 25 Mbps (wholesale) peak speed for a broadband service is also comparatively generous. In the United Kingdom, for example, modelling on the current and future connectivity needs of small business found that the median downstream demand for small business would rise from 5 Mbps in 2015 to 8.1 Mbps in 2025 (Kenny 2015). Further, Ofcom (2016b) found that the broadband needs of typical households can be met with download speeds of 10 Mbps (with lower speeds constraining people's use of the internet).

As noted earlier, the quality of a broadband service is more than just download and upload speeds. Similar to voice-only services, the quality of a broadband service also depends on how reliable its throughput is, how successful it is, and whether the content that is being communicated is intelligible. nbn's Service Level Schedule, which forms part of its Wholesale Broadband Agreement with RSPs, outlines a range of other quality standards, including for connection and fault rectification times.

Key functions of a baseline

With technological advancement, digital-based communication has become the new norm. As noted earlier, broadband will effectively become the medium for voice communications for most Australians.

Participants' views

nbn (sub. 47) suggested three principles should apply to a *baseline* voice service: It:

... should (a) satisfy basic consumer needs; (b) be defined in functional terms, and adaptable to technological, industry and consumer changes over time; (c) only include a mandated service level requirement where it is necessary to designate a universal service provider of last resort.
(p. 12)

⁶³ The House of Lords in the United Kingdom recently amended the UK Government's proposed minimum speed for universal services from 10 to 30 Mbps (UK Parliament 2017). Watson (2017) observed that if the amendment is accepted by the House of Commons, it would be expensive (around £0.9 billion) and unachievable to implement (at least in the short to medium term), moving broadband speed requirements from a necessary minimum to an aspirational target. Fildes (2017) reported that the House of Commons did not accept these amendments and dropped the 2020 deadline.

Box 5.11 International comparisons of broadband speed targets, 2016

When compared with Australia's national broadband targets, the United Kingdom's targets are lower while the targets in the United States are similar. These countries have targets to provide minimum download speeds of at least:

- 10 Mbps to all UK residents by 2020 (UK Department for Culture, Media & Sport 2016a)
- 25 Mbps broadband to all Americans (FCC 2015).

National broadband targets have also been increasing over time in these countries. Prior to 2016, the UK Government's commitment was 2 Mbps (UK Department for Culture, Media & Sport 2016a),^a and prior to 2015 the United States target was 4 Mbps (FCC 2010).^b

In contrast, target broadband speeds in Canada are higher than Australia's targets. On 21 December 2016, the Canadian Radio-television and Telecommunications Commission (CRTC) set the following targets for basic telecommunications services:

- 90 per cent of Canadian houses and small business at least 50 Mbps download and 10 Mbps upload for fixed broadband internet access services by 2021 (with the remaining 10 per cent by around 2026–31)
- unlimited data option for fixed broadband access services
- the latest mobile wireless technology available not only in homes and business, but also along major Canadian roads (CRTC 2016a, 2016c).

Similarly New Zealand's connectivity target was recently modified^c to:

- 99 per cent of New Zealanders able to access broadband at peak speeds of at least 50 Mbps ...
- the remaining one per cent able to access at least 10 Mbps by 2025 (New Zealand Ministry of Business, Innovation & Employment 2016b, p. 15).

Notably, the targets established in the United States and Canada appear to be set as aspirational goals rather than a *baseline* standard. For example, Sylvain (2016) noted that at the time of the increase in the United States, around 17 per cent of the population lacked access to 25 Mbps and over half of all rural residents lacked such access. And in Canada, the CRTC (2016b) acknowledged that in 2015, 18 per cent of Canadian households did not have access to fixed broadband internet access services at speeds of 50 Mbps download and 10 Mbps upload.

Even the United Kingdom's modest target of 10 Mbps means that some availability gaps remain. For example, Ofcom (2016c) anticipated that by 2017 around 5 per cent of UK households and business would still be unable to obtain 10 Mbps. At the same time, Ofcom announced plans to reinforce these relatively modest target broadband speeds with a compliance and enforcement regime.

^a At that time, this was comparable with minimum speeds in other EU member states of 1 Mbps in Spain, Belgium and Croatia, 2 Mbps in Finland, and 4 Mbps in Malta (UK Department for Culture, Media & Sport 2016a). ^b Bauer et al. (2015) noted that the increase in the United States' broadband benchmark speed (from 4 to 25 Mbps in January 2015) reflected the Federal Communication Commission's (FCC) recognition of changes in the market place rather than its opinion as to what the appropriate target should be. The minimum upload speed increased to 3 from 1 Mbps at that time. That said, the FCC requires internet providers to supply 10 Mbps download and 1 Mbps upload speeds when they apply for government subsidies to boost access in rural areas (Brodkin 2016).^c New Zealand's previous connectivity target was 80 per cent of New Zealand premises with 100 Mbps broadband and more than 90 per cent of other premises with a peak speed of 5 Mbps by 2022 (New Zealand Ministry of Business, Innovation & Employment 2016a).

Optus (trans., 1 February 2017) stated that ‘... any new baseline service should be designed to ensure that it is both technologically and vendor neutral’ (p. 4).

Many participants commented on the need for a *baseline* broadband and voice service to be *reliable* and *intelligible*. For example, McLaren (sub. 18) suggested that a future *baseline* voice service should be specified as a minimum for safety in stressful or emergency situations as ‘successful’ and ‘intelligible’.

While there was a diverse range of participant views, numerous participants envisaged the quality of *baseline* services in terms of its reliability (box 5.12), especially for emergencies. Regional Development Australia Central West (sub. DR103) also pointed to the relative importance of ‘reliability’ in a small survey of 50 businesses in its region. Survey respondents ranked service reliability as most important followed by speed, access, cost, data size and mobility.

To enable access to emergency services, *baseline* broadband and voice services need to be reliable *and* intelligible. Where there are gaps in the availability of a *reliable and intelligible* service, targeted government interventions may be warranted (chapter 7). In such cases, when put together the set of services should meet a *baseline* standard.

Others also considered that a *baseline* service needed to meet the basic communications needs of most businesses and consumers, irrespective of where they lived. Regional Development Australia Far North, for example, was of the view that telecommunications services need to be ‘fit for purpose’ (trans., 9 February 2017, p. 6). Increasingly businesses need to communicate with their customers, purchase goods and services from other suppliers and interact with governments online (rather than via telephone or paper-based forms of communication). Similarly, many individuals increasingly communicate with their families, friends, neighbours, communities, businesses and governments via digital mediums (box 5.12).

A number of participants suggested that a minimum data cap is also necessary (boxes 5.8 and 5.12). This is particularly an issue for satellite broadband services. nbn’s Fair Use Policy for satellite services (which establishes data caps at the wholesale level) is described in appendix B.

Many users of distance education services, and telehealth and ehealth services argued that a *baseline* standard should take account of their particular needs. For example, based in part on its 2016 Rural Health Issues survey which identified that ‘access to high-speed broadband for medical practices as the most important priority for general practitioners, and the second most important priority among all rural doctors’ (p. 1), the Australian Medical Association (sub. DR147) considered that:

Whatever technology is employed in rural and remote Australia, it must be able to deliver broadband services that meet two-way applications for eHealth and tele-health, medical education, videoconferencing, VoIP and other applications. It must also be available at a comparable cost to those services provided in major cities. (p. 2)

Box 5.12 Selected participants' views about what constitutes a *baseline* service

Reliability matters to many

Regional Development Australia Central West (sub. DR103):

... being technology neutral; being able to support universal access to core services, such as online Government Services, eLearning, telehealth and emergency services; [and] being subject to minimum acceptable levels of quality, reliability and continuity of service. (p. 4)

The Australian Communications Consumer Action Network (sub. DR124):

That the Productivity Commission clearly states that the reformed USO baseline broadband service is capable of 25 Mbps and proportional upload speeds for all Australians. ... [and] Include ... an assessment of the reliability and intelligibility as measurable factors in the baseline. (p. 4)

BIRRR (sub. DR143):

... **ALL** Australian consumers and businesses have baseline voice services that are equivalent to the standard offered in the existing TUSO. ... Wherever Australians live and work they should have access to equitable, guaranteed broadband data services, which exceed a minimum standard in terms of accessibility, affordability, upload/download speed, reliability, repair times, data allowances and maximum access network latency. (p. 3)

The Wamboin Communications Action Group (sub. DR151):

In order for a service to be fit-for-purpose, it must meet or exceed basic requirements of: data speeds (download and upload); data throughput (available data quota for end subscribers); latency; reliability; affordability. (p. 7)

The Cape York Digital Network (trans., 2 February 2017):

Our points are, the baseline USO should include that it is reliable and adequate for the government's digital services, whatever they may be. If people cannot connect, or have to connect multiple times to a service, the speed, the bandwidth, is really secondary to what is going on. (p. 33)

As do data speed and quantity

Bebbington (trans., 14 February 2017):

'Capable of delivering' is not a standard or a safeguard. ... The benchmark must be an actual minimum delivery speed, not hypothetical. ... The standard must be 'delivering 25 megabits a second', so that when there's not, consumers can seek some recourse or improvement. If a consumer, however, elects to pay for 12/1, that's their choice. Speed expectations worldwide would continue to increase, as will demand for data. The USO should stipulate a minimum speed now for satellite, fixed and fibre, plus set minimums for future dates to ensure Australia remains on par with the rest of the world. ... Minimum data limits should also be imposed, so that every satellite customer can expect a minimum level of data now and in the future. (pp. 6–7)

The Pastoralists Association of West Darling (trans., 8 February 2017):

... to operate safely and effectively, we do absolutely need a reliable telephone system, and secondary to that, we do need a reasonably acceptable level of service in regard to internet data provision. (p. 73)

Moree Shire Plains (sub. DR128):

In addition to the minimum quality of the baseline there also needs to be minimum quantity. Thus the service needs to achieve both certain minimum speeds and facilitate reasonable minimum data transmission allowances. (p. 2)

The Commission's view

Given the breadth of needs across a diverse range of users, the Commission proposes that the standard for a *baseline* broadband and voice service quality be set to meet the needs of most Australians in the majority of circumstances, and especially in emergency situations. Framing the *baseline* in this way recognises that the higher the *baseline* quality the greater the cost to the community. Setting universal *baseline* quality at a relatively high level to suit the particular circumstances of a relatively small number of users is unlikely to be justified given the costs involved.

While some users and communities may justifiably require services at levels greater than the *baseline* — for example, users of distance education services, people with disability and those needing priority assistance — this does not mean that the *baseline* quality should be lifted to suit the particular needs of a relatively small number of users. To the extent that any particular needs of a small number of users justify government intervention, these needs are best addressed through targeted measures (chapter 7).

Correspondingly, in areas where broadband and voice service provision does not meet the *baseline* standard, this type of *availability* gap is likely to be best addressed via targeted and cost-effective government interventions.

Conceptually, a *baseline* level of service refers to a minimum acceptable level of service for broadband and voice that enables basic telecommunications-enabled functions to be undertaken successfully.

Expressed in functional terms, a *baseline* broadband and voice service refers to one that is *reliable and intelligible*, especially in emergency situations, where:

- *reliable* means that users can consistently rely on at least one telecommunications service to provide a successful end-to-end communication
- *intelligible* means that the content of the communication can be reasonably heard, read or viewed by the relevant parties.

The Commission envisages that a suitable *baseline* functional standard (recommendation 5.2) would apply to all fixed broadband and voice services, irrespective of the technology used or whether these are used privately or on a shared basis.

In future, as nbn and other statutory infrastructure providers (SIPs, explained below) become the primary channels for delivering universal broadband and voice services, the quality of SIPs' services (including nbn's multi-technology mix services) will matter relative to a *baseline* standard. Whether these services are likely to meet a *baseline* standard (given their current configurations) is discussed in further detail in chapter 6.

Translating a functional *baseline* standard into a technical standard

Technical standards specify the distinct elements of a functional standard that can be measured, and hence monitored, across different technologies. They are usually based on industrial, scientific and consumer experience and are regularly reviewed and updated, as necessary (Standards Australia 2017). Whether these technical standards (or a subset of them) should be set in legislation, regulatory instruments, industry-based standards and/or contractually is discussed in further detail below.

End-users typically distinguish the quality of telecommunications services as comprising two elements:

- service performance — which relates to how well or badly the subscribed-to service functions. Factors that affect service performance include the reliability of a service and the consistency of connectivity it provides
- customer service — a term covering all the ‘touchpoints’ consumers may experience when contacting their retailer’s customer services in relation to the subscribed-to service. It includes phone contacts (the principal channel in most cases), face-to-face elements (including retail stores and any engineers encountered ‘on the ground’) and webchat/online portal channels which some consumers increasingly use (Jigsaw Research 2016).

Establishing technical standards for a *baseline* universal broadband and voice service applies to the first of these two elements; that is, to service performance. Table 5.2 outlines a variety of potential metrics for assessing the service performance of *baseline* broadband and voice services in relation to *intelligibility* and *reliability*.

The United Kingdom, as an example, has also grappled with setting technical standards for broadband services (box 5.13).

Helping customers make informed choices is a valuable adjunct

While the metrics outlined in table 5.2 and box 5.13 generally do not extend to customer service measures, that does not imply customer service is unimportant.

To assist customers to make an informed choice in an increasingly complex telecommunications market, there is growing recognition internationally of the benefits of independent monitoring across a broad range of metrics. For example, the UK telecommunications regulator (Ofcom) has commenced regular public reporting of telecommunications service providers across a range of service performance and customer service metrics (see, for example, Ofcom 2016d). Singapore’s telecommunications regulator also publishes broadband performance using a variety of measures (IMDA 2016), which has seen an overall lift in RSP performance such that they typically deliver above their advertised rates.

Table 5.2 Selected metrics for measuring service performance

Variable	Definition
Intelligibility	
Download and upload speeds	The performance of an internet connection, based on the number of bytes per second that data travels from the user's device to the internet (upload) and from the internet (download)
Web browsing speed	The time taken to fetch the main hypertext markup language (HTML) and assets (text, basic codes and content files)
Latency	The time it takes a packet of data to travel to a third-party server and back
Packet loss	The proportion of data packets that are lost in transmission over a connection
Domain Name System (DNS) resolution	The time taken for an internet service provider to translate website names into internet protocol addresses
DNS failure	The proportion of requests for which the DNS server cannot translate a domain name to an internet protocol address
Jitter	Measures the rate of change of latency
Data cap	Limits the amount of data that is able to be transferred over a period of time
Contention ratio	The degree to which data capacity is shared between different end users at the same network node
Committed information rate	The minimum speed that the access network guarantees will be available between end points under normal conditions
Reliability	
Annual availability	Measures the proportion of time a service is available throughout a year
Installation time	How long it takes to install a new broadband connection from order to successful completion ^a
Fault repair time	How long it takes to repair a fault in the network ^b
Connection time	How long it takes a service to be connected

^a Customer service elements include: getting through to someone who can help; quality of first line support; experience re-contacting/follow-up calls; speaking to the 'right' person; time taken from order to completion of order; flexibility of engineer appointment; quality of installation; quality of set-up; and follow-up (Jigsaw Research 2016). ^b Customer service elements include: getting through to someone who can help; quality of first line support; experience re-contacting/follow-up calls; speaking to the 'right' person; time taken to resolve a problem; flexibility of engineer appointment; quality of engineer visit; follow-up and compensation (Jigsaw Research 2016).

Sources: Adapted from Ofcom (2016d); Ofcom (2016a); Jigsaw Research (2016).

Box 5.13 Setting standards for broadband services in the United Kingdom

Ofcom (2016a) when considering what is meant by a ‘decent’ broadband service stated:

... stakeholders had differing views on what the technical specification should be. Some argued for a basic USO: in effect, a ‘safety net’ for people and businesses. Others argued for an advanced, highly-specified intervention that would offer higher speeds. The question of what constitutes decent broadband will change with time as the needs of people and small businesses evolve. In addition, the requirements of [small and medium enterprises] are greater than those of individual consumers.

Given these points and the fast pace of change in consumer and business needs from broadband, we have provided advice on a range of technical specifications:

- Scenario 1: a **standard broadband** service, characterised only by a 10 [Mbps] download speed;
- Scenario 2: a **more highly specified standard broadband** service, adding upload speed (1 [Mbps]), latency (medium response time), maximum sharing between customers (a ‘contention ratio’ of 50:1), and a defined data cap based on current usage profiles (100 GB per month); and
- Scenario 3: a **superfast broadband** service, with download speeds of 30 [Mbps], upload of 6 [Mbps], fast response times, a ‘committed information rate’ of 10 [Mbps] (i.e. guaranteed 10 [Mbps] at all times) and an unlimited usage [data] cap. (p. 2)

Here, the Australian Competition and Consumer Commission (ACCC) plans to publish a best-practice speeds advertising guide for RSPs in the near future, following its consultations in relation to broadband speed claims. In response, some RSPs are moving towards publishing further information for consumers (ACCC 2017c). The Government recently announced additional funding for the ACCC to implement an independent Broadband Performance Monitoring Program to provide Australian consumers with ‘accurate and independent information about broadband speeds’ (ACCC 2017b, p. 1). The ACCC’s program will be similar to established programs in the United Kingdom (Ofcom 2016d), the United States (FCC 2016a), Singapore (IMDA 2016) and Canada (SamKnows 2016). In announcing the program, the ACCC (2017b) said: ‘Such programs have led to improved transparency of information and increased performance-based competition for broadband services’ (p. 2).

Currently, quality settings differ between voice-only and broadband services

There are divergent quality settings for voice-only and broadband services at both the wholesale and retail level. This difference is most prominent in relation to a key measure of service reliability — fault repair times in nbn’s satellite footprint. For example, under the CSG, Telstra (in its role as both the wholesale and retail TUSO provider) has a fault repair time standard for voice telephony services in remote areas of three business days. In comparison, the standard for fault repair times for nbn’s satellite services in remote areas is either 4 or 10 business days (table 5.3).

Table 5.3 Comparing connection and fault rectification timelines: retail voice-only versus wholesale broadband (with voice capability)^{a,b,c}

Number of business days

Area	Retail voice-only	Wholesale broadband (with voice capability)	
	CSG-attracting services	<i>nbn</i> fixed-line and fixed wireless	<i>nbn</i> Sky Muster satellites
In place connection			
Urban	2	1	1
Rural	2	1	1
Remote	2	1	1
New connection^d			
Urban	5 or 20	9 or 14	20
Rural	10 or 20	14 or 19	20
Remote	15 or 20	19	20 or 35 ^e
Fault service repair times			
Urban	1	1	1 or 3 ^e
Rural	2	2	3
Remote	3	3	4 or 10 ^f

^a Excludes service classes 0, 4, 7, 10 and 20 premises in *nbn*'s Wholesale Broadband Agreement. These classes represent complex connection cases and although *nbn* have indicated these cases will be connected by 2020, they have flexible timeframes commensurate with the complexity of each case (Laurence 2017). ^b Urban areas have equal to or greater than 10 000 people, rural areas have 201 to 9999 people, remote areas have equal to or fewer than 200 people. ^c Some *nbn* rectification timeframes are tighter where the end user fault does not require plant work or *nbn* attendance at the premises. ^d The CSG allows for different connection times depending on how close the premises seeking a connection is to existing infrastructure (table 4.3). The variance in connection times across *nbn*'s fixed-line and fixed wireless depends on a range of factors, outlined in *nbn*'s Service Level Schedule in its Wholesale Broadband Agreement. ^e The shorter timeline is where the end user fault does not require plant work or *nbn* attendance at the premises. ^f The longer timeline is where the premises is in an 'Isolated Area', which means any area within the footprint of *nbn*'s satellite network which is defined as a 'Very Remote' or 'Remote' geographical area in the most recent *Accessibility Remoteness Index of Australia plus (ARIA+)* published by the Australian Population and Migration Research Centre of the University of Adelaide as at the Satellite Commercial Launch Date.

Sources: ACMA (2016e); *nbn* (2016p, 2017a).

The form in which these quality settings is implemented (that is, regulatory or non-regulatory) also differs across voice-only and broadband services.

- Service quality for voice-only services is primarily established via regulatory instruments. They include the CSG, the Network Reliability Framework and Priority Assistance, of which the latter two apply only to Telstra as part of its carrier licence conditions in its role as the universal service provider (chapters 3 and 4). The quality of voice-only services are also subject to an industry code — the Telecommunications Consumer Protections Code (TCP) — which is enforced by the ACMA with

individual consumer complaints in relation to the TCPC escalated to the Telecommunications Industry Ombudsman (TIO) as needed. As mentioned earlier, international codes may also apply.

- Quality settings for broadband services are largely contractual in nature. They are based on (i) the Australian Government's Statement of Expectations of nbn that guide the building of broadband infrastructure and (ii) nbn's Wholesale Broadband Agreement Service Levels Schedule (which apply between nbn and their RSPs).⁶⁴ Although there are consumer protections in Australian consumer law and the TCPC, no statutory *baseline* quality standards currently exist for mobile or internet-based services delivered over NBN infrastructure. The same applies to voice services delivered over NBN's fixed wireless or satellite infrastructure.

Compliance and enforcement arrangements also differ across service type.

- The compliance and enforcement of minimum voice-only quality standards largely rests on the ACMA assessing: RSP performance in the delivery of the *standard telephone service* — including where RSPs offer a voice service over nbn's fixed-line footprint — under the CSG (including any Priority Assistance obligations); and Telstra's performance against the Network Reliability Framework, which applies only to Telstra's fixed-line network and is contained in Telstra's carrier licence conditions (chapter 4).
- The compliance and enforcement of broadband standards is currently contractual in nature. As noted earlier, nbn's Wholesale Broadband Agreements with its RSPs (nbn 2016p) includes service repair timeframes, which vary across its different technologies (and differs with those set out in the CSG). There are some penalties to nbn in the event that nbn does not meet these timeframes (nbn, sub. DR159) but as they are contractual in nature, the compliance and enforcement of these timeframes do not rely on the ACMA. While this approach to compliance and enforcement does rely on RSPs dealing directly with wholesale providers (in the event of a fault needing to be rectified) and may be simpler from the perspective of an end user, it can also create incentives for RSPs and SIPs (including the nbn) to shift the blame onto each other (chapter 7 outlines some options to address this).

Telecommunications is one of a number of industries which has a specialist regulator — the ACMA — and a specialised ombudsman — the TIO. These sit alongside generalist Australian consumer law⁶⁵ and competition law, where the primary regulator is the ACCC.

⁶⁴ The ACCC (sub. DR152) said that nbn had indicated at the time of its Special Access Undertaking to the ACCC that a suite of wholesale service standards would be necessary as the rollout of the NBN infrastructure reached scale. These matters include such things as '... end-user connections, activations, service fault rectifications, network performance and availability, compensation for consumers similar to that set out in the [CSG] and corrective action' (p. 2).

⁶⁵ Australian consumer law is jointly regulated by the ACCC and the Australian Securities and Investments Commission, along with the eight State and Territory fair trading and consumer protection bodies (PC 2017b).

Although the roles of the two regulators intersect, they are discrete (box 5.14). That said, from a consumer's perspective these discrete roles are not readily discernible.

Box 5.14 Two regulators and their overlapping but distinct roles

Both have consumer protection responsibilities

The ACCC and the ACMA each have consumer protection responsibilities in the telecommunications markets. However, there are important differences.

- The ACCC is a generalist regulator with responsibility for consumer protection across all industries, including telecommunications. Its powers are mostly for investigating and enforcing breaches of the Australian consumer law, such as misleading, deceptive or unconscionable conduct, unfair contract terms and consumer guarantees. The ACCC (and its State and Territory consumer protection regulators) usually intervenes after an event or conduct has caused consumer loss or detriment.
- The ACMA, on the other hand, is an industry-specific regulator. It is responsible for rule-making and standard setting in the telecommunications sector and for investigating and enforcing breaches of those rules or standards. It also registers and enforces compliance with industry codes, such as the Telecommunications Consumer Protections Code (TCPC), which establishes minimum standards for providers in key customer-facing areas such as advertising of products and services, credit and debt management, and complaint handling. The ACMA also enforces the Telecommunications Industry Ombudsman (TIO) scheme.^a

Other responsibilities

In addition to consumer protection, the ACCC and the ACMA also have other responsibilities in telecommunications.

- As the competition regulator, the ACCC is responsible for promoting competition in telecommunications markets through the access regulation framework. The ACCC can declare or regulate a service if it is satisfied that it is in the long-term interests of end users, for which it is required to set default prices and other terms and conditions of access.
- The ACMA has a revenue collection responsibility associated with the funding of the TUSO and other public interest telecommunications services. The ACMA also has technical and specific responsibilities, such as planning, rule making and licensing of spectrum and technical regulation of telecommunications equipment, networks and customer cabling.

^a The scheme offers alternative dispute resolution services for small business and residential consumers with unresolved complaints about their telephone or internet services. Members of the TIO scheme must comply with the scheme and the ACMA can direct a provider to enter into the scheme (ACMA 2016k).

FINDING 5.1

There are divergent quality settings for voice-only and broadband services, and a complex and opaque mix of regulatory instruments and contractual arrangements governing these settings.

There are overlapping reviews and legislative developments

The Government has proposed legislation outlining the role of SIPs for the provision of broadband at the wholesale level (DoCA 2016e). This will guarantee that end users continue to have access to underlying telecommunications infrastructure and services after NBN infrastructure is rolled out. The Government has also flagged that it intends to review consumer safeguards at the retail level (DoCA, sub. 58).

The selection of any future set of technical *baseline* standards for broadband and voice services either overlaps in scope or interacts with the outcomes of the safeguards review and the protections established in the proposed SIP regime, or protections that may subsequently be established under that regime (ACMA, sub. DR157). Accompanying these developments is the ACCC's (2017b) recently announced Broadband Performance Monitoring Program (outlined above).

This overlap was identified by other participants. For example, the Australian Communications Consumer Action Network (ACCAN, sub. DR124) said that the 'timing of the consumer safeguards review and telecommunications reform legislation is critical before any current arrangements can be abolished or reduced' (p. 14). Similarly, the National Farmers' Federation (sub. DR129) contended that for 'a truly congruous framework to be developed it is critical that the SIP regime and consumer safeguards are aligned as much as possible' (p. 10).

Accordingly, the ACMA (sub. DR157) commented:

Increasingly, there will be a multi-layered set of obligations; that is, obligations operating separately at the infrastructure and retail layers, but which will interact with each other. Given these interactions, such obligations need to be carefully designed so that they deliver a coherent outcome for consumers. To achieve this, there needs to be a clear line of sight between the intervention and the outcome for the consumer. (p. 6)

The Commission agrees with this assessment.

Baseline technical standards need to be set as part of a unified regime

Prospective *baseline* standards for broadband and voice services need to be established in a single, holistic exercise. Doing so is critical to developing a streamlined framework for broadband and voice services that have wholesale and retail components. Put simply, the existing separate and differing quality standards for voice-only and broadband services need to converge into a single set of well understood and coherent *baseline* technical standards. Due to the structurally separated nature of broadband services, these standards also need to be effectively aligned and integrated across the wholesale and retail sectors so that customers can confidently deal with their respective retailer and get their problem resolved quickly, irrespective of whether the problem is caused by the RSP, the nbn or another SIP. This process will inevitably take time and require adequate consideration of the implications for all wholesale and retail telecommunications providers.

Accordingly, the Commission has not selected a definitive set of technical *baseline* standards to complement its proposed functional *baseline* standard for broadband and voice services. However, setting the future *baseline* technical standards needs to be undertaken **prior to** the:

- Australian Government's proposed consumer safeguards review
- setting of any standards, rules and benchmarks in the Australian Government's proposed SIP regime.

To minimise the regulatory burden and ensure coherence in regulatory approaches, consideration should also be given to:

- relevant aspects of Australian consumer law (set out in Schedule 2 of the *Competition and Consumer Act 2010* (Cth)), and the telecommunications access regime (notably, Part XIC of that Act)
- the ACCC's (2017b) Broadband Performance Monitoring Program.

Ideally, future regulatory developments should all sit within a cohesive regulatory framework for telecommunications services.

Who should set and adjust the technical *baseline* standard?

While the establishment of technical *baseline* standards should be undertaken in an integrated manner, in practice *baseline* standards in many countries are often set by governments in secondary legislation based on advice from the relevant telecommunications regulator. This approach has been adopted in the United Kingdom (Ofcom 2016a) and in New Zealand.

In New Zealand, following the New Zealand Government initially setting the *baseline* standards for broadband services on its ultra-fast broadband (UFB) network, the Commerce Commission (New Zealand's telecommunications regulator) will adjust service network quality and reliability requirements for two key ('anchor') products provided by the open access wholesale-only fixed line network providers. In addition, the Commerce Commission will set generic quality and reliability requirements for each wholesale provider's networks. Otherwise, UFB providers have discretion to set specific quality and reliability requirements for their other (non-anchor) commercial services as they see fit (New Zealand Ministry of Business, Innovation & Employment 2016b; Office of the Minister for Communications (New Zealand) 2017).

Alternatively, *baseline* standards can be set by the regulator itself — for example, the United States' Federal Communications Commission (FCC 2015) sets them.

Either approach enables *baseline* standards to be adjusted relatively promptly in response to changing circumstances, without the need to make (often time consuming) legislative changes. It also efficiently marries the need for technical expertise with relevant policy

considerations. That said, depending on the arrangements in place and the decisions made, having a regulator set *baseline* telecommunications standards can cause unease among policy makers (as happened recently in response to the FCC’s recent decision to reclassify broadband as having a minimum speed of 25 Mbps (Brodkin 2016). Critically, the responsible agency for setting *baseline* standards should operate within an effective de facto budget constraint so that it does not set an overly generous *baseline* with sizable flow-on costs to the broader community.

Given the need for future *baseline* technical standards to be established in a consistent and integrated manner across wholesale and retail sectors, the Commission proposes that the Australian Government establish the initial set of future *baseline* technical standards from a whole-of-government perspective but that it subsequently task the ACMA with responsibility for regularly reviewing and adjusting these *baseline* standards as necessary (recommendation 5.2).

What form should technical standards take?

Whether these technical *baseline* standards should take the form of legislation, government regulation, self-regulation, co-regulation or non-regulatory approaches (such as contractual arrangements) is ultimately a matter for the Australian Government, based on assessments using the principles of best practice regulation (COAG 2007; OBPR 2014; PM&C 2014), which include that they are clear, credible and enforceable.

Specifying *baseline* standards in primary legislation is not ideal

As a matter of principle, technical standards should not be specified in primary legislation. For example, when upgrading its recent broadband speed target, the UK Government explained that ‘secondary legislation can be revised more easily, and is a more appropriate means to specify the minimum level of service’ (UK Department for Culture, Media & Sport 2016a, p. 15).

Statutory *baseline* standards should be limited in number

When setting standards in government regulation, a key consideration is to balance any *systemic* risks of poor outcomes for consumers against the possible effects of onerous expectations on providers’ prices and choice of technology, and the fiscal risks for governments associated with setting excessively generous standards.

Government action associated with the management of different types of risk underpins a number of the rationales for universal services. For example, a key risk for consumers from a poor quality telecommunications service is that they may be unable to contact (or adequately communicate with) emergency services when it is most needed. In some instances this event may have consequential risks for public safety. Even so, while the

severity of this event occurring may be catastrophic (to either the individual or the public at large), the likelihood of it occurring may be relatively low.

Governments are also not best placed to manage all risks.⁶⁶ Consumers can and should manage some of the (often private) risks they face by acquiring relevant information to help them make decisions and acquire the tools which are right for them and their circumstances. This approach is especially warranted in remote areas where help (even from neighbours or nearby towns) can be many kilometres away. For example, as discussed earlier in this chapter, tourists travelling in remote locations as well as locals can manage these risks by acquiring personal locator beacons or using the HF RFDS channel, HF/VHF maritime and aviation channels, or (in South Australia) utilising a network of UHF radio repeater towers, which the South Australian Government's Outback Communities Authority (OCA) has invested in and maintains (OCA 2014). Indeed, risk acceptance by government might reduce the role for individual responsibility and increase the risk borne by individuals who do not develop the skills necessary to manage under circumstances of higher personal risk. This was illustrated in Marree where Turner (trans., 9 February 2017, pp. 27–28) noted that travellers along the Birdsville and Oodnadatta Tracks are often underprepared and have an expectation that there will be good mobile coverage along these dangerous, isolated outback tracks.

Risks of poor quality telecommunications services to any one individual can also pose a political risk to governments as well as to the reputation of service providers. In managing one-off events arising from poor quality telecommunications service, governments need to assess whether the event reflects a systemic risk or simply a one-off idiosyncratic occurrence.

Regulation is ideally aimed at addressing *systemic* risk; it cannot address idiosyncratic risk without creating an undue burden and limiting choice and flexibility. Making providers comply with a large number of *baseline* standards potentially leads to higher prices and reduced choice. The presence of network capacity constraints and the demand for low-priced packages means that providers will often need to trade-off different features to optimise services to meet the needs of their customers and comply with any regulated minimum standards. In these circumstances, the more metrics that are included in a *baseline* standard, the greater is the likelihood of ‘failure’ to meet one of them. Consequently, the higher will be the price for consumers (in order for providers to ‘pass’ all of the standards). In some cases, establishing relatively high *baseline* standards may also preclude some technologies that could deliver adequate broadband and voice services to the majority of users.

Unwarranted high quality *baseline* standards also present a fiscal risk for government and taxpayers (termed, ‘gold plating’).

⁶⁶ And, in any case, risk cannot be eliminated. Nor should governments pay to transfer risks to the private sector that cannot be credibly transferred.

Bearing all this in mind — along with the principles of best practice regulation (COAG 2007; OBPR 2014; PM&C 2014) — suggests a considered and restrained approach to establishing *baseline* technical standards. As a matter of principle, government should select the ‘bare necessities’ when legislating or regulating technical *baseline* standards in telecommunications services.

In particular, while there may be calls to align technical *baseline* standards for SIPs with those in the current TUSO and the CSG, this may not be reasonable or appropriate. For example, the Commission questions whether the current appointment-keeping timeframes that are embedded in nbn’s Wholesale Broadband Agreements with RSPs and in the CSG should be specified in any future regulatory *baseline* standard for SIPs. An alternative approach may be to measure and record providers’ performance against this benchmark rather than establish it as a *baseline* standard. Ultimately, a provider’s ability to accomplish a good record for keeping appointments contributes to its ability to achieve timely connections and fault rectifications, which are two key performance-based standards.

***Baseline* standards should apply to both wholesale and retail service providers**

Delivering a broadband and voice service to each customer requires a service that operates as an interconnected chain. The links in the chain that will affect the actual experience of broadband users include the home network (such as modems, software and signal reception), the wholesale network, the technology delivering services, the RSP’s network (such as network configuration and how much bandwidth is purchased) and the wider internet (nbn 2017h; Ofcom 2016d). As the performance of the wider internet and the home network are not within the control of either wholesale or retail providers, the choice of regulatory focus comes down to the wholesale network and the RSP’s network. Indeed, Telstra (trans., 31 January 2017) noted that the:

... separation of the network from the RSP function means that the RSPs are not in a position to control much of the service quality, but they can control some, certainly in relation to broadband. (p. 38)

Accordingly, Telstra (sub. DR123) argued that as RSPs did not have control of the wholesale broadband network, an industry co-regulatory approach was warranted to address customer interactions in the retail sector. In particular, it suggested that at the wholesale level, *baseline* performance standards should be introduced as part of the proposed SIP regime; while at the retail level (following a suitable amendment of the TCPC):

... RSPs would be required to offer Quality of Service Performance Commitments in a transparent manner. The requirement to publish these ... would be enforceable in a transparent manner under the [TCPC] and subject to ACMA and TIO oversight. The new ... regime would be consistent with, and complementary to, the Australian Consumer Law framework administered by the ACCC. (p. 16)

nbn, however, argued that regulating service levels across the country was detrimental to competition. nbn (sub. 47) argued that imposing service levels across Australia may limit the provision of services on alternative infrastructure and, hence, suggested that service levels should be mandated only in areas where there is no competition in the telecommunications sector. nbn (sub. 47) also stated that in areas where competition exists, competitive forces should ensure that service levels are set at appropriate levels.

While markets and competition generally play an important role in meeting consumer needs, specifying and requiring a set of *baseline* technical standards for the provision of a universal service is not inimical to competition, in and of itself. Problems can arise when standards are set too high or impose an undue compliance burden. Accordingly, when setting standards, either at the wholesale or retail level, consultation with a range of stakeholders will be required to take into account the benefits and costs of the proposed standards, particularly to ensure that they do not impose an undue compliance burden on providers, with costs to the community more broadly.

The Commission notes that the pending legislation for the Government's proposed SIP regime may provide a key foundation for implementing the *baseline* standard for wholesale providers. The proposed regime offers an opportunity for the setting of Ministerial standards, rules and benchmarks covering a range of technology-specific service quality measures at the wholesale level.

The Commission considers that the presence of sufficient competition among RSPs — when combined with adequate information to consumers about the relative performance of different RSPs (for example, the broadband monitoring arrangements established by the ACCC 2017b, 2017c) — should be sufficient discipline on RSPs to achieve and maintain acceptable standards (including *baseline* standards).

Accordingly, the proposed SIP regime could be used to enact *baseline* standards in regulation for wholesale providers while the existing TCPC could be modified to set commensurate *baseline* standards for RSPs. It would, however, be prudent to monitor and review this approach going forward to ensure that consistency in *baseline* standards across the wholesale and retail sectors is maintained. For example, in the event that *baseline* standards were not aligned across the wholesale and retail sectors, a statutory approach could be implemented at the retail level.

Done well, establishing a limited number of transparent and coherent *baseline* standards for broadband and voice services would minimise the regulatory burden on all providers. It may also help ensure that the wholesale provider (mostly nbn) and retailers do not engage in a blame game (and cost shifting) that thwarts and delays the repair of customers' services. As discussed in chapter 7, should consumer difficulties persist, the Government could consider introducing further measures in the context of the Government's proposed review of consumer safeguards (chapter 9).

What about the compliance and enforcement of *baseline* standards?

The enforcement and compliance of the *baseline* standard needs to be set in a commercially viable framework and with complementary wholesale/retail elements.

The compliance and enforcement of future wholesale and retail *baseline* standards by the ACMA would ideally be subject to a responsive regulatory regime, with its principles of consistency, proportionality and transparency (Rorie 2015). In some circumstances (for example, extensive non-compliance with statutory fault rectification timeframes) the escalation of sanctions on SIPs and/or RSPs may be warranted (for example, from negotiation and settlement to the levying of a fine).

RECOMMENDATION 5.2

The Australian Government should, as a matter of priority:

- adopt a functional *baseline* standard for broadband and voice services at the premises as one that is *reliable and intelligible*, irrespective of the technology used
- establish the commensurate technical *baseline* standards for these services.

These technical *baseline* standards should:

- be developed prior to the Australian Government's foreshadowed review of consumer safeguards
- be used to set both wholesale *baseline* standards in regulation (based on, for example, the proposed Statutory Infrastructure Provider regime) and complementary retail *baseline* standards (based on, for example, the Telecommunications Consumer Protection Code)
- apply once NBN infrastructure is fully rolled out
- be regularly reviewed and adjusted by the Australian Communications and Media Authority in a manner that balances the benefits of a higher *baseline* standard with the costs imposed on the broader Australian community.

6 What might the NBN and the market deliver?

Key points

- NBN Co Limited (nbn) has a mandate from the Australian Government to provide infrastructure to support wholesale broadband services to *all premises* in Australia on request. Given that voice services are increasingly being delivered over internet protocols (and will ultimately be delivered this way), nbn's services also have a voice capability. That said, voice quality varies across the different National Broadband Network (NBN) technologies.
- Following the full NBN rollout, expected in 2020, broadband and voice services are likely to be available to all premises due to a universal retail presence on the NBN and near-ubiquitous mobile network coverage.
 - NBN infrastructure will generally enable retail broadband services that meet or exceed a *baseline* standard.
 - Most premises will receive voice services of at least a *baseline* standard through a combination of the NBN and mobile services, but premises in the NBN satellite footprint without adequate mobile coverage (estimated at up to 90 000 premises) are unlikely to receive a *baseline* voice service.
- To better assess market gaps in *availability*, the Australian Communications and Media Authority should:
 - work with mobile network operators to identify the number and location of premises in the NBN satellite footprint without adequate mobile coverage
 - require nbn to report on the reliability of its networks in a manner similar to the National Reliability Framework.
- The market is unlikely to provide *accessible* telecommunications services for some groups of people following the full NBN rollout, even in the presence of the telecommunications universal service obligation (TUSO). This is due to the relatively high costs of, and narrow revenue bases for, these services, particularly in regional and remote areas.
 - These groups include people with disability and life-threatening health conditions, people in remote Indigenous communities, some older people, and people who are homeless.
 - Although advances in technology are expected to improve accessibility, government intervention is likely to be warranted to target their particular needs.
- Given current market trends, telecommunications services are likely to continue to be affordable for most people following the full NBN rollout. However, some people on low incomes may find it difficult to afford these services without targeted government support.
- Tentative estimates suggest that individual market gaps in the availability, accessibility and affordability of telecommunications are likely to be small and differ across users. This gives weight to targeted government intervention rather than a blunt one-size-fits-all approach such as the current TUSO.

Harnessing markets is a guiding principle used by the Commission and internationally for developing universal service policies, provided it is effective and efficient (box 1.1). This chapter examines the extent to which markets, in the absence of the telecommunications universal service obligation (TUSO) and given the substantial public investment in National Broadband Network (NBN) infrastructure, could address the Commission’s proposed universal service objective (recommendation 5.1) and the nature of any gaps that are likely to remain. The analysis in this chapter assumes the completion of the NBN rollout (expected in 2020) and the application of current policy settings (apart from the TUSO), including those with respect to NBN infrastructure. It also assumes that mobile services will continue to play an important role for the vast majority of premises across Australia (chapter 2).

It is challenging to assess the reach of the market in addressing the Commission’s proposed universal service objective, particularly assuming the full rollout of NBN infrastructure. While data — and past trends in data — are used to infer what might occur, there is an element of uncertainty associated with the Commission’s assessment as it is contingent on outcomes that may occur in the future. Related to this, it is difficult to assess the extent to which Telstra would continue to operate the copper access network outside of the NBN fixed-line footprint and its network of payphones in absence of the TUSO. It is likely that portions of these networks operate on a commercial basis, especially where they are used to supply additional services such as digital subscriber line (DSL) broadband in the case of the copper access network and Telstra Air WiFi hotspots in the case of the payphone network. It is generally assumed throughout this chapter that these networks will be decommissioned in full, but this is a conservative assumption rather than the likely outcome.

Data may also necessarily reflect a range of existing policy settings and disregard future technological change. For example, a survey of consumers on attitudes to the affordability of telecommunications services may reflect, and be conditioned by, existing policies such as the Telephone Allowance and other telecommunications subsidies. To the extent that a certain proportion of these consumers report that a service is affordable may in fact reflect the influence of such policies, rather than a genuine market-based response.

This chapter addresses three questions — the extent to which markets (in particular, the mobile services market) and the NBN address universal service *availability* (section 6.1), *accessibility* (section 6.2) and *affordability* (section 6.3), noting that these different dimensions of the Commission’s proposed universal service objective are interconnected. Section 6.4 concludes with an assessment of the size of potential market gaps, including particular user needs, in telecommunications. To the extent that the market is unlikely to fully address the different dimensions of universality, chapter 7 considers some policy options to address market gaps.

6.1 To what extent might the NBN and the market deliver universal service availability?

In line with the Commission’s proposed reframed universal service objective outlined in chapter 5, this section presents the NBN as the primary vehicle for universal service delivery. However, it also acknowledges that mobile services play an important complementary role, especially for the supply of voice calling but also to some extent for broadband.

What will the NBN deliver?

The Australian Government expects that NBN Co Limited (nbn) will supply broadband infrastructure capable of providing peak wholesale download rates of at least 25 megabits per second (Mbps) to all premises (on request) in Australia (Fifield and Cormann 2016b).⁶⁷ Within the fixed-line footprint (which will comprise 92 per cent of all premises), NBN infrastructure will replace the existing copper access network,⁶⁸ while in the fixed wireless (5 per cent of premises) and satellite (3 per cent of premises) footprints Telstra will maintain ownership of the copper access network and the NBN will operate independently of it.

As such, the Commission considers that the NBN will address *wholesale* universal broadband (with voice capability) service availability at the completion of the NBN rollout.

Furthermore, at least one retail service provider (RSP) is likely to be willing to supply a *retail* NBN service on request to each NBN-connected premises for the following reasons.

- The costs of retail service provision over the NBN are likely to be similar across Australia.
- There is already evidence of NBN-wide retail service provision.

The costs of retail service provision over the NBN are likely to be similar across Australia

The provision of retail services over NBN infrastructure involves three input costs — wholesale,⁶⁹ transmission and administrative/marketing/service costs.

⁶⁷ Premises deemed ‘adequately served’ by other superfast broadband network operators are not eligible to receive a NBN service. Forty-five networks in residential estates have been granted adequately served status (DoCA 2015c).

⁶⁸ Parts of the copper access network will remain in use, but their ownership will transfer to nbn.

⁶⁹ In reality, there are three NBN wholesale charges (appendix B). However, it is the uniform/capped nature of these charges that is of significance here, rather than the structure of the charges themselves.

Wholesale costs

nbn currently operates with a uniform capped wholesale price model, where profits from commercial services (primarily fixed-line) cross-subsidise the provision of non-commercial services (primarily fixed wireless and satellite) (BCR 2016a). The Australian Government has proposed an industry levy (known as the Regional Broadband Scheme — RBS) to fund nbn's provision of satellite and fixed wireless services, and has released an exposure draft of legislation for comment. The proposed RBS would require nbn and other fixed-line superfast broadband providers to fund these services. Notwithstanding the Commission's concerns with the design of the RBS (chapter 8), it does not capture RSPs operating on the NBN and, hence, is not expected to increase the costs that RSPs face when supplying services on the NBN.

Transmission costs

The NBN can be thought of as 121 geographically distinct wholesale networks, with RSPs' access supplied through a local point of interconnection (POI). An exception is the NBN satellite footprint, where all traffic is directed to a single metropolitan POI. (More information on the structure of the NBN can be found in appendix B). To supply retail services over NBN infrastructure, RSPs must access a transmission network to connect their networks (typically located in capital cities) to each POI that they seek to access.

The four major RSPs accessing NBN infrastructure (Telstra, Optus, TPG Telecom and Vocus) each own substantial transmission networks (chapter 2), with Telstra, Optus and Vocus each possessing sufficient infrastructure to connect to all 121 POIs. Those RSPs that do not own sufficient infrastructure to cover the POIs they wish to reach must access the transmission network of a third party. Many transmission networks connecting the POIs to capital cities are captured by the Australian Competition and Consumer Commission's (ACCC's) 'domestic transmission capacity service' declaration, which provides for access to these services and sets regulated access prices in areas where there is insufficient evidence of competition. At present, 46 POIs are located in price-regulated areas (ACCC 2014). nbn has recently announced it may also offer wholesale transmission services to remote POIs beginning in mid to late 2017, although further information is yet to be released (Lynch 2016).

While transmission costs are higher in regional and remote areas than in cities (ACCC, pers. comm., 9 September 2016), these differences are likely to be low. Using regulated transmission prices, Ockerby and Wongsosaputro (nbn, sub. 47, attachment) found that the two-year transmission costs per NBN service ranged from \$3 to \$9 for an access seeker with a 50 per cent market share at a POI to \$5 to \$17 for an access seeker with a 25 per cent market share at a POI. At their highest, these costs represent less than 3 per cent of the wholesale rates charged by nbn.⁷⁰ Ockerby and Wongsosaputro (nbn, sub. 47, attachment), concluded that:

⁷⁰ The provision of a 12/1 Mbps retail broadband service over NBN infrastructure involves an access (activity virtual circuit) charge of \$24 per month (\$576 over two years), plus additional charges levied on

... given the uniform wholesale prices already being charged by nbn co, as well as the fact that the ACCC's benchmark backhaul [transmission] prices are fairly even across all 121 POIs, the costs faced by RSPs should be fairly uniform across Australia. (p. 21)

Other costs

While the Commission is not aware of any published data relating to the magnitude of administrative, marketing or service costs for RSPs accessing NBN infrastructure, there is evidence that, with the exception of satellite services, RSPs are developing retail NBN plans on a nationwide basis (ACCC 2016b). This suggests that marketing costs may be relatively geographically uniform.

There is already evidence of NBN-wide retail service provision

Although the rollout of NBN infrastructure had only reached less than 40 per cent of premises at 30 March 2017 (appendix B), evidence to date suggests that retail 'gaps' are not emerging. As noted earlier, Telstra and Optus have a presence at each POI, and there are four or more access seekers at all POIs (table 6.1), despite the ACCC's (2017a) assessment that at the present stage of the NBN rollout an access seeker need only to connect to around one third of the POIs to reach around three quarters of all activated premises. Moreover, Telstra, Optus and Vocus are all currently offering wholesale transmission services to every POI (Long 2017; Optus 2017; Telstra 2017).

Table 6.1 Number of access seekers at each NBN point of interconnection^a

31 December 2016

<i>Number of access seekers</i>	<i>Points of interconnection</i>
3 or less	0
4	41
5	28
6	23
7	11
8	12
9	2
10	3
11	0
12	1
Total	121

^a Access seekers include retail service providers and wholesale transmission network providers

Source: ACCC (2017d).

an aggregated basis (the average total wholesale charge was \$43 per user in 2015-16 (nbn 2016b)). The maximum \$17 transmission charge is less than 3 per cent of nbn's minimum \$576 wholesale charge.

Although at present nearly 95 per cent of NBN retail services are supplied by the four major providers (ACCC 2017d), there are around 140 RSPs offering retail services (nbn 2016h), and 10 RSPs offering services to the entire NBN satellite footprint. These providers are offering a combination of broadband and voice service packages (box 6.1).

Box 6.1 **Can NBN infrastructure supply voice services?**

For clarity, a distinction should be made between the wholesale broadband services that nbn supplies to all access seekers^a and the retail voice and broadband services that RSPs and Over-the-Top (OTT) providers can supply over these wholesale services. Regardless of access technology, nbn's standard wholesale access products include *both* best-efforts (traffic class four) access (this is at the headline peak download/upload speed) and a 0.15/0.15 Mbps prioritised (traffic class one) channel. For example, both a 100/40 Mbps fibre to the premises wholesale service and a 25/5 Mbps *Sky Muster* wholesale service include a 0.15/0.15 Mbps prioritised data channel.

How these products are transformed into retail voice and broadband services is at the discretion of the RSP. nbn (2016o) suggested that the prioritised data channel is suited to supplying a voice service, in the form of a managed voice over internet protocol (VoIP) service (chapter 2). Although views regarding the required bandwidth for a VoIP service differ, 0.15/0.15 Mbps appears to be sufficient. For example, Cisco (2016) suggested 0.087/0.087 Mbps, Maloff (2014) suggested 0.1/0.1 Mbps, VoIP Test (2016) suggested 0.09/0.09 Mbps (but noted that 0.03/0.03 Mbps may be sufficient), and Psyllos (2012) suggested 0.095/0.095 Mbps for a 'very good' audio quality.

Market developments to date also suggest that all nbn wholesale services can supply retail voice services. Telstra and Optus are each offering broadband packages with pay-per-use voice services, bundled voice and broadband packages, and voice-only packages to premises in the fixed-line and fixed wireless footprints, while bundled voice and broadband packages are available in the satellite footprint. OTT VoIP (through providers such as Skype and WhatsApp) is also available for all retail broadband services, but is likely to be of lower quality.

However, as discussed in some detail later in the chapter, the quality of these voice services is not uniform across each of nbn's access technologies.

^a This is known as a Layer 2 Ethernet bitstream service (appendix B).

FINDING 6.1

Irrespective of the telecommunications universal service obligation, current trends and policy settings around NBN Co Limited make it likely that retail NBN services will be universally available on request after the full rollout.

What will mobile networks deliver?

The Commission expects that the overwhelming majority of premises in the NBN fixed-line and fixed wireless footprints, and a majority of premises in the satellite footprint will be able to receive mobile service that is adequate for voice calling purposes.

Although the Commission does not have data relating to the overlap of the three mobile networks with each NBN footprint, it is reasonable to assume that the commerciality of fixed and mobile networks are geographically correlated, and hence mobile coverage is expected to be more concentrated in (commercial) fixed-line areas than in (non-commercial) fixed wireless and, especially, satellite areas. Telstra's mobile networks cover 99.3 per cent of the population, with Optus' networks at 98.5 per cent and Vodafone Hutchison Australia's (Vodafone's) networks at 96 per cent. This suggests a combined coverage of *at least* 99.3 per cent of the population — and hence roughly 99.3 per cent of premises — which exceeds the 92 per cent of premises to be covered by the NBN fixed-line footprint and the 97 per cent of premises to be covered by the combined NBN fixed-line and fixed wireless footprints.

In addition, network operators are continuing to expand their 4G network coverage footprints, increasing the availability of mobile broadband. On current investment plans, Telstra has indicated that its 4G network will reach 99 per cent of the population by June 2017 (Telstra 2016c).

In the draft report, the Commission estimated that up to 90 000 premises in the NBN satellite footprint would be unable to receive a mobile service for voice calling purposes. Several participants criticised this estimate on the grounds that it did not factor in the strength of the mobile signal (Longmire, sub. DR84; ACCAN, sub. DR124; Cotton Australia, sub. DR133). On this point, Telstra (sub. DR123) submitted:

... the fact a customer's residence falls within a mobile coverage map does not automatically translate into an ability to deliver a [standard telephone service] to the residence.

Consumers may reside within areas of mobile coverage but not receive mobile signal within their premises due to a number of factors and obstructions. This can be contrasted with a fixed infrastructure connection where connection to the premises guarantees in premises access to the service.

For example, something as innocuous as the size and location of windows in a premises can impact on in-building coverage and signal strength. Generally, mobile coverage within a premises will improve with the more windows and the larger in size. Smaller windows, increased glass thickness and tints will reduce mobile coverage. (p. 7)

While the Commission acknowledges these issues, the estimate is conservative in several other regards.⁷¹ It:

- is based on assumed Telstra mobile coverage of 99.25 per cent of the population, while Telstra claims 99.3 per cent coverage (this accommodates the possibility of an overstatement of coverage due to rounding)
- assumes that Optus' and Vodafone's mobile coverage areas lie entirely within Telstra coverage areas, which serves to underestimate actual combined coverage areas

⁷¹ By 'conservative', it is meant that the estimate potentially *overstates* the number of premises in the NBN satellite footprint who are unable to receive a mobile service for voice calling purposes.

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- assumes that all non-covered areas lie in the NBN satellite footprint, which overstates the size of these areas. Because of this assumption, the same estimate could apply to all of Australia.

In addition, Regional Development Australia Northern Territory (sub. DR115) criticised the methodology used to generate the Commission’s estimate; in particular the assumption that average household sizes are equal across the NBN fixed-line, fixed wireless and satellite footprints. Regional Development Australia Northern Territory supplied data suggesting that household sizes are larger in very remote Australia, and hence likely to be larger in the NBN satellite footprint. But the implication of this is that the upper bound of the Commission’s estimate may further *overstate* the number of premises without mobile coverage — increasing the overall confidence in the estimate. This is because Telstra’s mobile coverage estimates are based on population coverage rather than premises coverage, so higher household sizes in remote areas suggest that the population that cannot receive mobile coverage are concentrated in a smaller number of premises.

Alternative sources lend support to the Commission’s estimate. For example, Optus (sub. 4) submitted that ‘net cost households comprise a maximum of 100 000–150 000 premises’ (p. 17). Optus subsequently clarified that this estimate was based on its own mobile coverage, and that following the same methodology based on Telstra’s mobile coverage would lead to an estimate of only around 65 000 premises without mobile coverage (pers. comm., 21 February 2017). Further, according to the *MyBroadband* data set (DoC 2015a), at August 2015 there were about 51 000 premises in distribution areas rated as having ‘no mobile coverage’.

What is an adequate level of mobile coverage?

Ultimately, the actual extent of mobile coverage depends on the level of coverage considered adequate to establish that a mobile voice service is ‘available’. As noted by Telstra above, the actual mobile service quality experienced by a consumer in an area which is nominally covered is affected by a variety of factors.

A key dimension is whether indoor coverage is required. The Australian Communications Consumer Action Network (ACCAN, sub. DR124) submitted that it ‘does not consider that coverage outside the premises qualifies as a service’ (p. 12). But while coverage indoors is clearly desirable, for the Commission’s purposes there are two reasons that outdoor coverage should suffice.

- The extent of indoor coverage is affected by factors such as window size and thickness that are often outside the control of both policy makers and mobile network operators, but sometimes within the control of users. Moreover, users with only outdoor mobile signal may have the option of installing either internal or external antennas which can improve the quality of the indoor coverage

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- Because universal availability of retail broadband (with voice capability) services is likely following the full rollout of the NBN, mobile services will not be the only voice calling option available to a premises.

For these reasons, the Commission considers that an outdoor mobile signal of adequate strength to engage in voice calling constitutes the *availability* of a mobile service.

Will these services meet a *baseline* standard?

To what extent can NBN and mobile services be expected to meet the Commission’s functional *baseline* standard — recommendation 5.2 — that *baseline* quality broadband and voice services should be both reliable and intelligible?

The findings in this section should be interpreted with caution, for two reasons. First, while the Commission is recommending that the Australian Communications and Media Authority (ACMA) develop *technical* standards to facilitate the adoption of these *functional* criteria, the findings in this section draw directly on the Commission’s proposed functional criteria. A more rigorous approach will be possible once the technical standards have been established. Second, the NBN is in rollout phase. Publicly available data on key service characteristics are limited and may not be representative of the service that will be available at the conclusion of the rollout.

This approach also requires the Commission to make several judgment calls. For broadband, the Australian Government’s expectation that nbn will deliver minimum peak wholesale speeds of 25 Mbps is relatively generous by international standards (chapter 5). Moreover, nbn was established by the Australian Government in 2009 to provide broadband services to all Australians, an objective set out in successive statements of expectations supplied by shareholder ministers from successive Australian Governments (nbn, sub. DR159). This amounts to an unambiguous indication by the Australian Government that NBN infrastructure is expected to supply a reasonable *baseline* quality of service for broadband (which will also have a voice capability) at the completion of the rollout. Hence, for the purposes of this section, the Commission will assume that services supplied over NBN infrastructure will meet, or exceed, a *baseline* quality of service for *broadband* (which may change over time).

The remainder of this section focuses on the extent to which voice services supplied over the combination of NBN infrastructure and mobile networks will meet a *baseline* standard. Because these services are available in conjunction with one another rather than independently, the assessment considers the technologies together on an area-by-area basis.

Criteria for assessing the adequacy of voice services against a *baseline* standard

This section evaluates the adequacy of voice services against the *baseline* standard through a functional lens rather than drawing on detailed technical specifications. The assessment is based on two criteria:

- reliability, which draws on the requirement that a service be *reliable* (chapter 5)
- call quality, which draws on the requirement that a service be *intelligible* (chapter 5).

The reliability criterion has three dimensions: the availability of multiple (both NBN and mobile) services, the individual reliability of these services, and their availability in the event of a power outage.

Other factors related to reliability are the mandated timeframes for connection and service fault rectification, and the enforcement regimes underpinning these. Indeed, several participants commented that the Customer Service Guarantee (CSG, chapter 4) cannot apply to services supplied over NBN fixed wireless and satellite networks. However, the Commission considers that these aspects of reliability are regulatory in nature (rather than inherent to the technology at hand), and should be examined as part of the considerations in setting technical *baseline* standards (chapter 5). They are not discussed in this section.

The call quality criterion has many dimensions in a technical sense (for example, latency, jitter and echo) which in a formal testing environment can be combined in a composite indicator known as a ‘mean opinion score’. But for the Commission’s purposes, an assessment can be made on the basis of evidence provided by participants and consideration of whether the network was designed to support voice services.

NBN fixed-line footprint

Very few participants raised concerns with the adequacy of voice calling over nbn’s fixed-line networks. Gregory (trans., 7 February 2016) said that while TUSO services were originally delivered with mean opinion score-tested copper infrastructure, this emphasis has fallen away with the transition to the NBN. This led to the view that some NBN fixed-line customers will receive a ‘substandard or degraded service, or an unworkable service’ (pp. 6-7). Birrell (sub. DR76, p. 1) commented that ‘NBN infrastructure will have the potential to provide a high quality telephone service, however in times of blackout, system overload, electrical disturbances, etc. this potential rapidly declines’.

These concerns were not raised by other participants, nor did participants supply the Commission with first-hand accounts of poor call quality over NBN fixed-line connections. This is despite NBN fixed-line infrastructure already being the sole medium for the supply of fixed voice services in areas where the copper access network has been disconnected, including those supplied by Telstra under the TUSO. Further, if there are isolated instances of poor voice call quality over NBN fixed-line services, the near ubiquity of mobile services within the NBN fixed-line footprint provides customers with a viable alternative.

Consequently, the Commission considers that call quality within the NBN fixed-line footprint is likely to be adequate to meet a *baseline* standard at the completion of the NBN infrastructure rollout.

Reliability is likely to be more variable within the NBN fixed-line footprint than call quality. While nbn operates with a reliability objective of 99.9 per cent⁷² for all fixed-line services (nbn 2016p), power outages at nbn sites are exempt from this measure. The Commission does not have any data on the relative impact of power outages on the various nbn fixed-line networks, but it is likely that those which require more localised powered infrastructure — such as fibre to the node (FTTN) — will be more susceptible to power outages. Some, but not all, of nbn's street-side nodes have a back-up power supply unit.

Power outages at the customers' premises will also have a varied impact across the NBN fixed-line footprint. These will lead to unavailability of the service for non-fibre to the premises (FTTP) customers unless a back-up power unit (supplied independently of NBN infrastructure, such as an uninterruptable power supply) has been installed (table 6.2). This contrasts with the 'plain old telephone service', where the copper line can be used to power a basic telephone (that does not require connection to the mains power) in the event of a power outage because of the direct current link to the local exchange.

Table 6.2 Impact of power outages on NBN fixed-line services

Technology	Proportion of all premises (%)	What happens in a power outage at the premises? ^a
Fibre to the premises (FTTP)	17–21	The service will remain available for a period of time. A back-up battery powering the network termination device is optional but available free of charge with a FTTP connection. A desktop (not cordless) phone can connect directly to the network termination device and powered from the back-up battery. The battery can supply adequate power for voice calling purposes for between 3.5 and 11 hours under a variety of usage, battery age and temperature scenarios modelled by nbn.
Fibre to the node/basement (FTTN/B)	43–48 ^b	The service will not remain available. As with a 'plain old telephone service', the copper line into the premises is powered (except this is now from the node rather than from the exchange) with a FTTN/B connection. But a VDSL with VoIP functionality modem is required to make calls from a FTTN/B connection, and these require an additional power source.
Fibre to the curb (FTTC)	Up to 6 ^b	The service will not remain available. nbn has indicated that customers will be required to power the distribution point unit (roughly the equivalent of the node in an FTTN connection) located outside of the premises.
Hybrid fibre coaxial (HFC)	21–27 ^b	The service will not remain available. No back-up battery is supplied with the HFC network termination device.

^a Assumes nbn's usual power supply arrangements are still operational. ^b Proportions are Productivity Commission estimates based on (2016b, 2016i).

Sources: Crozier (2017b); nbn (2016b, 2016i, 2016o); Tsang (2015).

⁷² This is the proportion of time for which the service is available.

But the near ubiquity of mobile service availability within the NBN fixed-line footprint provides a counter to concerns about reliability in the event of a power outage.

Prior to the 2014 redesign of the NBN fixed-line footprint from an all-FTTP model to the present multi-technology mix, the ACMA (2013c) undertook stakeholder consultation which led to the *Telecommunications (Backup Power and Informed Decisions) Service Provider Determination 2014*. This declaration allowed nbn to move from the compulsory supply of a back-up battery for the network termination device in FTTP areas to the optional supply at the customer's request. The consultation revealed mixed views on the necessity of back-up power supply options in fixed-line areas. For example, according to the ACMA (2013c):

During 2012, the former Department of Broadband, Communications and the Digital Economy (now Department of Communications) undertook a consultation process with representative stakeholder groups. The department also conducted consumer research in consultation with NBN Co to gauge attitudes to the backup power supply service.

The consumer research found that the majority of consumers surveyed (56 per cent) consider that the installation of a backup power supply unit should be based on a consumer choice. Eighty per cent indicated they would choose to use a mobile phone to call emergency services during a power failure. Anecdotal comments from this research also highlighted a number of consumer concerns regarding the installation of backup power supply units. These included that the unit was 'aesthetically unappealing' and 'battery backup is an unnecessary waste of money and resources'. (p. 6)

And discussing the scale of the issue, ACCAN (2014) noted:

Both the 2012 and 2013 ACCAN National Consumer Perceptions Survey contained the following question: *Thinking of the fixed line phones that you've got at home, have you got one that does NOT need to be plugged into a power point?*

In 2013, 59% of respondents answered no, indicating that they were already in a position of not having a functional fixed-line phone handset in the event of a main power failure. Given the ubiquity of mobile phones, this figure is not regarded by ACCAN as a cause for concern.

However as the mains power-dependent NBN equipment is being introduced in the context of a compulsory migration of services not initiated by the consumer, with implications for what is an essential service for some, it is appropriate that regulatory steps be taken to ensure the right information is being provided consistently to consumers as soon as possible. (p. 3)

In the context of this inquiry, Birrell (sub. DR76) was the only participant to raise a concern with the lack of battery back-up for NBN fixed-line services. While this may be due to a lack of awareness, it is also true that the proportion of the adult population with a mobile service but no fixed voice service grew by 10 percentage points between June 2013 and June 2016 (ACMA 2013b, 2016d). Such growth indicates an increased willingness to rely on mobile services among the Australian population.

Of course, the lack of an nbn-supplied back up battery does not preclude customers from supplying a back-up unit of their own (an uninterruptable power supply unit). These can be purchased for less than \$200.

In light of these considerations, the Commission considers that reliability across the NBN fixed-line footprint will likely be adequate to meet a *baseline* standard for voice calling at the completion of the NBN infrastructure rollout.

NBN fixed wireless footprint

Similarly, most participants did not raise significant concerns about call quality over nbn's fixed wireless networks. That said, Better Internet for Rural, Regional & Remote Australia (BIRRR, sub. 143, p. 97) claimed that 'Many users on nbn Fixed Wireless are experiencing serious [quality of service] issues and their VoIP services are also suffering', attributing the problems to congestion in nbn's networks. These concerns were not echoed in other submissions.

nbn (sub. DR159) submitted that it could not determine whether voice services that can be supplied over its fixed wireless networks were adequate without appropriate technical criteria being supplied.

Telstra (sub. 30) commented favourably on call quality over nbn's fixed wireless networks, noting that it:

... already provides voice services as part of a bundle to customers over NBN [fixed wireless] infrastructure. The actual service delivered is no different to other services offered in fulfilment of the [TUSO]. To date we have not received a complaint in relation to voice quality or voice service availability over NBN [fixed wireless]. (p. 15)

Mitiamo IT (sub. DR118, p. 1) agreed, opining that 'NBN Fixed Line and Fixed Wireless services are generally adequate for carrying telephone calls', as did Coutts Communications (sub. DR114):

I am heartened that the PC Report recognises the straightforward proposition that NBN Co should be empowered to provide a 'quality equivalent voice service' on NBN Fixed Wireless. (p. 1)

In light of this evidence, the Commission considers that call quality within the NBN fixed wireless footprint will likely be adequate to meet a *baseline* standard at the completion of the NBN infrastructure rollout.

Several participants (Isolated Children's Parents' Association NSW, sub. DR117; Isolated Children's Parents' Association of Australia, sub. DR126; BIRRR, sub. DR143) raised concerns about service reliability within the fixed wireless footprint, centring on the lack of a back-up battery solution for NBN fixed wireless services in the event of a power outage at the customer's premises. These concerns did not extend to the reliability of NBN fixed wireless services themselves, which operate with a reliability objective of 99.9 per cent (in line with NBN fixed-line services). Given that the majority of NBN fixed-line services will also not be operational in the event of a power outage at the premises (table 6.2), it is somewhat unexpected that this aspect of NBN fixed wireless services has attracted a greater degree of attention from participants. Although mobile services are likely to be more ubiquitous within the NBN fixed-line footprint than within the NBN fixed wireless

footprint, it is highly probable that the overwhelming majority of premises in the fixed wireless footprint will also have mobile coverage.

Hence, the Commission considers that reliability across the NBN fixed wireless footprint will also likely be adequate to meet a *baseline* standard for voice calling at the completion of the NBN infrastructure rollout.

NBN satellite footprint

Many participants submitted that call quality over the *Sky Muster* service was poor, especially when ‘double hop’ (*Sky Muster* service to *Sky Muster* service) calls are made. This is due to the high latency associated with these calls (box 6.2).

Some participants submitted that the latency of the *Sky Muster* service is particularly challenging in some applications such as for business purposes (Croft, sub. DR80; Moffatt, sub. DR93), distance education (Isolated Children’s Parents’ Association Qld, sub. DR86; Isolated Children’s Parents’ Association of Australia, sub. DR126) and emergency calling (McLaren, sub. 18). Johnson (sub. DR95) submitted that the latency can lead a call being mistaken for an automated telemarketing campaign.

Telstra (sub. DR123) undertook controlled testing of calls from USOSat service to USOSat service (single hop) and *Sky Muster* service to *Sky Muster* service (double hop). Latency and mean opinion score ratings were measured for each service (table 6.3).⁷³ Double hop *Sky Muster* service satellite calls achieved a mean opinion score of 3.58 to 3.64, which translates to between ‘fair’ and ‘annoying’. For context, Telstra (sub. DR123) states that:

A value of 4.0 to 4.5 is considered to be the normal value of [the copper access network] and causes complete satisfaction. Many VoIP services aim at this level. Values dropping below 3.5 are termed unacceptable by many users. (p. 10)

The Commission also experienced both single and double hop *Sky Muster* calls, and found the latency of single hop calls to be barely noticeable and of double hop calls to be noticeable but manageable. Frequent double hop calls could make use of the service frustrating, but many calls (including those to emergency services) would likely feature a single hop.

⁷³ Latency is a factor that influences the mean opinion score of a service. Mean opinion score is measured on a 1 to 5 scale as follows: 5: Perfect. Like face-to-face conversation or radio reception. 4: Fair. Imperfections can be perceived, but sound still clear. Typically, the range for mobile phones and toll quality services. 3: Annoying. 2: Very annoying. Nearly impossible to communicate. 1: Impossible to communicate.

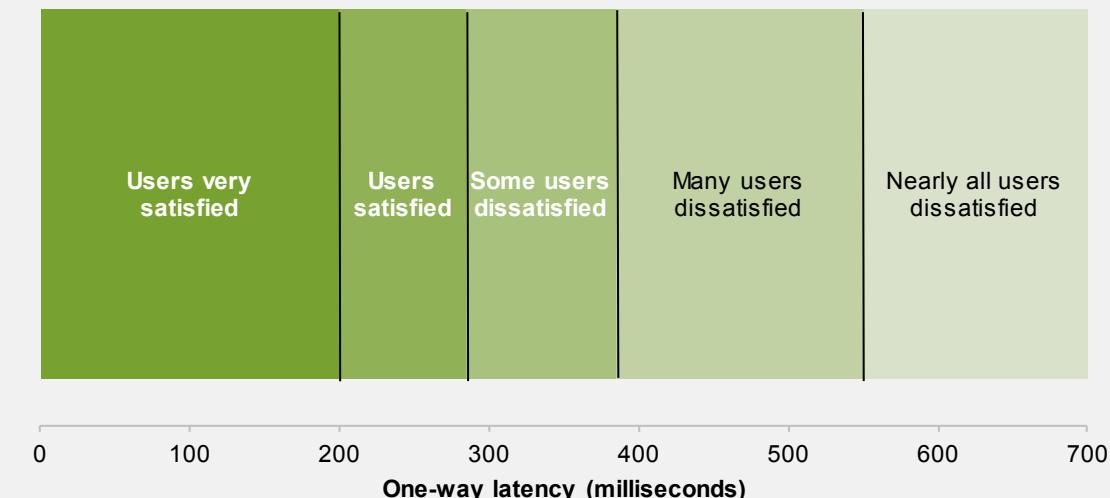
Box 6.2 Voice call latency

The *latency* of a voice service is the time taken for a signal to pass from the mouthpiece of one phone to the earpiece of the other (one way latency). Users perceive latency in a nonlinear fashion (see below), and for services other than geostationary satellite services, it is usually comfortably less than 200 milliseconds and not perceivable. But for geostationary satellite services, due to the limitations imposed by the speed of light, latency cannot be reduced to less than around 250 milliseconds for a call which must ‘bounce off’ the satellite once (a single hop) and around 500 milliseconds for a call which must ‘bounce off’ the satellite twice (a double hop).

Calls made between geostationary satellite services (such as the *Sky Muster* satellites and USOSat) and other services feature a single hop, while calls between two geostationary satellite services feature a double hop. An exception is calls made between two USOSat services, which feature only a single hop because of ‘meshing’ technology (Telstra, sub. DR123). nbn’s *Sky Muster* satellites do not feature this technology.

Latency and user satisfaction

Perception of one-way voice call latency based on International Telecommunication Union modelling



Source: ITU (2003).

Table 6.3 Satellite service to satellite service voice call quality

Based on testing conducted by Telstra

Call	Latency milliseconds	Mean opinion score
<i>Sky Muster</i> service to <i>Sky Muster</i> service	666.3–666.65	3.58–3.64
USOSat service to USOSat service	398.45	4.12

Source: Telstra (sub. DR123).

Mobile services are also available within the NBN satellite footprint, likely reaching at least three quarters of premises.⁷⁴ Where this coverage is of adequate strength, the Commission considers that service call quality is of an adequate *baseline* standard within the NBN satellite footprint. But where there is no coverage, or the signal is sufficiently weak that call clarity outdoors is poor, the Commission considers that — at the current time — the combination of NBN *Sky Muster* satellite and inadequate mobile coverage may not meet a *baseline* standard for voice call quality.

Many participants submitted that the NBN *Sky Muster* service did not meet a *baseline* standard for voice calling reliability. The main issues raised were:

- The service frequently drops out or is unavailable, especially during bad weather.
- There is no back-up battery solution. This is compounded by the greater prevalence of power outages in rural areas (PC 2013b).

Based on the large body of anecdotal evidence supplied to the Commission, the actual reliability of nbn's *Sky Muster* service is below the 99.7 per cent target. nbn (sub. DR159) noted that:

The Commission refers to nbn's satellite target reliability of 99.7% in a number of places and compares this to the performance of other networks. However, it is important to recognise that this is an availability target in relation to the satellite's availability to provide broadband services, rather than measured performance outcome (it being too early in the lifecycle of nbn's satellite network to provide definitive statements about actual performance). It is also the case that the availability target for satellite has a number of exclusions for factors beyond nbn's control such as weather, solar activity, satellites transiting the sun, rain fade and radio-frequency interference, which may reduce the actual availability that is achievable for voice services. (p. 12)

While nbn has also accepted that the *Sky Muster* service has performed below expectations, it expects reliability to improve. In response to questioning from the Senate Estimates Environment and Communications Legislation Committee regarding the *Sky Muster* satellite service, nbn CEO Bill Morrow (2017) stated:

We saw late last calendar year an exorbitant number of network failures that were occurring. This was in the neighbourhood of 30 to 40 a week that we were seeing on a constant basis. And it would take the network down for an hour or two. And it would take the modem inside someone's house an hour to boot back up.

... I just want to make sure that the committee is really clear on this. This satellite, while it is wonderful in its new technology, cutting edge in so many ways, and offers a service that most people in the distant remote would never be able to have because of the reach, is prone to error. It will never be as reliable as what many people would get in the metropolitan areas. It uses a 30-gigahertz band that is susceptible to rain fade, so when there is heavy rain it is going to go out, and there really is not anything that we can do.

⁷⁴ This based on a maximum of 90 000 premises without mobile coverage out of a total of 412 000 premises in the NBN satellite footprint — 78 per cent.

... I can say I am confident that improvements will continue. I am not confident they will go away entirely for a while. There are so many things — we think everything is great. We had a very unfortunate incident last night that lasted for a couple of hours. We thought everything was running well; there was no indication of any other problem, and something new pops up. So, again, this is so new, I think it is going to take us probably close to six months to a year to iron out and get the bugs to come out to where we can sort them. (pp. 129–30)

Recent data indicate improvement to the reliability of the *Sky Muster* service, with the Minister for Regional Communications announcing in April 2017 that ‘NBN Co’s data shows the Sky Muster service has stabilised, with 80 per cent less network outages than September last year’ (Nash 2017).

The Commission considers that, currently, the combination of NBN *Sky Muster* satellite and poor/no mobile coverage does not meet a *baseline* standard for voice call quality. However, in March 2017 nbn announced that it will direct additional resources into improving the reliability of the service so the possibility that the service may improve in the future should not be ruled out.

Earlier in this chapter, the Commission estimated that the number of premises in the NBN satellite footprint without adequate mobile coverage is likely to be less than 90 000. The design and implementation of a targeted policy response to fill this ‘market gap’ (chapter 7) needs to be informed by a more systematic identification of the number and location of premises affected.

FINDING 6.2

When the NBN is fully rolled out, the combination of the NBN and mobile networks is likely to supply retail broadband and voice services to most premises at a level that meets or exceeds *baseline* standards.

All premises are likely to receive a broadband service at or above a *baseline* standard, but premises in the NBN satellite footprint *and* without adequate mobile coverage are unlikely to receive a voice service that meets *baseline* standards. This is due mostly to the unreliability of the *Sky Muster* service (including the prevalence of power outages), and to a lesser extent to call quality issues.

RECOMMENDATION 6.1

As a matter of priority, the Australian Government should request that the Australian Communications and Media Authority work with mobile network operators to identify the number and location of premises in the NBN satellite footprint without adequate mobile coverage. This involves:

- developing metrics that give effect to the Commission’s functional criterion that all premises with an *available* mobile service have outdoor mobile coverage of adequate strength to engage in voice calling of a *baseline* quality
- collecting data from mobile network operators to map the extent of mobile service availability that meets these metrics.

Actual performance data are needed

The assessment of quality of service was made without the benefit of actual performance data relating to the reliability of nbn's wholesale services. Ideally, this data should be collected and made publicly available to enable a more comprehensive assessment of the adequacy of these services.

There is precedent for mandated reporting of data of this nature. Under the Network Reliability Framework (chapter 4), Telstra is required to report to the ACMA on the reliability of its CSG-attracting fixed-line voice services in terms of network availability and the proportion of services that do not experience a fault.

The Commission considers that a similar scheme applying to all NBN wholesale services would be well-suited to assessing the true reliability of the services. But because nbn operates as a wholesale-only provider (and Telstra an integrated network provider and retailer), the scheme would need to be adapted to account for this by being framed around the availability of an end-user connection rather than a retail service. The reporting should be delineated by technology (including the different technologies that comprise the NBN fixed-line footprint) at a minimum, and should ideally distinguish between each of the 101 satellite beams.

Implementation of a network reliability reporting scheme should commence immediately, to inform the development of any targeted programs to address gaps in services (as detailed in figure 9.1 in chapter 9). The ACMA has statutory information-gathering powers under the *Telecommunications Act 1997* (Cth) that would enable this data to be collected from nbn (also discussed in chapter 9).

As well as providing a more rigorous basis for assessing quality of service, these data would allow any such assessment to recognise if the quality of service experienced over the NBN improves (or declines) into the future. There is already some evidence that consumer experiences with the NBN are improving, with complaints to the Telecommunications Industry Ombudsman about retail services supplied over the NBN as a proportion of NBN services in operation falling over the past several years (chapter 2).

RECOMMENDATION 6.2

The Australian Government should task the Australian Communications and Media Authority to require NBN Co Limited to report regularly and publicly on the reliability of its networks, delineated to a reasonably granular level (by access technology at a minimum).

Any cost implications for nbn?

In response to the draft report (and particularly draft findings 6.1 and 6.2), nbn (sub. DR159) submitted that the Commission had overstated the expectations that the Australian Government had placed on nbn:

nbn wishes to correct the position that has been adopted by the Commission throughout the Draft Report — the assumption that nbn has been set up to provide both broadband and voice services to all premises in Australia. This is perhaps best encapsulated on page 205 of the draft report — ‘Options to address universal availability should leverage off NBN infrastructure, as it is designed to provide wholesale broadband (including voice) services to all Australian premises ...’ This is simply an incorrect characterisation of nbn’s role. (p. 8)

In nbn’s view, its role is to provide a broadband and/or voice service to premises on request in the fixed-line footprint, and a broadband service to premises on request in the fixed-wireless and satellite footprints. Telstra, meanwhile, is responsible for supplying voice service infrastructure in the fixed wireless and satellite footprints until 2032, a role laid out in the TUSO.

To clarify, any premises in the satellite or fixed wireless footprint may request a service from nbn (through a RSP) and use it for broadband and voice calling purposes. But it is nbn’s contention that it has provisioned its networks anticipating that less than 60 per cent of premises across its fixed wireless and satellite footprints would request an nbn service due to the assumed continued availability of Telstra voice and DSL broadband infrastructure in these areas.⁷⁵ In the absence of the TUSO, nbn argued that take-up rates for nbn fixed wireless and satellite services would increase, imposing additional net costs on nbn as a consequence.

nbn (sub. DR176) submitted that it is not in a position to quantify any potential cost implications of reforms to the TUSO because of uncertainty around the:

- circumstances in which nbn may be required to deliver additional services
- specification of *baseline* services
- number and location of services supplied by Telstra in the NBN fixed wireless and satellite footprints
- timeframe over which policy changes would be implemented.

But in the absence of a formal quantification of these potential costs, the Commission maintains a degree of scepticism around the extent to which the reforms to the TUSO proposed in this inquiry would impose material net costs on nbn, for the following reasons.

⁷⁵ Based on the information in table 6.4, nbn’s forecast for take-up rates in the combined fixed wireless and satellite footprint is 44 to 59 per cent.

The effect on take-up rates is unlikely to be substantial

Based on the factors described in table 6.4, nbn (2014b) estimated take-up rates of 50–65 per cent in the satellite footprint and 40–55 per cent in the fixed wireless footprint in 2020-21, while nbn (2016b) forecast 73–75 per cent take-up in the fixed-line footprint ‘beyond’ 2020-21. These estimates are arguably predicated on the continuation of the TUSO, but were it to be removed there would be two possible sources of additional take-up — by premises with DSL broadband and by premises with voice-only services.

As noted earlier, the extent to which DSL broadband and voice-only services are supplied on a non-commercial basis is unclear. In particular, it is probable that some DSL services would continue to operate on a commercial basis, both because the existence of a DSL service implies that the premises is relatively close to the exchange and because these services can attract higher revenues than voice-only services. Nonetheless, even if all copper-based infrastructure were to be decommissioned as a result of reform to universal service policies, it is likely that:

- in the NBN fixed wireless footprint, premises that currently access DSL broadband would substitute to either NBN fixed wireless broadband or mobile broadband (given that the vast majority of premises in the fixed wireless footprint lie within mobile coverage). While DSL and NBN fixed wireless are comparable at present in terms of retail prices and service quality, to the extent that mobile broadband continues to converge with fixed broadband (chapter 2), it may become an increasingly attractive option in coming years. Voice-only premises (likely to be a subset of those listed as ‘without broadband’) would likely substitute to mobile voice services, given the lower cost and increased functionality of this option relative to an nbn fixed wireless voice-only service
- in the NBN satellite footprint, premises that currently access DSL broadband (estimated to account for only 2 to 4 per cent of the total footprint) would substitute to either *Sky Muster* broadband or mobile broadband. Although mobile broadband is less prevalent in the satellite footprint than in the fixed wireless footprint, where available it may be viewed favourably over a *Sky Muster* service.⁷⁶ Voice-only premises with mobile coverage would also be unlikely to switch to *Sky Muster* given the relative costs, quality of service and reliability of *Sky Muster* services. Options proposed by the Commission for improving voice service quality in areas of inadequate mobile coverage (chapter 7) could be expected to reduce further additional take-up of *Sky Muster* services.

These factors imply a degree of uncertainty around possible increases to NBN fixed wireless and satellite take-up rates as a result of reform of universal service policies. Given the ranges around nbn’s own forecasts (table 6.4), it is possible that any actual increase in take-up rates could lie within these bands.

⁷⁶ Given the data caps that apply to *Sky Muster* service and the limited (although expanding) data packages available over mobile broadband, some premises may opt to use both services in conjunction.

Table 6.4 NBN satellite and fixed wireless take-up rate forecasts
nbn forecasts for 2020-21 and ‘beyond’, assuming continuation of the TUSO

Service	Proportion of premises in satellite footprint ^a	Proportion of premises in fixed wireless footprint ^a	Proportion of premises in the fixed-line footprint ^b
	%	%	%
No fixed broadband service	10–20 with mobile broadband, 7 ‘without broadband’	16–19 with mobile broadband, 7 ‘without broadband’	15–16
DSL broadband	2–4	8–17	0
Vacant premises	18–19	18–19	8.5–9.5
NBN service	50–65	40–55	73–75

^a Estimates are from nbn (2014b) and are forecasts for 2020-21. ^b Estimates are from nbn (2016b) and are forecasts for ‘beyond’ 2020-21.

The net cost of supplying additional services is unknown

As highlighted by nbn (sub. DR159), the Bureau of Communications Research (2016a) found that nbn’s fixed wireless and satellite services are expected to operate on a non-commercial basis out to 2039-40 with average net losses expected to accrue at \$105 per connected premises per month for fixed wireless services and \$110 per connected premises per month for satellite services.

The Commission considers that these estimates are not an appropriate basis for approximating any hypothetical additional net costs to nbn as a result of reform of universal service policies (to the extent that there are material increases to take-up rates). It is not clear that the net cost associated with supplying a service to an additional premises already within an existing fixed wireless/satellite coverage area would align with the average net cost per premises of establishing that network and connecting premises.

Moreover, it can be reasonably expected that nbn would have contingency plans to manage reasonable variations to its take-up rate assumptions, irrespective of the cause of these variations. There is precedent for nbn significantly underestimating demand for satellite and fixed wireless services — nbn’s 2012–15 Corporate Plan estimated take-up rates at 22 per cent for fixed wireless and 25 per cent for satellite, but these estimates were doubled in 2014 (nbn 2014b). Given the fast-moving pace of technological change and, especially, the uncertainty around the capabilities of 5G technology (expected to arrive around 2020, chapter 2), it is inconceivable that nbn’s network planning could not accommodate revised expectations.

The validation of any additional net costs falling on nbn, and their funding, is discussed in chapter 8.

6.2 What about accessibility?

Many participants expressed concerns about the *accessibility* of telecommunications services — including those delivered over NBN infrastructure — to particular groups of people in the absence of the TUSO. They argued that, accordingly, government intervention is warranted to address universal accessibility.

The main groups of users for which accessibility is said to be an issue include people with disability and life-threatening conditions, some Indigenous people, some older people, people without a fixed address, and people in remote communities who rely on telecommunications to access telehealth, distance education and emergency services.

The specialised nature of the needs of these user groups may mean that users are either unable to access a *baseline* standard of telecommunications services (say, due to a disability) or, where a *baseline* standard of services were accessible, it would not be sufficient to meet their needs (such as a telehealth service). There may be genuine cost constraints for a service provider to meet the needs of these users, particularly where their relatively small numbers make it difficult to generate sufficient revenue, with the possible result that needed services are not provided, or are provided at a high cost to users. This may particularly be the case in regional and remote areas.

The remainder of this section examines the main accessibility issues arising for these groups and the extent to which the market and NBN infrastructure can meet their needs, particularly in the absence of the TUSO. As a wholesale provider, nbn does not have a direct relationship with end users and, thus, its role in addressing the particular needs of user groups is somewhat limited. However, NBN infrastructure does largely provide the means by which those user needs can be addressed through RSPs.

While the Commission has not undertaken a comprehensive review of all telecommunications needs within the community, having chosen to focus on the main consumer groups, it notes that a number of participants raised concerns about the needs of businesses and farmers in regional and remote areas (for example, Victorian Farmers Federation, sub. DR125; Moree Plains Shire, sub. DR128; Kerin Physio, sub. DR166).

People with disability

Some 1.1 million Australians with disability, accounting for about 5 per cent of the population, use a range of aids or equipment for communications (table 6.5). Within this group, around 310 000 use email or internet.

A number of participants emphasised the importance of government supporting the accessibility of people with disability to telecommunications services. For example, ACCAN (sub. 48) said that there ‘is a clear need for greater intervention to ensure that all Australians with disability can access and benefit from our increasingly ubiquitous connected society’ (p. 23). The Australian Communication Exchange (sub. 22) said:

For people who are deaf or have a disability, the NBN may one day open the door to an alternative USO service to the [National Relay Service] NRS, however, there is more investigation required to understand how a transition could happen. Currently, a third party — a relay office who can bridge current communication gaps and technological limitations — is required.

Until all Australians acquire the necessary hardware and technical skills to use computers and the internet, removing their access to suitable services such as the standard telephone could lead to further isolation and disadvantage. (p. 5)

And nbn (sub. 47) recognised that:

... continued regulatory intervention will be necessary to ensure that telecommunications solutions are provided to groups with specific needs such as persons with hearing impairments or those with documented life-threatening medical conditions, or to address challenges of affordability. (p. 17)

Table 6.5 Number of people using communication aids
2015

Type of communication aid used	Number of users
	'000
Electronic communication aids	
Reading or writing aids	45.9
Speaking aids	10.5
Email or internet	310.0
Non-electronic communication aids	
Reading or writing aids	50.2
Speaking aids	21.1
Reading, writing or speaking aid not specified	108.1
Hearing aid	701.6
Cochlear implant	10.2
Other hearing aids	48.9
All using communication aids ^a	1 110.3

^a Total may be less than the sum of the components as persons may be using more than one type of aid.

Source: ABS (*Disability, Ageing and Carers, Australia: Summary of Findings, 2015*, Cat. no. 4430).

The telecommunications needs of people with disability are currently met through such government measures as the TUSO, the National Relay Service and the National Disability Insurance Scheme (chapters 3 and 4) as well as an array of market-driven services. Furthermore, the *Disability Discrimination Act 1992* (Cth) imposes a general obligation on telecommunications service providers to ensure their services are accessible to people with disability. The ACMA (2010) noted that this obligation may extend to the provision of equipment. Moreover, a policy direction within the Government's 2010–2020 National Disability Strategy is to facilitate 'communication and information systems that are

accessible, reliable and responsive to the needs of people with disability, their families and carers' (COAG 2011, p. 29).

In addition to existing government measures, there are some initiatives by providers to address the specific equipment needs of people with disability. For example, Optus (2016a) has a program that provides disability equipment to its customers in Optus-cabled areas in Sydney, Brisbane and Melbourne (DoCA 2016a).

Resellers of Telstra's services have a commercial agreement with Telstra to provide their customers with disability equipment (ACMA 2010). Disability equipment, such as teletypewriters (TTYs), may also be supported over parts of the NBN infrastructure (for example, Printacall Communications Technology, subs. 15 and DR109).

Despite existing government and voluntary measures, some limited data suggest that the accessibility of telecommunications services, in the broad, for people with disability is on the whole lower than that for people without disability. For example:

- in 2014, around 46 per cent of people with disability (around 2.6 million people) did not access government services by way of the internet compared with 30 per cent of people without disability (ABS 2015, table 11.3)
- in 2016, according to work co-funded by the Swinburne University of Technology and Telstra, Thomas et al. (2016) found that the *Australian Digital Inclusion Index* was very low for people with disability (44.4) compared with the national average of 54.5, particularly in relation to basic skills, internet access, digital activities and digital ability.⁷⁷ That said, the overall score improved slightly over the previous three years (2.4 points from 2014 to 2016).

There also appears to be an increasing demand by people with disability under the National Relay Service (chapter 4). While the number of individual users of this service is unclear, the Department of Communications and the Arts (DoCA 2016a) noted an increased demand from its previous estimate of 5000 to 10 000 users with recent innovations in the service (table 6.6).

That said, the following is worth noting.

- In its submission to the Australian Government review of the National Relay Service, Telstra (2016d) noted that there is a decreasing reliance on its disability equipment

⁷⁷ The *Australian Digital Inclusion Index* is made up of three sub-indices — 'access', 'affordability' and 'digital ability'. 'Access' is made up of: internet access, which covers frequency, places and number of access points; internet technology, which covers computers, mobile phones, mobile broadband, and fixed broadband; and internet data allowance, which relates to mobile and fixed internet. 'Affordability' is made up of: relative expenditure, which means the share of household income spent on internet access; and value of expenditure, which means total internet data allowance per dollar of expenditure. 'Digital ability' is made up of: attitudes, which includes notions of control, enthusiasm, learning and confidence; basic skills including mobile phone, banking, shopping, community and information skills; and activities including accessing content, communication, transactions, commerce, media and information. A digital inclusion index score less than 45 is 'low', a score between 50 and 60 is 'medium', and score above 65 is 'high'.

program as customers increasingly choose to shift away from fixed-line telephone services to mobile and internet-based communications. This is consistent with consumer trends more generally (chapter 2).

Table 6.6 Potential substitutes for the National Relay Service options

<i>National Relay Service option</i>	<i>Potential mainstream service options</i>
SMS relay	SMS, WhatsApp, Facebook Messenger, email, iMessage, Twitter Direct Messages
Internet relay, TTY type and read	Live chat, Facebook Messenger, email, Twitter Direct Messages
Video relay	Skype, Face Time, Viber, Google Hangouts

Source: DoCA (2016a).

- Improvements in technology can help to meet some of the needs of people with disability (as well as those of other user groups). For example, some software and apps have improved the accessibility of telecommunications for many people with disability (table 6.6) who have traditionally relied on the National Relay Service (DoCA 2016a). However, it is also important to be mindful of the technological preferences of different age groups as well as of people with different disabilities — for example, Printacall Communications Technology (sub. 15) stated:

It is an accepted fact that younger deaf and hearing impaired people will more readily embrace new technologies such as tablets, smart phones, social networks and those [new technologies] such as video relay available through the [National Relay Service]. However it may be that the status quo suits the elderly profoundly deaf who prefer to continue to use a traditional TTY. (p. 4)

On balance, the Commission considers that, in the absence of the TUSO, government intervention to address the accessibility of telecommunications for people with disability continues to be warranted. However, it is not clear what is likely to be the full extent of particular needs for this group, particularly after the full NBN infrastructure rollout. The Commission notes that the Australian Government is considering potential options for reform, including to the National Relay Service, to improve communications for people with disability (DoCA 2016a). It expects that this should cast light on the full extent of telecommunications needs for this group.

People with life-threatening health conditions

As at 30 June 2016, around 211 000 registered customers with life-threatening health conditions received priority connection and fault repair of their fixed-line home telephone service without any additional cost (Priority Assistance) (chapter 4). Connection to, or fault repair of, the service must occur within 24 hours in urban and rural areas and within 48 hours in remote areas if the Priority assistance customer has no other working fixed-line phone service from Telstra or another RSP.

Telstra is required to provide Priority Assistance under its carrier licence (chapter 3). Other providers do not have to provide Priority Assistance and only iPrimus (Optus 2016c) does so voluntarily in accordance with the relevant industry code. Providers may also offer services that are similar to Priority Assistance, but that do not align exactly with it, as defined in Telstra's carrier licence or the industry code. An example is Optus' Special Assistance service.

Some participants believed that Priority Assistance is important for vulnerable customers and should be improved. For example, the Telecommunications Industry Ombudsman (TIO, sub. 52) stated that consumers with life-threatening health conditions were likely to be disproportionately affected by the lack of access to a *standard telephone service*.

With respect to NBN infrastructure, the Government's Migration Assurance Policy focuses on ongoing improvement of the migration of customers from Telstra's copper networks to the NBN fixed-line network, including minimising disruption to services. The policy identifies people who may need extra support to migrate before the disconnection date and contains several sections on vulnerable end users and medical alarms. nbn is currently working with DoCA on an update, which is expected to be finalised in 2017. In addition to this policy, nbn has committed to support RSPs who provide a Priority Assistance service (nbn 2016m). This suggests that, in relation to nbn's fixed-line services at least, customers registered for Priority Assistance will continue to be serviced.⁷⁸

However, Priority Assistance is not available over NBN fixed wireless and satellite networks. The Wholesale Broadband Agreement (between nbn and RSPs) restricts RSPs from using NBN services to supply end-users with a CSG or Priority Assistance voice service. Further, nbn (2016k) noted that its satellite service is not designed to support such equipment as medical alarms, autodiallers, and emergency call buttons.

There is also the issue of how Priority Assistance would operate in the absence of the TUSO. Both policies are closely related and reflect Telstra's legacy as a former government-owned monopoly. Telstra's Priority Assistance obligations set out in its carrier licence conditions make frequent reference to the TUSO, such as with respect to the *standard telephone service* and the CSG. Therefore, any changes to the TUSO will inevitably result in consequential amendments to Priority Assistance.

The removal of the TUSO is likely to 'weaken' Priority Assistance as a consumer safeguard, as its availability will no longer be guaranteed to all Australians. But it may not render Priority Assistance as totally ineffective. While existing Priority Assistance customers could continue to receive services (as long as they continue with Telstra), new customers to the market would no longer be guaranteed to have access to Telstra fixed-line services (and the Priority Assistance benefits that come with them).

⁷⁸ That said, there may be a need for Priority Assistance customers to have a battery backup for services over NBN fibre-to-the-node and fibre-to-the-basement technologies in the event of power outages. However, power outages should not affect prioritised resolution of faults on the services.

It appears, therefore, that a potential gap exists relating to the offer of Priority Assistance over nbn's fixed wireless and satellite networks as well as possibly, more broadly, resulting from any phasing out of the TUSO. However, the Commission is uncertain as to how many of the existing (or future) Priority Assistance customers are affected and may require further government support. This is a matter for the Australian Government to address in its planned consumer safeguards review (chapter 9). A measure that the review could consider is funding or requiring one or more RSPs within the fixed wireless and satellite footprints to provide a Priority Assistance service.

Indigenous people

There were an estimated 670 000 Indigenous people, or 3 per cent of the total Australian population of 22.3 million as at 30 June 2011 (SCRGSP 2016a). The (projected) Indigenous population at 30 June 2016 was 745 000, which was still 3 per cent of the projected total population of 24.4 million.

Like other Australians, Indigenous people also face telecommunications availability, accessibility and affordability concerns but at a typically worse intensity. For example:

- a higher proportion of Indigenous people than non-Indigenous people live in regional and remote areas (65 per cent of Indigenous people compared with 29 per cent of non-Indigenous people as at June 2011) where relatively limited telecommunications services are available (SCRGSP 2016a). In remote areas, the relative proportion of Indigenous people compared with non-Indigenous people is again higher at 21 per cent compared with 2 per cent (SCRGSP 2016a)
- higher proportions of Indigenous people than non-Indigenous people are on low incomes and have disabilities (SCRGSP 2016a), thus exacerbating their ability to access and afford available telecommunications services
- there is a higher rate of homelessness among Indigenous people than non-Indigenous people, which makes it more difficult for them to access available fixed telecommunications services and, perhaps, creates a preference for mobile services. For example, around 26 744 Indigenous people were counted as homeless on the night of the 2011 Census, or 4.9 per cent of the Indigenous population,⁷⁹ compared with 70 085 non-Indigenous people, or around 0.4 per cent of the non-Indigenous population (ABS 2012b, 2012d)⁸⁰

⁷⁹ However, as noted by the ABS (2012d), the estimate of Indigenous people who are homeless is likely to be an underestimate, particularly for those staying temporarily with other households, reflecting both a relatively large under-enumeration of Indigenous persons in the Census and because, for some of them, a usual address may be reported that is associated with a 'place' rather than with a home or dwelling.

⁸⁰ Similar proportions relate to the numbers of Indigenous and non-Indigenous people who seek specialist homelessness services. Around 61 700 Indigenous people sought specialist homelessness services in 2015-16 compared with around 190 500 non-Indigenous people (AIHW 2017b). Of these, 46 per cent of Indigenous people and 43 per cent of non-Indigenous people were homeless (as opposed to being at risk of homelessness) at the beginning of first support period. These data translate to an estimated 3.8 per cent and 0.4 per cent of Indigenous and non-Indigenous populations respectively using as bases ABS projected

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- a lower proportion of households with Indigenous people (63 per cent) than households without Indigenous people (77 per cent) had an internet connection (in 2011), thus potentially adding to their ‘digital exclusion’ (ABS 2012c). (Box 6.3 shows more recent ABS data on internet usage by Indigenous people.)
 - in their *Australian Digital Inclusion* work, Thomas et al. (2016) found that Indigenous people generally have very low digital inclusion scores compared with the national average (46.6, or 7.9 points below the national average). In terms of all components of their digital inclusion index, Indigenous people experienced the lowest score compared with the national average, particularly with respect to basic digital skills, affordability – value of expenditure and digital activities (Thomas et al. 2016). While Indigenous people’s digital inclusion is low, it has improved over the three years to 2016, albeit at below the rate of improvement experienced nationally.

In addition to the relative disadvantages that Indigenous people face compared with non-Indigenous people, and recent data showing low digital inclusion, there is a number of complex culturally-specific issues relating to their use of, and preferences with respect to, telecommunications services, particularly in remote areas (ACCAN, sub. 48; CAYLUS, sub. 25; Rennie et al. 2015, 2016).

One important issue relates to the strong preference among many Indigenous people in remote areas for pre-paid mobile broadband services where there is mobile coverage. The *Home Internet in Remote Indigenous Communities* project found that:

Households in remote communities are choosing not to acquire satellite broadband services, preferring pre-paid mobile broadband in areas where there is mobile coverage. The consumer preference for pre-paid billing, as well as practical difficulties associated with satellite internet connections, means that households are more likely to go without internet than enter into satellite internet contracts. Our findings suggest that policy objectives aimed at improving internet quality (such as faster speeds), although desirable for services and business in remote Australia, will not encourage residents of remote communities to adopt broadband. We question whether satellite internet ... can meet the needs of remote communities under current arrangements. However, changes to the way that satellite internet is sold and supported could make a significant difference. (Rennie et al. 2015, pp. 3–4)

The sharing culture associated with Indigenous people in remote communities is another important issue. Some participants noted the financial hardships experienced within these Indigenous communities as a result of their sharing culture, with one participant citing the case where an Indigenous community member received a very large phone bill because the phone was largely used by other community members. The *Home Internet in Remote Indigenous Communities* project found that individual owners of computers wanted computer access and usage restricted to their household or immediate family members.

estimates of Indigenous and non-Indigenous populations as at 30 June 2016 (ABS 2014b, 2016a). Across all locations, Indigenous people were nine times more likely to use specialist homelessness services than non-Indigenous people (AIHW 2017b).

[This] has implications in considering models for the provision of [information and communications technology] and internet access in remote communities. Specifically, telecentre or ‘internet café’ type arrangements which are run by Indigenous community members may not be the most suitable mechanism for providing equitable access to the broader community, owing to family and other cultural obligations (kinship). (Rennie et al. 2015, p. 6)

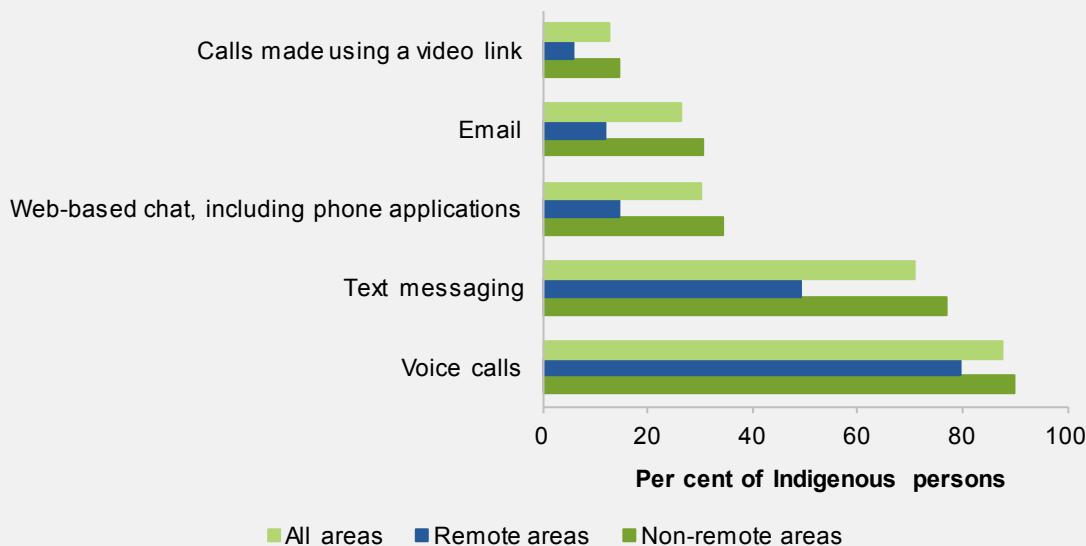
Box 6.3 Internet usage by Indigenous people

Data from the ABS *National Aboriginal and Torres Strait Islander Social Survey 2014-15* showed a number of particular telecommunications usage patterns by Indigenous people.

- The main types of telecommunications contact Indigenous people made with people outside their household were voice calls and text messaging (figure a).
- Just over 20 per cent of Indigenous people had not accessed the internet in the previous 12 months.
- The most common sites for accessing the internet were the house of a neighbour, friend or relative, work, educational institution or public library (figure b).
- The main type of government services accessed by the internet were the lodgement of bills and the lodgement of claims or applications for benefits, although over a quarter of Indigenous people did not access government information or services over the internet.

a Type of telecommunications contact with persons outside the Indigenous household^{a,b,c}

Proportion of Indigenous persons by non-remote or remote area, 2014-15



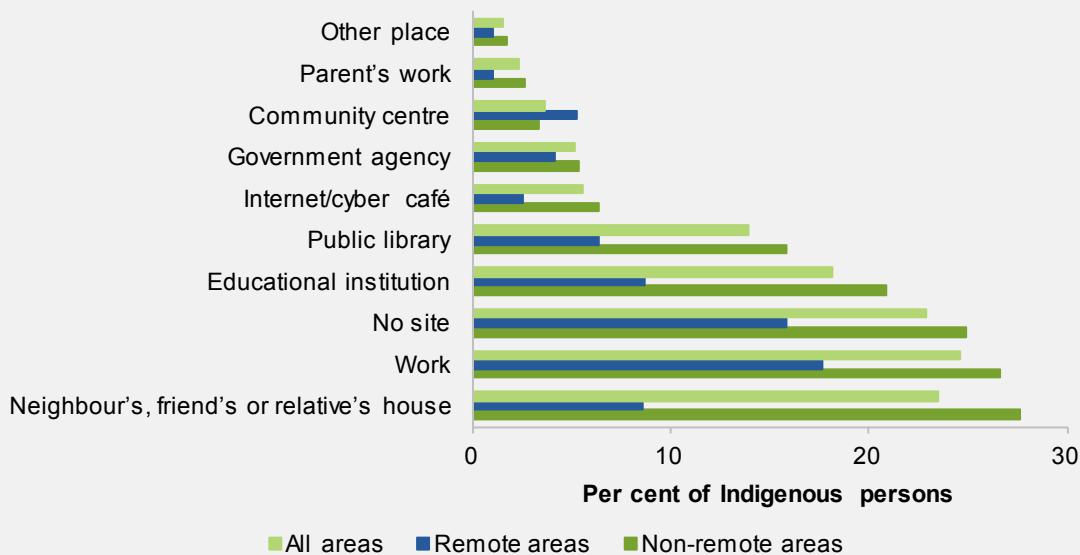
^a Contact is with family or friends living outside the Indigenous household in the previous three months. ^b ‘Non-remote areas’ includes major cities, inner and outer regional areas and ‘remote areas’ includes remote and very remote areas. The Australian Standard Geographical Standard is used by the ABS for the collection and dissemination of geographically classified statistics. ^c Voice calls include calls made through mobile, fixed telephone or internet.

(continued next page)

Box 6.3 (continued)

b Sites where internet is accessed^{a,b,c,d,e,f}

Proportion of Indigenous persons by non-remote or remote areas, 2014-15



^a 'Non-remote areas' includes major cities, inner and outer regional areas and 'remote areas' includes remote and very remote areas. The Australian Standard Geographical Standard is used by the ABS for the collection and dissemination of geographically classified statistics. ^b 'Educational institution' includes school, TAFE, or university. ^c 'Government agency' includes government shopfront or department. ^d 'Community centre' includes voluntary organisation. ^e 'Parent's work' includes parent's study place. ^f Excludes access through mobile phones.

Source: ABS (*National Aboriginal and Torres Strait Islander Social Survey, Australia 2014-15*, Cat. no. 4714.0).

A third important issue is the strong preference of many Indigenous communities to themselves manage certain telecommunications activities to prevent anti-social or problematic behaviours such as cyberbullying and access to porn and gambling websites:

There are culturally specific factors to connectivity and particularly mobile telephony and data services that impact strongly on levels of risk, and on community and personal safety in remote Aboriginal communities. (CAYLUS, sub. 25, p. 2)

A final important issue arises from the fact that Indigenous people are relatively more mobile than non-Indigenous people (SCRGSP 2016a), which could affect their demand for telecommunications services. As the *Home Internet in Remote Indigenous Communities* project found:

Residents' degree of mobility both within and outside the community has implications for ICT provision in relation to access, ownership, management of billing and sustainability. ICT arrangements need to be flexible in response to residential mobility, and some devices and equipment may be more suitable than others depending on community members' degree of mobility. For instance, residents moved houses within the community for a range of reasons, including available housing stock, maintenance issues in some houses, the cost of power, and

cultural customs surrounding death. Such inter-community mobility has consequences for fixed infrastructure costs such as satellite dishes.

The high level of mobility does not necessarily equate to a preference or requirement for mobile devices. [Personal computers] can be easier to manage in the domestic setting. In contrast, there is a high degree of sharing of mobile devices. (Rennie et al. 2015, pp. 5–6)

nbn and a number of telecommunications service providers have sought to address Indigenous users' telecommunications needs. For example, nbn has a reconciliation action plan in which it undertakes to investigate opportunities to support people and organisations in Aboriginal and Torres Strait Islander communities to 'bridge the digital divide' (Morrow and Mohamed 2016). And Telstra has sought in 2013 to 'assess the barriers to digital inclusion for Aboriginal and Torres Strait Islander peoples across remote, regional and urban settings' (Featherstone 2013), and has programs directed at Indigenous people, particularly with respect to 'keeping remote communities connected' (Telstra 2016f).

However, a reliance on markets is unlikely to fully address the disadvantages in which Indigenous people are placed compared with non-Indigenous people, or the culturally-specific issues that they have, with respect to telecommunications services. The Commission considers there is no question as to whether there is scope for government intervention here. However, the form that this intervention should take — whether it should target the telecommunications needs of Indigenous people or communities specifically or meet those needs indirectly through more generic policies broadly available — requires further consideration (chapter 7).

Today's older people and digital inclusion

Older people (aged 65 years and over) — around 3.5 million people or 15 per cent of Australia's population at 30 June 2015 (ABS 2016b) — are often seen as being at risk of digital exclusion (ACMA 2016f; Thomas et al. 2016). As the ACMA (2016f, p. 1) noted, this group of people would have been in their 40s or older before consumer access to dial-up internet 'gained momentum' in the mid-1990s.

The risks of digital exclusion for this age group were articulated further by the Victorian Government in developing its 2014 Digital Literacy for Older Victorians program (Victorian Department of Education and Training 2014). It considered that the risks included: less familiarity and limited access to digital technologies later in life; issues of training access, travel and internet connectivity, particularly in regional and rural areas; limited understanding of what digital literacy is and how these skills can improve quality of life, maintain community connections and reduce isolation; generic computer courses not meeting learner needs (for example, too long in duration, or the content not specific to needs); and difficulty applying digital literacy skills at home without ongoing support.

Research by the ACMA (2014b, 2016f) found, among other things, that:

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- a lower proportion of older people aged 65 years and over (79 per cent) accessed the internet compared with people aged 18 years and over, and the proportion of older people who accessed the internet declined with older age groups (in the 12 months to June 2015)
 - internet access among older people increased over the five years to June 2015 by over 20 per cent
 - older people used the internet less frequently than younger people (50 per cent of people aged 65 years and over used the internet three or more times a day compared with 86 per cent of people aged 18 to 44 years) (in the six months to June 2015)
 - people aged 65 years and over preferred accessing the internet through desktop computers and laptops whereas people aged 18 and over preferred internet access through laptops and mobiles (in the six months to May 2015)
 - 21 per cent of people aged 65 years and over had never accessed the internet compared with 1 per cent of people aged 18 to 44 years and 4 per cent of people aged 45 to 64 years (in the 12 months to June 2015)
 - fixed-line telephone phone calls were the ‘most used’ communications service for a greater proportion of older people (55 per cent) than the rest of the population (10 per cent) (in the six months to May 2014)
 - the vast majority of people aged 65 years and over (93 per cent) had a fixed-line telephone connection at home (as at December 2013), which was the highest percentage across all age groups. In contrast, people aged 65 years and over were the least likely age group (74 per cent) to own or use a mobile phone. A quarter of people aged 65 years and over had a fixed-line telephone at home but no mobile phone (as at December 2013) (figure 6.1, panel a).

Similar findings on landline phone and internet use by older people were evident in recent data by Roy Morgan (2017) and the ABS (figure 6.1, panel b), respectively.

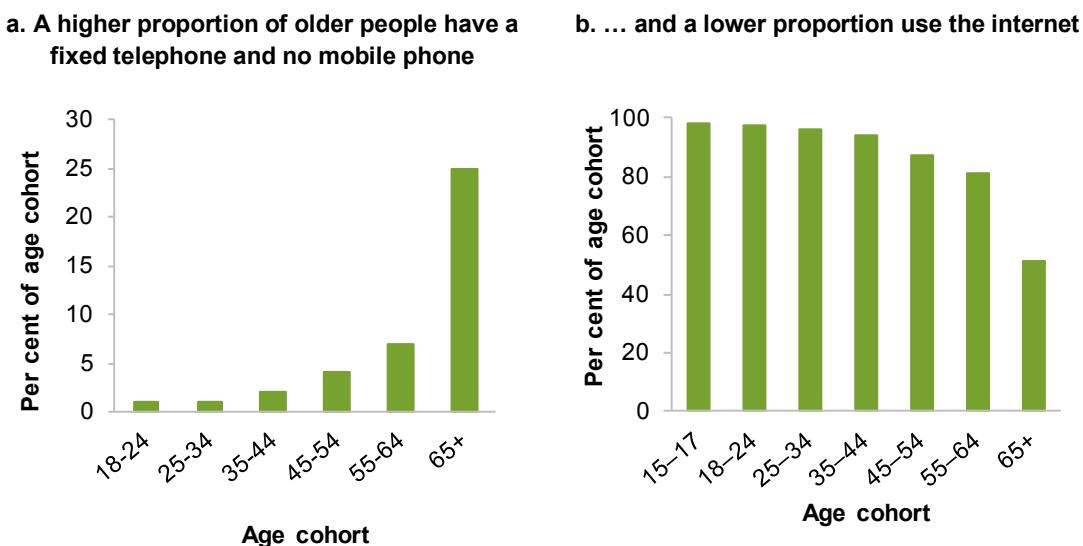
According to their *Australian Digital Inclusion* work, Thomas et al. (2016) found that people aged 65 and over were Australia’s least digitally-included demographic group (with a score of 41.6, or 12.9 points below the national average). In terms of most components of their index, the 65 years and over age cohort experienced the lowest score of all the age cohorts, particularly compared with the 14 to 24 year age cohort with respect to attitudes, basic digital skills and internet access. They considered that the age gap had remained relatively steady since the index was first estimated in 2014.

A survey for the Digital Transformation Office (now the Digital Transformation Agency) also found a strong preference amongst older people (aged 65 years and over) to *not* access government services online (DWA + JM Bruce 2015). Around 57 per cent of older people ‘prefer not to’ or ‘will not’ use digital channels to interact digitally with the Australian Government — more than double the rate for younger people (aged 18 to 29 years).

Research by nbn (2016), however, found that nearly 80 per cent of Australian grandparents used technology to stay connected with friends and family; around 93 per cent used the internet every day; and more than 70 per cent could not imagine life without the internet.⁸¹

Figure 6.1 Telecommunications usage by people of different ages

Proportion of age cohort with a fixed telephone and no mobile phone, December 2013; proportion of age cohort who access the internet, 2014–15.



Sources: ABS (*Household Use of Information Technology, Australia, 2014-15*, Cat. no. 8146.0); ACMA (2014b, figure 6).

There are signs of telecommunications service providers offering incentives to older people to assist their migration from voice to digital platforms. For example, Vodafone (in partnership with Seniors Card NSW) has begun to offer people aged over 60 discounts on their mobile phone bills and in-store workshops on how to set up and use a smartphone (Vodafone 2016a). Telstra provides a Tech Savvy Seniors program to older people, particularly in regional and remote areas of New South Wales, Victoria and Queensland to give them the opportunity to develop their digital skills (Telstra 2016a). Such market-driven initiatives appear to be motivated by providers' desire to capture this segment of consumers.

Overall, this evidence shows that, while there is an increasing trend among older people to go online, and signs of market-driven measures to support this, this age group is still less likely than younger age groups to access the internet and is more likely than younger age groups to have a fixed telephone. The implication of this is that, at the time of the full rollout of the NBN, a small proportion of older people is at risk of digital exclusion and, in particular, being reliant on voice-only services. There is scope, therefore, for further

⁸¹ Based on an online survey of around 1000 participants. As an online survey, the results are likely to suffer from selection bias.

government intervention to promote the accessibility of broadband services to the current cohort of older people and, indeed, to support the transition of this group from voice-only services available under the current TUSO.

However, this is likely to be a transient issue. It is to be expected that observed patterns of telecommunications use and preferences among today's cohort of people aged 65 years and over will change as today's younger-aged cohorts — with their preference for accessing the internet and mobiles over fixed services — move into older-aged cohorts. Hence, the accessibility of broadband services will be less of a concern for future cohorts of older people.

People with no fixed address

The universal service objective proposed in this report is premises-based (chapter 5). However, some groups are not attached to fixed premises such as people who are homeless, domestic tourists, itinerant workers as well as people in remote and very remote Indigenous communities. And even where some groups are attached to premises, they may require connectivity away from their premises to undertake their day-to-day activities or businesses (such as farming).

It is difficult to gauge the full extent or nature of the telecommunications needs of people without a fixed address. That said, there are some data available on people who are homeless and on their use of telecommunications as follows.

People who are homeless

According to ABS Census data for 2011, there were over 100 000 people who were homeless on the night of the Census with the majority (57 per cent) residing in the major cities (ABS 2012d; table 6.7).⁸² The Australian Institute of Health and Welfare reported that in 2015-16 there were 279 000 clients of providers of specialist homeless services over the year, but 57 000 clients 'on any given day' (AIHW 2017a, 2017b).⁸³ Of these clients,

⁸² The ABS statistical definition of homelessness that underpins its Census is that, when a person does not have suitable accommodation alternatives, they are considered homeless if their current living arrangement: is in a dwelling that is inadequate, or has no tenure, or if their initial tenure is short and not extendable, or does not allow them to have control of, and access to space for social relations (ABS 2012a, 2012d).

⁸³ These data are from the *Specialist Homelessness Services Collection*, which is managed by the Australian Institute of Health and Welfare (AIHW 2017c). Clients are defined as homeless if they are living in any of the following circumstances: *no shelter or improvised dwelling* — includes where dwelling type is no dwelling/street/park/in the open, motor vehicle, improvised building/dwelling, caravan, cabin, boat or tent; or tenure type is renting or living rent-free in a caravan park; *short-term temporary accommodation* — dwelling type is boarding/rooming house, emergency accommodation, hotel/motel/bed and breakfast; or tenure type is renting or living rent-free in boarding/rooming house, renting or living rent-free in emergency accommodation or transitional housing; *couch surfing or with no tenure* — tenure type is no tenure, or conditions of occupancy are living with relative fee free, couch surfing.

around 44 per cent, or over 120 000, were homeless (rather than at risk of homelessness) over the year, with an estimated 25 000 on any given day. Around 65 per cent of clients are estimated to live in the major cities (table 6.7).

The Melbourne Institute of Applied Economic and Social Research conducts a large longitudinal survey (*Journeys Home*) of around 1600 recipients of an income support payment flagged by Centrelink as either ‘homeless’ or ‘at-risk of homelessness’.^{84,85} Some initial findings from that survey on mobile phone and internet use among the 1200 respondents included that:

- most of the ‘primary homeless’ — people without conventional accommodation such as those who sleep rough and live in squats — had an active mobile phone (79 per cent) or used the internet (71 per cent) in the six months prior to their survey interview. The rates were slightly higher for the ‘cultural homeless’, which covers primary homelessness as well as secondary and tertiary homelessness and much higher for those respondents who were not homeless (table 6.8)
- most of the cultural homeless in major cities had an active mobile phone (90 per cent) or used the internet (79 per cent) in the six months prior to their survey interview.⁸⁶ By comparison, fewer cultural homeless in regional and remote had an active mobile phone (74 per cent) or used the internet (65 per cent)
- mobile phones were typically used to send a text message (by 96 per cent of respondents), access the internet (74 per cent) and for email (54 per cent)
- most of the primary homeless who used the internet did so while travelling (76 per cent) and to find accommodation (87 per cent) or access Centrelink services (70 per cent) (Bevitt et al. 2015).

Overall, these data suggest that many people who are homeless have mobile phones and, as they mainly live in the cities, are likely to be well served by mobile services and the increasingly available free WiFi zones (chapters 2 and 4).

⁸⁴ The *Journeys Home* longitudinal survey conducted by the Melbourne Institute of Applied Economic and Social Research (Bevitt et al. 2015) adopted a ‘cultural’ definition of homelessness, which assesses whether people’s accommodation meets the minimum community standard that people expect in ‘contemporary Australian society’. The definition encompasses three types of homelessness: *primary homelessness* — includes all people without conventional accommodation (for example, sleeping rough and living in squats); *secondary homelessness* — includes people who move frequently from one form of temporary shelter to another, and includes ‘couch surfing’ and use of emergency accommodation (for example, refuges and shelters); and *tertiary homelessness* — refers to people staying in boarding houses on a medium- to long-term basis, defined as 13 weeks or longer.

⁸⁵ Telecommunication needs of people who are homeless were also considered in a much smaller survey by Humphry (2014) for inner and outer metropolitan Sydney and Melbourne. That survey found that around 90 out of the 95 families surveyed had a mobile phone.

⁸⁶ Productivity Commission estimates based on *Journeys Home* Restricted Release Waves 5 and 6 data sets. Numbers are weighted according to population and responding sample using weights provided by *Journeys Home*. Sixty seven per cent of all cultural homeless are in the major cities with the remainder in regional and remote areas.

Table 6.7 Where are people who are homeless?^a

Remoteness	Census (ABS, 2011)	<i>Clients of specialist homeless services (AIHW, 2015-16)^b</i>	
		No.	%
Major cities	60 541	57	78 635
Inner regional	13 449	13	25 806
Outer regional	9 785	9	13 240
Remote	4 220	4	3 686 ^c
Very remote	17 239	16	na
Total ^d	105 234	100	121 366
			100

na not available

^a Totals may not add due to rounding. ^b The number and per cent of clients who are homeless are Commission estimates drawing on AIHW data on all clients of services. ^c Combines remote and very remote Australia. ^d Totals may not add due to rounding.

Sources: Productivity Commission estimates based on ABS (*Census of Population and Housing: Estimating Homelessness, 2011*, Cat. no. 2049.0) and the AIHW *Specialist Homelessness Services Collection* (2017b).

Table 6.8 Mobile phone and internet use by people who are homeless — Journeys Home^{a,b}

Housing situation	Respondents with active mobile	Respondents who use the internet	
		%	%
Primary homelessness	79	71	
Cultural homelessness	85	76	
Neither	97	85	

^a Mobile and internet use is during the six months before waves 5 and 6, respectively. ^b Number of respondents in wave 6 was 1174.

Source: Productivity Commission estimates based on Bevitt et al. (2015).

However, for those people who are homeless who reside in regional and remote areas, mobile coverage is likely to be poorer than in major cities, and as such these people may face availability issues. Of the approximately 17 500 payphones provided by Telstra as part of the TUSO, only 5 per cent are located in areas without mobile phone coverage (chapter 3).

Despite signs that Telstra is offering a free online service to people who are homeless (Tasker 2016), in the absence of the TUSO, some targeted government intervention may be needed to address the particular telecommunications needs of this group of people.

Users of telehealth, distance education and emergency services in regional and remote areas

Many participants considered there was a role for government to ensure that *baseline* services are available to people in regional and remote areas to access a range of services — in particular, telehealth, distance education, and emergency services (chapter 5).

In the absence of the TUSO, participants' principal concerns centred around accessing *baseline* services within the NBN satellite footprint where it was considered that the relatively low quality of voice and video services (including power outages) over nbn's satellite network would be an impediment, particularly in the absence of mobile coverage (section 6.1, box 6.4).

Box 6.4 Participants' concerns about relying on nbn satellite services to access emergency services

Many participants had concerns about the reliability of nbn's satellite services in accessing emergency services due to such factors as power blackouts, especially where mobile coverage is inadequate (for example, Brindley, sub. DR66; Mistake Creek Area Progress Association, sub. DR144; Maher, sub. DR148; Piggott, sub. DR156; Western Australia Mid West Development Commission, sub. DR167; Wood, sub. DR169).

Microsoft (sub. 20) said:

VoIP apps do not enable inbound and outbound live voice conversations with any other person on the planet that has a telephone number — regardless of which provider supplies that telephone number — a valuable capability for some consumers. In addition, existing geolocation capabilities used for emergency calling were designed and optimised for use on traditional telephone networks, not the internet. (p. 2)

The NSW Farmers' Association (sub. DR108) said:

... for members living in exceptional geographic isolation, it serves to illustrate the cold logic of wanting more than one means of communication to the outside world. It is the experience of members, and particularly those that live in the greatest isolation in Western NSW, that during an emergency either their satellite internet connection or their landline telephone service will work, but not both. Beyond imperatives for business, education or social connectivity, having an alternative means of connection during emergencies is a lifeline for those in isolation. (p. 9)

Regional Development Australia Northern Territory (sub. DR115) considered it was 'flawed' to argue that market conditions were likely to ensure the in most cases emergency services were accessible in the NBN satellite footprint:

... data [on preferences for using mobile phones to raise emergency assistance] fails to recognise that people in remote areas are not always within mobile range. ... The statement that there are alternatives such as satellite mobile phones, personal locator beacons, HF radios and so on, fails to acknowledge the additional expense associated with these items. (p. 8)

BIRRR (sub. DR143) provided case studies of emergency situations in remote areas and said without a universal service guarantee:

In the event of an emergency a non-working Sky Muster service would leave many RRR [rural, regional and remote] residences with no form of communication. (p. 40)

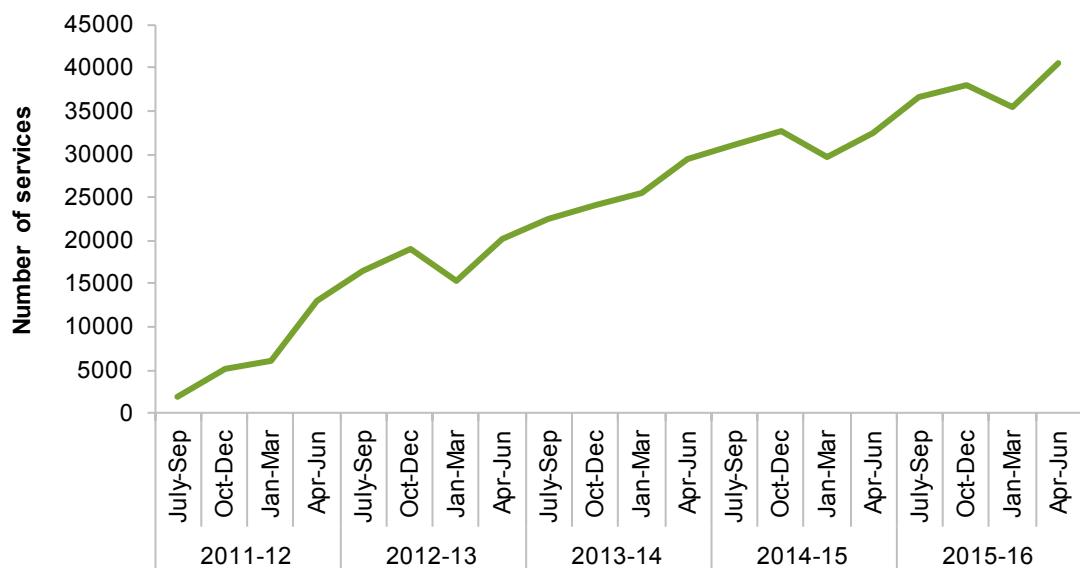
As noted earlier, the Commission estimates that up to 90 000 premises may not be able to access a mobile service within Australia. The remainder of this section considers the nature and scale of telecommunication user needs in accessing telehealth, distance education and emergency services, including any government and private sector initiatives that may exist in the absence of the TUSO. Policy options to ensure that a *baseline* voice service is available to enable access to these services within the NBN satellite footprint are considered in chapter 7.

Telehealth

There are some data on the extent of demand for telehealth services, particularly in regional and remote areas. For example, Department of Health (2016) data showed that Medicare claims were processed for around 476 000 telehealth services provided to 144 400 patients between 1 July 2011 and 30 June 2016. There was a significant increase in claims processed over the period, by over 2000 per cent (figure 6.2). Most of the processed claims (around 83 per cent) originated from patients in regional areas, whereas a very small proportion (around 7 per cent) originated from remote areas, with the remainder from major cities (table 6.9).

Figure 6.2 Medicare telehealth services

Claims processed each quarter between 1 July 2011 to 30 June 2016



Source: DoH (2016).

Table 6.9 Medicare telehealth services by patient remoteness area^{a,b}
Total claims processed between 1 July 2011 and 30 June 2016

Location	No of services	Proportion of services	
		No.	%
Major city	46 472		10
Inner regional	213 224		45
Outer regional	182 725		38
Remote	23 122		5
Very remote	9 964		2
Unallocated ^b	38		0
All locations	475 545		100

^a Covers supported and unsupported telehealth services. Supported telehealth services are attributed to the location of the supporting provider, and unsupported telehealth services are attributed to the residential address of the patient. ^b Small discrepancies occur due to the apportioning of postcodes for remoteness areas.

Source: DoH (2016).

The Royal Flying Doctor Service (RFDS) provided around 62 700 ‘remote consultations’ by general practitioners over the phone or radio in 2015–16 to individuals and health workers in regional and remote areas that did not have a locally-residing general practitioner (RFDS, pers. comm, 26 October 2016).⁸⁷ Remote consultations ranged from helping to manage chronic conditions such as diabetes, asthma and heart conditions to emergency work such as poisons and injuries. The vast majority of remote consultations were delivered by telephone (99.9 per cent) with the remainder by radio or video. RFDS Victoria is currently rolling out a video-based telehealth system to deliver endocrinology services through Telstra Health’s Anywhere Healthcare platform and is looking to extend the system to additional rural locations (RFDS, pers. comm, 20 March 2017).

A 2016 survey of around 600 rural doctors by the Australian Medical Association (AMA 2016; sub. DR147) identified access to high-speed broadband for medical practices as a key solution to rural health care ranked second in priority after extra funding and resources.

A recent survey of more than 10 000 Australians commissioned by nbn found that 5 per cent of respondents consulted a practitioner online (nbn 2016j),⁸⁸ with the main reasons for doing so varying slightly by location. Metropolitan respondents were more likely to seek an online consultation to save time away from work/home duties and because of the cheaper cost of consultation, whereas regional respondents were nearly twice as likely to consult only because of no suitable provider locally. Other survey findings

⁸⁷ These remote consultations involve the resolution of issues in the absence of medical infrastructure — that is, there is no access to emergency departments or on-site services.

⁸⁸ Although the survey was of over 10 000 people, the number of respondents varied according to the questions — for example, the question about consulting a practitioner online was answered by 510 respondents.

included that, compared with metropolitan respondents, regional respondents were more likely to:

- have a condition requiring regular consultations and were less likely to be satisfied with the availability of local general and specialist practitioners and with the quality local specialist medical services
- look up symptoms and conditions online.

NBN infrastructure is being, or will be, used to facilitate telehealth services, particularly in regional and remote areas. nbn provides exemptions to its Fair Use Policy, which allow RPSs to offer a *Sky Muster* service to users of telehealth in remote and isolated communities in partnership with providers of these services (chapter 4). Australian Government funding has also, in the past, been directed to pilot telehealth services over NBN infrastructure. For example, the CSIRO has been funded to conduct a telehealth pilot to combat diabetes-related blindness in remote Indigenous areas with services delivered over NBN infrastructure (nbn 2015c). Further, there is now a dedicated telehealth practice (GP2U) providing a range of telehealth services over NBN infrastructure, including by way of video-conferencing (nbn 2016j).

Distance education

There are limited data on the number of children and families reliant on distance education services (services from kindergarten to year 12) through a telecommunications network. According to the Federal Council of the Isolated Children's Parents' Association (FCICPA 2016), in remote Australia, there were around 280 children aged four years who accessed early childhood programs in their transition to school and around 1500 families who required a distance education tutor.

As noted above, nbn provides exemptions to its Fair Use Policy, which allow RPSs to offer *Sky Muster* service to users of telehealth in remote and isolated communities in partnership with providers of these services (chapter 4). At the moment, nbn provides exemptions upon request by RSPs to support the delivery of educational services by State and Territory Departments of Education. The process for connecting to NBN infrastructure for these services will differ depending on the body delivering the service. Premises with children who receive distance education may be eligible to receive a second service to their premises which offers an additional 50 gigabytes (GB) of data per month per student (up to 150 GB for three students) (ACCAN 2016d; BIRRR 2016; nbn 2016q). However, as noted by some participants, this extra allowance does not apply to tertiary students, nor to students who travel to and from school, 'but [who] are still expected to use the internet for homework' (Denham, sub. DR170, p. 2).

Emergency services

The availability of telecommunications services to enable access and provision of emergency services can be critical for public safety, particularly in regional and remote areas most at risk of natural disasters (chapters 4 and 5). Emergency service organisations require telecommunications services that are widely available, secure, interoperable and time critical.

People seeking emergency services have a preference for telecommunications services that are easy to use when under stress and allow voice calls. For example, a consumer survey undertaken as part of an Australian Government review of the national Triple Zero emergency call service found that 72 per cent of respondents preferred voice calls as the primary method for contacting Triple Zero (DoC 2015b). There is a strong preference for using mobile phones for raising emergency assistance. The majority of calls to Triple Zero in 2015-16 originated from mobile phones (69 per cent), and less frequently from fixed lines (31 per cent) and public payphones (2 per cent) (chapter 4).

Irrespective of the TUSO, existing policy settings seek to ensure that emergency services are accessible to most people in Australia. Regulation requires that all mobile phone users are able to access Triple Zero, even without credit, a current service, or a SIM card — as noted above, there is evidence of a strong consumer preference for using mobile phones for emergency calls. Similarly, since 2013, all handheld satellite phones are required to access Triple Zero (ACMA 2017d). All nbn customers who have a *standard telephone service* provided by an RSP (that is, a service on the NBN fixed-line network) are able to access Triple Zero. And the Australian Government (Fifield 2016) is seeking expressions of interest from providers for the future provision of the Triple Zero service in an internet protocol-based environment (chapter 4).

That said, the NBN satellite network is not configured to provide voice call access to emergency services. As emphasised by nbn in its *Sky Muster Service Users Guide*:

Your internet service provider may offer a VoIP service and may need additional equipment. This service does NOT replace your normal telephone landline and should not be relied upon for emergency calls. (nbn 2016h, p. 12)

As discussed in chapter 5, the Commission notes that there are technological alternatives to conventionally-used terrestrial networks for raising emergency assistance in regional and remote areas. These include satellite mobile phones, satellite-based messenger devices (such as Spot), two way HF radios, and personal locator beacons. Further technological advances are also likely in this area.

Electromagnetic energy exposure

Some participants raised concerns about symptoms associated with electromagnetic energy exposure to wireless-based communications, urging the retention of the TUSO (for example, Stop Smart Meters Australia, sub. DR100; Adler (EMF Aware Alliance), sub. DR179, including a petition from over 200 people). Bandara (sub. DR168) said:

My strongest objection [to the discontinuation of the TUSO], as an expert, is based on the adverse health effects suffered by thousands of Australians from wireless communication systems that emit microwave/radiofrequency electromagnetic radiation (MW/RF-EMR) knowingly and also possibly by millions unknowingly. This type of radiation has already been classified as 2B possible carcinogen by the WHO's International Agency for Research on Cancer ... (p. 1)

Landline telephone lines and wired internet connections are a MUST to preserve health of millions of Australians. Responsible national health agencies elsewhere have already started giving recommendations to the public to reduce exposure to wireless radiation ... Some governments have enacted new laws to this effect, for example, France banning wireless systems in small children's facilities and allowing only wired communications systems. (p. 3)

On this matter, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), which is the Australian Government's primary authority on radiation protection and nuclear safety, noted:

- there is no established scientific evidence that 'electro-magnetic hypersensitivity' (sensitivity to electromagnetic fields) is caused by electromagnetic fields at levels below exposure guidelines. ARPANSA acknowledged that the health symptoms experienced by affected individuals are real and can be a disabling problem and advised those affected to seek medical advice from a qualified medical specialist
- there is no established scientific evidence that the use of mobile phones causes any health effects. However, some studies have shown a weak association between heavy mobile phone use and brain cancer
- based on current research there are no established health effects that can be attributed to the low electromagnetic exposure from mobile phone or nbn fixed wireless base station antennas (ARPANSA 2016).

The Commission notes that there are already Australian Government measures to address concerns in this area — for example:

- ARPANSA monitors scientific evidence on electromagnetic fields and health including electromagnetic hypersensitivity and cancer, and publishes information on how to reduce exposure from mobile phones and other wireless devices. It engages with members of the public that are concerned, the electromagnetic hypersensitivity community, researchers and medical specialists. It established the Electromagnetic Energy Reference Group, which includes representatives from the community, the Chief Medical Officer of Australia, academics and government organisations, and other stakeholders. It sets the radiofrequency electromagnetic energy human exposure limits within Australia
- the ACMA adopts ARPANSA's electromagnetic energy limits in its regulations for communications equipment (such as mobile phones and mobile phone base stations)
- the National Health and Medical Research Council (NHMRC) funds an electromagnetic energy research program through which two centres of research excellence (the Australian Centre for Electromagnetic Bioeffects Research and the

Population Health Research on Electromagnetic Energy) undertake research on health issues and electromagnetic sensitivity. The research program is funded by a levy paid annually by radio communications licence holders and collected by the ACMA

- the Australian Government participates in the World Health Organization's International Electromagnetic Fields Project, which assesses the health and environmental effects of electromagnetic energy exposure (ACMA 2017c; ARPANSA 2015; NHMRC 2014).

The Commission considers that, in principle, any government intervention to address the health effects of wireless-based communications should be based on robust peer-reviewed scientific evidence. In the field of medical science, this is traditionally the double blind experiment based on a falsifiable hypothesis and subject to rigorous testing and repeatability (with research published in the Cochrane database). Even if concerns about health effects were validated in this way, the benefits of any intervention to address these health effects, such as the continuation of the TUSO, need to be weighed against their costs from a community-wide perspective. It is the Commission's view that addressing the health risks from any telecommunications technology through targeted interventions such as providing consumer information or setting standards in relation to the relevant technology is more cost effective than through a blunt measure such as the TUSO.

FINDING 6.3

Certain groups of people with particular needs may experience gaps in the availability and accessibility of telecommunications services following the full rollout of NBN infrastructure and in the absence of further government intervention.

The groups most likely to experience difficulties include: people with disability and life threatening conditions; people living in remote Indigenous communities; some older people; people who are homeless; and users of telehealth, distance education and emergency services within the NBN satellite footprint who do not have adequate mobile coverage.

The costs of providing specialised services to meet the needs of these groups are likely to result in providers not offering the services, or providing them at a high price. Notwithstanding that technological advances could reduce these costs, the particular needs of some people in these groups warrant targeted government intervention.

6.3 What about affordability?

A *baseline* telecommunications service is affordable if its purchase does not place undue hardship, particularly on people with low incomes (chapter 1).

There are different ways of measuring the affordability of telecommunications services (chapter 5). While price plays an important role, telecommunications affordability refers to

the ability of a person (or a household) to pay for *baseline* telecommunications services relative to their income, as well as where those services fit into their hierarchy of needs (after food and shelter), which varies across individuals and their circumstances.

Several policy measures that address telecommunications affordability may continue in the absence of the TUSO. These include low-income measures by Telstra as part of its carrier licence conditions and the Australian Government's Telephone Allowance (chapters 3 and 4). The South Australian Council of Social Service (sub. DR85) and ACCAN (sub. DR124) considered that the Telephone Allowance was inadequate and should be reviewed. The Commission considers this to be a matter that should be covered by the Australian Government's planned consumer safeguards review (chapter 9).

The remainder of this section reviews evidence on the affordability of telecommunications services for users in general, for people on low incomes as well as with respect to users of services over NBN infrastructure generally.

What's the evidence on telecommunications affordability?

Real prices of both fixed and mobile services have continued to decline rapidly over time (chapter 2). For example, the real average monthly price of fixed voice and mobile services fell by 51 and 54 per cent respectively between June 1998 and June 2016, while DSL and HFC broadband service prices fell by 21 and 16 per cent, respectively, between June 2007 and June 2016 (ACCC 2017a). This downward trend in real telecommunications prices is in contrast to trends in many other key services such as electricity, water and sewerage, education, and health (figure 6.3). Furthermore, mobile services in Australia — which are available to at least 99.3 per cent of the population — are well-ranked internationally in terms of their low tariffs (chapter 2).

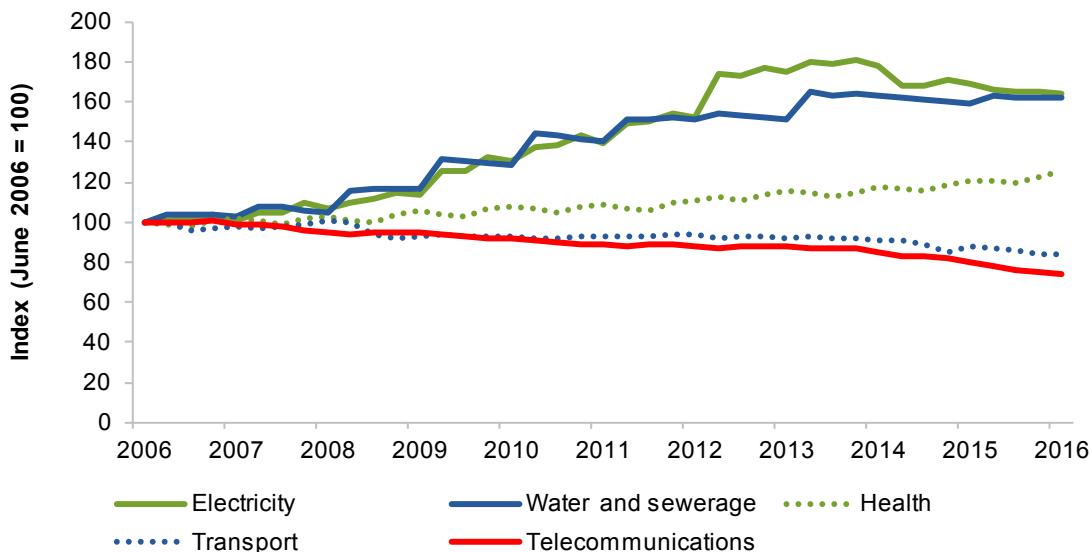
Even though in absolute terms household spending on telecommunications services has grown for most of the past decade (figure 6.4, panel a),⁸⁹ it has typically accounted for a small share of household income (figure 6.4, panel b; table 6.10). According to ABS data, average household expenditure on telecommunications services in 2009-10 accounted for 2.8 per cent of disposable household income (table 6.10).⁹⁰

⁸⁹ Thomas et al. (2016) also found that households spent a growing proportion of their gross income on internet services in the past two years (1.17 per cent in 2016 compared with 1 per cent in 2014).

⁹⁰ Disposable income is a more relevant measure than gross income (which is inclusive of tax) in assessing the affordability of telecommunications. It better reflects that portion of income available to users for discretionary spending. That said, for low-income users (the group of most interest from a policy perspective), disposable and gross income are likely to be quite similar.

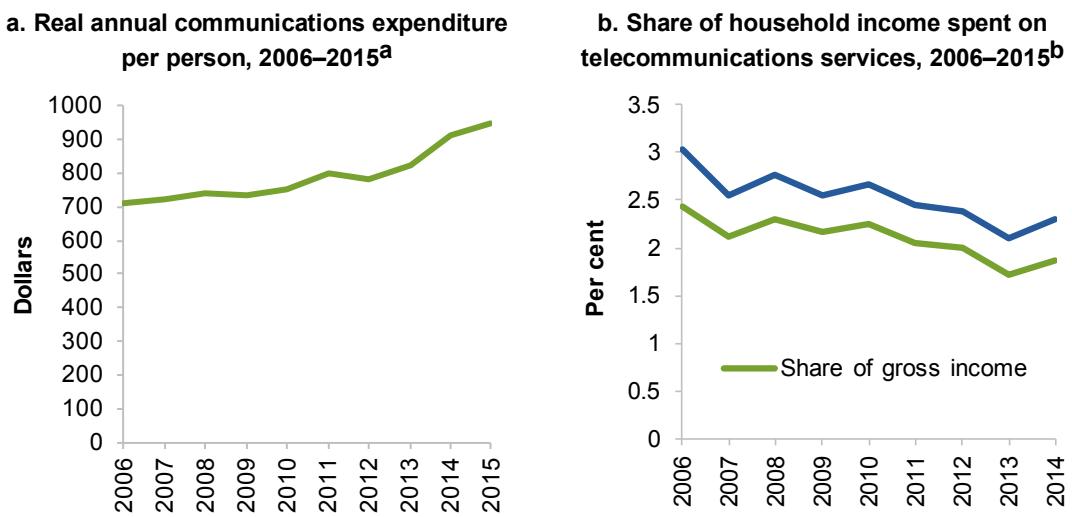
Figure 6.3 Trends in the real prices of key services

Real price indices, June 2006 to June 2016



Source: Productivity Commission estimates based on ABS (*Consumer Price Index, Australia*, Cat. no. 6401.0, Dec 2016).

Figure 6.4 Real expenditure on communications is increasing overall, but declining as a share of household income^a



^a 'Communications' includes postal services, telephone and facsimile services and internet services.
^b 'Telecommunications services' includes telephone rent and calls, and internet charges.

Sources: Productivity Commission estimates based on ABS (*Australian National Accounts: National Income, Expenditure and Product*, Jun 2016, Cat. no. 5206.0; *Australian Demographic Statistics*, Cat. no. 3101.0); Productivity Commission estimates based on HILDA Online Data Dictionary Release 15.0.

Table 6.10 Spending on key services as a share of household income by income quintile^a

2009-10

Service ^b	Lowest income quintile	Second income quintile	Third income quintile	Fourth income quintile	Highest income quintile	Average household (disposable income)
	%	%	%	%	%	%
Water and sewerage	1.4	0.8	0.6	0.5	0.3	0.6
Electricity and gas	4.7	2.7	1.8	1.4	0.8	2.3
Telecommunications	6.3	3.8	3.0	2.3	1.5	2.8
Health	10.7	5.0	5.2	3.6	2.8	4.6
Transport	19.2	14.7	12.9	11.2	9.7	13.5

^a Individual income quintiles refer to gross household income. ^b Categories of key services may not correspond directly to figure 6.3. Water and sewerage includes rates for all properties. Electricity and gas includes heating oil and wood for all properties. Telecommunications covers telephone (fixed and mobile), fax and internet (fixed and mobile) charges but not spending on handsets or other hardware. Health includes insurance, practitioner's fees, medicines and therapeutic appliances. Transport includes motor vehicle purchases and parts, fuel, registration, insurance and parking fees and public transport fares.

Sources: ABS (*Household Expenditure Survey, Australia: Detailed expenditure Items 2009-10*, Cat. no. 6530.0; *Household Income and Income Distribution, Australia: Detailed tables, 2009-10*, Cat. no. 6523.0).

Moreover, average household spending on telecommunications services as a proportion of household income has been falling over time. Based on data from the *Household, Income and Labour Dynamics in Australia Survey* (HILDA Survey), the share of disposable household income spent on ‘telecommunications’ — which covers telephone (fixed and mobile), fax and the internet (fixed and mobile) — for an average household fell from 2.8 per cent in 2006 to 2.3 per cent in 2015 (figure 6.4, panel b), pointing to an improvement in affordability over time. Although the Bureau of Communications Research (BCR 2017) used a different approach to measuring affordability from HILDA data, it also reached a similar conclusion.

As noted, mobile services play an important complementary role in enabling ubiquitous universal service provision. Mobile service providers offer packages and payment options that can be tailored to users with diverse usage and expenditure patterns. For example, pre-paid mobile plans, which help users control their spending, are widely available in the market. Real prices of pre-paid mobile telecommunications services fell by around 18 per cent over the five years to 2015 (ACCC 2016b).

Several household surveys of consumer attitudes to telecommunications affordability — for example, the ABS *Multipurpose Household Survey*, the HILDA Survey and Lane et al. (2016) — indicated that most people viewed telecommunications services as affordable. For example:

-
- according to the HILDA Survey, less than 0.1 per cent of households in 2014 (around 8000 households) did not have a telephone (fixed or mobile) and around 2.1 per cent of households (around 183 000 households) did not have access to the internet at home because ‘they could not afford it’. That said, the HILDA Survey under-represents people on low incomes and does not include people in remote areas
 - ABS (2016d) data revealed that, in 2014-15, around 2.2 per cent of households (nearly 200 000) did not have access to the internet at home because of ‘cost’⁹¹
 - an ACMA survey (2016d cited in ACMA, sub. DR157) found that most consumers in 2015-16 were satisfied with call and service costs of fixed-line telephone (83 per cent), mobile phone (84 per cent) and internet (74 per cent) and with fixed-line telephone rental costs (74 per cent)
 - another ACMA survey (2016g) of residents connected to the NBN fixed-line network found that most reported that the costs of NBN fixed-line broadband (71 per cent) and fixed-line phone service (84 per cent) were less than or comparable to those paid prior to connecting. Similar findings were reported for businesses. The affordability of NBN services is considered further later in this section and in appendix D.

People on low incomes

A number of participants commented on the importance of considering and addressing affordability concerns for some groups of people, particularly those on low incomes and in regional and remote areas, who tended to have lower incomes (box 6.5).

There is evidence that some people on low incomes — estimated at over 4 million in 2013-14 — may face affordability issues compared with people on higher income.⁹² For example, according to ABS data, while people in the lowest gross income quintile (mean income of around \$19 000 per year) spent around 44 per cent less on telecommunications services than an average household in 2009-10,⁹³ their share of gross household income spent on telecommunications services (6.3 per cent) was more than 2.6 times that of an average household (2.4 per cent).⁹⁴ Similarly, low-income households spent more of their incomes on other key services, particularly on transport, health, and electricity and gas (table 6.10).

⁹¹ This represents a decline from 3.2 per cent of households in 2005-06.

⁹² According to ABS data (2016c), over 4 million people lived in low-income households, which are defined as households with equalised disposable income (disposable income adjusted for household size) below 60 per cent of the median equalised disposable income (below around \$27 000 per annum for a lone person and below around \$56 000 per annum for a couple with two children).

⁹³ For the lowest income quintile, gross income and the disposable income (which is gross income minus taxes and levies on income) are almost the same.

⁹⁴ Comparisons are in terms of gross household expenditure and incomes.

Box 6.5 Participants' concerns about telecommunications affordability

Based on its *Affordability Map* (ACCAN 2016b), ACCAN (sub. 48) identified a range of groups, mainly of people on low incomes, facing unique barriers to telecommunications affordability, including:

... people facing homelessness; low-income families; people with disability; students; older people; people receiving the lowest government income support payments (Youth Allowance and Newstart Allowance); migrants and asylum seekers; Aboriginal Australians and Torres Strait Islanders; the unemployed; prisoners; and people who live in social housing. (p. 20)

Drawing on a range of evidence (ABS 2016d; ACCAN 2016e; de Ridder 2015a), ACCAN (sub. 48) said that 'the current measures are not supporting all consumers who may be facing affordability barriers' (p. 20).

Carers NSW (sub. DR72) said that:

... research has shown that Australians are increasingly spending a greater proportion of household income on internet and digital services (Thomas et al. 2016). For many low-income households – particularly those that are renting their accommodation — ongoing internet subscriptions or the cost of a computer may be too expensive to afford (McFerran 2010; Morris 2016; Newman, Biedrzyckie and Baum 2010). (p. 1)

The South Australian Council of Social Service (sub. DR85) referred to its own research (Ogle and Musolino 2016), which showed the inadequacy of the Telephone Allowance in addressing affordability due to poor targeting and the level of support, the varying difficulty among different Centrelink recipients in paying for telecommunications services, the 'poverty premium' paid by low-income consumers of five times the price paid per unit by the highest income quintile, and the financial difficulty created by the need to contact government agencies through telecommunications mediums.

The National Rural Health Alliance (sub. DR89) said that telecommunications affordability was a significant issue for people living outside the major cities:

People living outside Australia's capital cities in 2011-12 earned only 85% the amount that their capital cities counterparts earned. Further, the percentage of employed people earning \$15 600 or less is 15% higher outside capital cities, while the percentage of employed people earning \$78 000 or over is 26% lower outside capital cities. While 23% of people living in major cities carry some sort of health card, 29% of people living outside major cities carry some sort of health card. Concession card holders ... are almost 30% more prevalent in regional areas (30%) compared with remote areas (about 23% — the same as in major cities). (p. 2)

Lamond (sub. DR134) expressed concerns about the inequity of service and cost between NBN fixed-line and satellite users.

BIRRR (sub. DR143) provided data on nbn *Sky Muster* plans and said that:

... telecommunications for RRR [rural, regional and remote] consumers are not becoming affordable. Sky Muster satellite does not offer the consumer an equitable or affordable service when compared to premises connected to the nbn Fixed line and Fixed Wireless services. ... [It] is a costly alternative to traditional USO services for RRR consumers, effectively leaving many on low incomes with no communication service. (pp. 38, 40)

Based on a survey of around 500 low-income Centrelink recipients and Low Income Health Care Card holders, Ogle and Musolino (2016) reported, among other things, that:

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- 66 per cent of respondents rated telecommunications costs in the top five most important factors in their day-to-day household budgets
 - 62 per cent of respondents had difficulty paying, cut back or stopped using telecommunications services for financial reasons in the last 12 months
 - respondents on Newstart, Youth Allowance and the Parenting Payment were more likely to have telecommunications affordability problems while those on the Age Pension had the fewest problems
 - those on low incomes paid a ‘poverty premium’ for data in that those in the lowest income quintile paid around five times the price per unit of data paid by those in the highest income quintile.⁹⁵

In their *Australian Digital Inclusion Index* work, Thomas et al. (2016) estimated digital inclusion scores for the affordability of internet services that indicated a worsening of affordability between 2014 and 2016 from a score of 53.5 to 51.2. They considered that ‘internet services are becoming comparatively less expensive — but at the same time, Australians are spending more on them’ and that the ‘growth in expenditure on internet access has outpaced the growth in incomes’ (p. 5). They concluded that ‘if the trend continues it may be cause for concern particularly for people on low incomes’ (p. 5). Their work further showed that digital inclusion scores were typically higher among higher income groups, apart from the lowest income group. They explained that the lowest income group included ‘many teenagers and young adults whose income is low, but who live at home with their parents, and so enjoy greater connectivity’ (p. 9).

Participants’ comments on the evidence and the Commission’s view

Participants (such as the South Australian Council of Social Service, sub. DR85 and ACCAN, sub. DR124) commented on some of the above evidence on telecommunications affordability particularly noting that household expenditure on telecommunications service has increased, estimates of the share of income spent on telecommunications services may underestimate affordability to the extent they ignore expenditure on hardware, and there are limitations in available ABS and HILDA data.

The Commission considers that, as a fundamental principle, assessments of telecommunications affordability should reflect *baseline* services, including what are likely to be acceptable to the wider community to warrant taxpayer subsidies. As such, it makes the following observation.

- Increases in expenditure on telecommunications services (evident in figure 6.4) do not necessarily imply that services are unaffordable as such. Expenditure increases may capture expenditure on new or more telecommunications services — such as two broadband services rather than one, or data streaming. These types of expenditure are

⁹⁵ This may reflect people on low incomes using pre-paid mobile service options more than higher income groups.

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- not necessarily consistent with *baseline* services, and do not necessarily warrant government support or subsidies.
- What is included in the basket of items that make up telecommunications expenditure for the purpose of assessing affordability is a moot point. It is important to consider whether particular items, such as mobile handsets, laptops and other personal telecommunications hardware, are consistent with *baseline* services that warrant government support or subsidies.
 - As to whether 2, 5 or 10 per cent is the right threshold for determining whether telecommunications services are unaffordable is also a moot point. The proportion of average household disposable income spent on telecommunications services is within the range spent on other key services such as electricity and gas and, indeed, is much lower than that spent on transport and health services (table 6.10).

The Commission also notes that, even though there are limitations with individual data sources — for example, ABS *Household Income and Expenditure Survey* data (table 6.10) are for 2009-10, and HILDA data exclude households in remote areas — they can collectively be used to build a picture of what is going on with respect to telecommunications affordability. ABS data, although dated, show how household expenditure as a share of household income differs across income quintile groups as well as across different goods and services at a point in time. And HILDA data show trends in the shares of household expenditure in household income for the past 10 years.

In conclusion, the Commission considers that, on balance, the evidence suggests that for most consumers, telecommunications services are affordable, and have become more so over time. However, some people on low incomes may face particular difficulties with the affordability of telecommunications services.

FINDING 6.4

The affordability of telecommunications services has improved for most Australians although some people on low incomes may face financial hardship in accessing these services.

What about affordability and the NBN?

The Commission analysed prices of basic retail broadband and voice packages available on the NBN. The results of the analysis can be found in appendix D.

As the rollout of the NBN is still ongoing, it is difficult to discern clear trends in retail prices at this time. Average real prices of retail broadband services on the NBN increased by over 5 per cent between 2012-13 and 2015-16 (ACCC 2017a), but this masks considerable variation over time and between high and low capacity services. The ACCC (2017a) noted that:

Both the ‘very low’ and ‘very high’ NBN consumer groups have exhibited a significant increase in spending since bill samples were last collected in 2012-13. In the case of ‘very low’ spending consumers, this appears to be due to the increase in the price of entry-level NBN plans offered by some providers. At the same time, some providers have offered new, higher-priced plans aimed at the ‘very high’ spending consumer group, which generally include high data inclusions and faster connection speeds.

The increase in average prices paid for NBN internet services does not reflect the experience of all consumers. While some providers have increased prices for entry-level NBN plans, there is still a range of options available to consumers who do not wish to purchase plans with high speeds and large data inclusions, or those who wish to spend less for basic NBN connectivity. (p. 106)

As noted earlier in this chapter, nbn’s wholesale prices are capped at a uniform level across each footprint, significantly improving the affordability of its higher-cost satellite and fixed wireless services. nbn has also committed to a number of long-term price controls, including that prices of individual nbn wholesale products may increase by no more than the consumer price index increase minus around 1.5 percentage points (subject to a lower bound of zero) in any year (nbn, sub. 47). Further, it is offering price discounts to the aggregated capacity charge (known as the ‘connectivity virtual circuit’ charge — CVC) to RSPs — known as the dimension-based discount (appendix B).

While these measures imply that the real unit price of each of nbn’s wholesale products will fall over time, they do not necessarily imply real reductions in wholesale *revenue* per end user. The average quantity of CVC provisioned per end user can be expected to increase over time (and thus the total CVC cost per end user, including discounts — appendix B) in line with the exponential growth in internet data traffic (chapter 2), and it is also probable that the share of consumers on higher speed tiers will grow. Reflecting this, nbn (2016b) forecasts that the network-wide average wholesale revenue per end user will grow from \$43 per month in 2015-16 to \$52 per month in 2019-20.⁹⁶ That said, the link between higher bills for high-usage consumers and the affordability of a *baseline* service is tenuous.

6.4 Summing up

As noted at the beginning of this chapter, it is challenging to assess the reach of the market in addressing universal service objectives taking account of the full rollout of NBN infrastructure and in the absence of the TUSO.

That said, the Commission has tentatively estimated the extent of the various market gaps, including particular user needs, in telecommunications using available data and other evidence — table 6.11. These estimates should be viewed with caution. First, they do not reflect future changes in technology, which could result in a narrower set of gaps and needs.

⁹⁶ nbn (2016b, p. 51) also attribute this to a ‘strong contribution from business revenue’.

Table 6.11 Some estimates of market gaps in telecommunications

<i>Market gap, including particular user need (source)</i>	<i>Year of estimate</i>	<i>Estimated size^{a,b,c}</i>
		No. of people (premises, or households)
Users of retail voice services (and emergency services) within the NBN footprint		
With inadequate mobile coverage (PC estimate, section 6.1)	2017	up to 90 000 premises
People with disability		
NRS customers (DoCA 2016a)	2016	5 000–10 000
People with life-threatening health conditions		
Priority Assistance customers (ACMA 2016d)	2016	211 000
Indigenous people		
In regional and remote areas (SCRGSP 2016a)	2011	437 000
In remote areas (SCRGSP 2016a)	2011	143 000
Who are homeless (ABS 2012d)	2011	27 000
Without an internet connection (ABS 2012c)	2011	66 000 households
Older people (aged 65 and over)		
For whom fixed-line phones are the 'most used' communications service (PC estimate based on ACMA 2014b) ^d	2014	1.9 million
Who don't own or use a mobile phone (PC estimate based on ACMA 2014b) ^d	2014	868 000
Who have a fixed phone but no mobile phone (PC estimate based on ACMA 2014b) ^d	2014	835 000
Who did not use the internet (ABS 2016d)	2014-15	1.6 million
People who are homeless		
In major cities (ABS 2012d)	2011	61 000
In regional and remote areas (ABS 2012d)	2011	45 000
Clients of specialist homelessness services in major cities (AIHW 2017b)	2015-16	79 000
Clients of specialist homelessness services in regional and remote areas (AIHW 2017b)	2015-16	43 000
Users of telehealth		
Patients receiving Medicare telehealth services (DoH 2016)	2011-16	144 000
RFDS 'remote consultations' (RFDS, pers. comm., 26 October 2016)	2015-16	63 000
Users of distance education (kindergarten to year 12)		
Children aged four years in remote areas who accessed early childhood programs (FCICPA 2016)	2016	280
No. of families who require a distance education tutor (FCICPA 2016)	2016	1500
People on low incomes		
Who don't have a telephone (fixed or mobile) because they cannot afford it (HILDA Survey)	2014	8 000 households
Who don't have access to the internet at home because of cost (ABS 2016d)	2014-15	199 000 households

^a Estimates have been rounded. ^b Estimates may overlap and should not be aggregated. ^c Estimates are likely to change by the time of the NBN rollout. ^d Commission estimates were derived by applying ACMA's estimated proportions of older people in the various categories to the ABS estimate of resident population of people aged 65 years and over for the relevant year.

Second, the estimates are based on data collected from different sources, over different time periods, and subject to different survey methods and estimation techniques, which makes it difficult to compare the estimates. And finally, there are overlaps in the estimates for the different groups — for example, some people may have multiple needs — making any aggregation of the estimates impossible.

Nonetheless, these tentative estimates suggest that a relatively small number of people are likely to be affected by telecommunications ‘market gaps’ or have particular telecommunications needs. This gives weight to a targeted approach to government intervention rather than an expensive ‘one-size-fits-all’ approach, such as the current TUSO.

FINDING 6.5

In the absence of the telecommunications universal service obligation — and given current policy settings, the full rollout of NBN infrastructure and the ubiquity of mobile services — the extent of market gaps (including particular user needs) in telecommunications is likely to be small and differ across groups.

7 Universal service policy options

Key points

- As universal service availability of *baseline* broadband and voice services will largely be met by a combination of National Broadband Network (NBN) infrastructure and mobile networks, any government intervention should be targeted to market gaps, including particular user needs.
- Options to address universal availability should leverage off NBN infrastructure and mobile networks. NBN infrastructure, in which there is substantial Australian Government investment, will provide wholesale broadband services that have a voice capability to all Australian premises upon request. Mobile networks deliver services to over 99 per cent of Australians.
 - The universal service role of NBN Co Limited (nbn), and of other designated providers, with respect to voice services should be clarified in legislation.
 - There should be minimal intervention to guarantee the retail provision of broadband services on the NBN. It could involve the Government monitoring retail presence on the NBN with a (non-automatic) trigger for a competitive tender for retail service delivery where a retail presence is absent and where competitive tendering is feasible.
 - A competitive tendering arrangement could be introduced for the delivery of *baseline* voice services within the NBN satellite footprint where there is inadequate mobile coverage. The introduction of the arrangement, including design of the tender and subsequent contract, will depend on accurate information about the extent of the *baseline* voice service gap.
 - A future legislative review of nbn should not be conditional on its privatisation.
- The Mobile Black Spot Program should be independently evaluated from a community-wide perspective before it proceeds to the next funding round. Measures to improve the program's operation that should be considered include a clearer prioritisation of the program's objectives.
- Although the number of payphones has fallen, there may be limited circumstances in which they, or some other form of community telecommunications, could be funded by the Government under a community telecommunications program. Such a program should: be flexible as to the form of service; target locations where there is a market gap including where there is no *baseline* voice service such as a mobile service; involve extensive community input; and involve competitive tendering where feasible.
 - There could be scope for an optional carve out of remote Indigenous communities whose particular needs could be met by another targeted program.
- A universal service fund has conceptual appeal in that it could consolidate multiple telecommunications funding programs and enable broad assessments of technological alternatives. However, the administrative effort involved in its establishment and getting its governance right could be problematic and not worthwhile for a small fund.
- Options to address universal service accessibility and affordability, including particular user needs, should be targeted and flexible, facilitate informed consumer choice, and support efficient competition.

Universal telecommunications services bring potential community-wide benefits (chapter 5).

While a competitive and contestable telecommunications market will enable most users to enjoy these benefits, there may be concerns about universal service *availability* such as the absence of retail service providers (RSPs) on parts of the National Broadband Network (NBN) and the quality of voice services provided over NBN Co Limited's (nbn's) satellite network, and concerns about universal service *accessibility* and *affordability* (chapter 6).

However, government intervention is not always justifiable, even where there is solid evidence of market gaps, including particular user needs. This is because the intervention may not generate value for money for the wider community and may involve high costs relative to the benefits it is trying to achieve in the first place (chapter 5).

This chapter examines policy options in terms of their relative cost-effectiveness in addressing the Commission's proposed universal service objective (recommendation 5.1).

As set out in chapter 1 (box 1.1), a universal service policy is likely to be effective in meeting a universal service objective at least cost to the community by:

- harnessing markets where efficient to do so
- targeting areas where efficient market solutions are not feasible
- being technologically neutral
- promoting efficient contestability or competition in the telecommunications sector and being competitively neutral
- promoting administrative simplicity and reducing regulatory compliance burdens
- being sufficiently flexible to adjust to future changes.

This chapter begins with a review of general approaches to addressing universal service objectives (section 7.1). It then looks at specific options to address availability (section 7.2). To the extent that these specific options do not meet the differing needs of particular sections of the Australian community — for example, because of concerns about accessibility and affordability — further policy options are briefly considered (section 7.3). The merits of consolidating these various options under the umbrella of a universal service fund are also examined (section 7.4).

In examining specific options, the Commission has assumed that there would be a *baseline* standard of quality that would apply to services received by telecommunications users. The Commission has proposed a functional definition of *baseline* quality in chapter 5 and that technical standards underpinning that definition be developed prior to the Australian Government's planned review of consumer safeguards (recommendation 5.2).

The Commission intends that most of its recommendations in this chapter would apply by the time the NBN is fully rolled out, expected to be in 2020. It acknowledges that the time taken to transition to, and implement, them will be important in determining how quickly

or slowly the wider community benefits. An important factor affecting the pace of reform is the current Telstra USO Performance Agreement (TUSOP Agreement) between the Australian Government and Telstra, which is due to conclude in 2032. Transitional matters are considered in chapter 9.

7.1 General approaches to addressing universal service objectives

There are several general approaches to addressing universal service objectives:

- relying on markets but with some minimal safety net intervention
- publicly providing services
- imposing a universal service obligation (USO) on a service provider
- competitive tendering for the provision of services
- directly subsidising users of services.

Establishing a universal service fund is also a general approach to addressing universal service objectives. As noted later in section 7.4, the Commission considers a universal service fund as an administrative arrangement that can combine the above general approaches.

These approaches are not mutually exclusive, and some can operate together. Indeed, many countries including Australia apply a combination of approaches (appendix C). Some approaches tend to be more relevant than others for particular universal service objectives — for example, directly subsidising users may better address accessibility and affordability than availability. And there are different ways for governments to implement the approaches — through regulation, contract, direct provision or subsidisation. They also can involve different trade-offs, particularly in terms of the Commission’s guiding principles for designing a universal service policy (box 1.1).

A minimal safety net

An approach to addressing universal service objectives is to rely on markets and for governments to intervene as a last resort, and only where there is evidence of a market gap. Any government intervention would be targeted to the market gap (which includes a particular user need). This approach can provide incentives for the market to operate efficiently as long as the government intervention is not seen as automatic.

This market-based approach was supported by some participants (Optus, sub. 4; DoCA, sub. 58). It has been applied to the provision of universal voice services in the Czech Republic, Estonia, Germany, the Slovak Republic and Sweden, and to the provision of universal broadband services in Denmark, Germany, Greece, Iceland, the Netherlands and Norway (appendix C). For example, in Germany, while there is no USO and the national

regulator (the Bundesnetzagentur) is currently satisfied there is sufficient competition in the market, it has the ability to intervene to ensure universal service provision 12 months after the incumbent notifies it of its decision not to provide universal services.

The approach does not require governments to anticipate a market gap, and can avoid the associated costs of predetermining where the gap may lie. However, the approach does require some degree of government intervention, such as ongoing credible market monitoring by a government agency tied to some trigger for government intervention. To allow for the market to operate efficiently, such government intervention should not be automatic, but occur following an assessment that it is actually warranted. The approach, thus, involves some level of government administrative cost.

Public provision

The public provision approach to addressing universal service objectives can be implemented in different ways including through governments imposing explicit universal service objectives or obligations on their public providers, or entering into contracts with their public providers to deliver universal services. Indeed, the Australian Government's business enterprise, nbn, is effectively a public provider of universal broadband services.

The cost-effectiveness of the public provision approach depends largely on how government business enterprises are internally structured. Drawing on the Commission's body of work in this area,⁹⁷ features that are likely to enhance cost-effectiveness include that:

- the public provider faces objectives that: are based on clearly specified and evidence-based rationales; are based on clear definitions of universal access and service; involve measurable outcomes; and are subject to regular review (box 1.1 and chapter 5)
- the public provider is in an arm's length commercial-type relationship with the government shareholder, which includes no ministerial or political interference in the provider's day-to-day operations
- the government lends money at commercial rates (or provides an explicit capital contribution) to a public provider that is not financially viable, rather than require that provider to borrow from the financial markets⁹⁸
- there is explicit funding of the public provider for the delivery of non-commercial services
- the public provider is required to pay dividends on a commercial basis

⁹⁷ The Commission has a long history of assessing government business enterprises commencing with the then Industries Assistance Commission's 1989 report on government (non-tax charges) (IAC 1989). Its most recent assessments in this area have been about the public ownership of electricity network businesses and public infrastructure (PC 2013b, 2014b), as well as in its annual reports on government services (for example, SCRGSP 2016b).

⁹⁸ If the public provider is not viable in its present form (that is, revenues do not exceed costs over the long term), requiring it to borrow more from the financial market will not make it viable unless there are genuine investment opportunities that reduce costs or increase revenues in the long term.

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- there is competitive neutrality between the public provider and private providers.

Universal service obligation

A common approach to addressing universal service objectives is through mandating in regulation or imposing in contract an obligation on a provider (or providers) to deliver services (appendix C). This often involves designating a provider, whether publicly or privately owned, as a ‘provider of last resort’ or a ‘universal service provider’ and/or imposing on it a requirement to deliver services ‘upon request’. The provider may be designated without inviting expressions of interest from other providers or through competitive tendering. The USO may be accompanied by funding, but this is not always the case.

As noted in chapter 3, Australia’s telecommunications USO (TUSO) is imposed on Telstra as the ‘primary universal service provider’ under the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth) and the Telstra USO Performance Agreement. Telstra receives funding for the delivery of the TUSO. There was no competitive tender involved in designating Telstra as the primary USO provider, although as noted later, a USO contestability arrangement was piloted in 2001.

Placing an obligation on providers to deliver universal services gives users a high degree of confidence that services will be available even though they may be non-commercial. That said, there are some risks (such as ensuring service continuity in the event of the insolvency of a private provider) that cannot be credibly transferred to the private sector. Governments should not only take care to avoid inadvertently paying the private sector for such risks, but also take steps to ensure arrangements are put in place from the outset to deal with such eventualities (PC 2014b).

It also has the advantage of being market led in that, apart from the requirement for government to implement the USO, it removes any onus on government to identify where services should be provided. However, as evident in relation to Australia’s TUSO in chapter 3, there are costs associated with the USO approach depending on how it is designed. Indeed, how a universal service provider is selected can have implications for competition within the telecommunications sector, with the potential for the provider to receive a competitive advantage to the detriment of efficiency of the telecommunications sector more broadly.

Competitive tendering

Another market-based approach to addressing universal service objectives is for governments to harness competition through competitive tendering.⁹⁹ Competitive

⁹⁹ As with public provision, the Commission has commented extensively on competitive tendering and procurement, for example, most recently in its reports on public infrastructure and public safety mobile broadband (PC 2014b, 2015).

tendering for universal service delivery was previously trialled unsuccessfully in 2001 (box 7.1). Participants offered a range of views on competitive tendering (box 7.2).

Box 7.1 **The Government's previous efforts to introduce contestability in universal service provision**

In 2000, the Australian Government decided to introduce contestability arrangements to enable telecommunications providers contributing to the universal service obligation (USO) subsidy to compete for USO customers and associated subsidies. The arrangements consisted of two parts.

An **extended zones tender** was applied to the most remote 80 per cent of Australia's landmass and involved \$150 million of Government funding to a single provider to introduce untimed local calls. Significant carrier investment was required above the \$150 million offered as part of the tender. Telstra was the successful bidder.

A **USO contestability pilot program** was introduced in 2001 in selected regions to test the scope for competition in delivering universal *standard telephone services*, with Telstra declared as the primary universal service provider for all of Australia. The first pilot was located in south-western Victoria and south-eastern South Australia, and a second pilot was located in north-eastern New South Wales and south-eastern Queensland. The pilots were designed to allow the participation of multiple providers who were pre-qualified by the then Australian Communications Authority. Providers could nominate to be a universal service provider in a particular pilot area and would receive a set subsidy for each customer they supplied in that area. Providers were required to supply anyone requesting a *standard telephone service* within the nominated area, which meant that potential competitors were required to have a network capable of supplying every individual within the area. The program finished in 2004 with no competing universal service provider registered for the pilot areas.

Sources: ACA (2001); ACCC (2007); DCITA (2004).

Box 7.2 **Participants' views on competitive tendering**

Competitive tendering was generally supported by several participants (Cape York Digital Network, sub. 17; McLaren, sub. 18; Macquarie Telecom, sub. 27; the Australian Competition and Consumer Commission, ACCC, s

ub. 40; Infrastructure Australia, sub. 51, attachment; the Department of Communications and the Arts, DoCA, sub. 58; National Farmers' Federation, sub. DR129).

Indeed, a 'contestable USO arrangement' was endorsed by the ACCC (sub. 40) with respect to the NBN fixed wireless and satellite footprints. While noting the failure of the previous USO contestability pilots in 2001, it considered that 'circumstances have changed significantly since this time, with greater infrastructure based competition and greater convergence of fixed and mobile services' (pp. 9–10). The ACCC (sub. DR152) subsequently said:

... we consider that the design of any tender process will be critical to meet the objectives of universal service. Principles such as promotion of competition, the efficient use of infrastructure and the long-term interests of end-users would assist in improving the outcomes of such programs. Interventions should also be appropriately targeted and designed to minimise market and competitive distortions. (p. 3)

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Box 7.2 (continued)

Similarly, DoCA (sub. 58) supported a ‘contestable delivery model’ and noted that the earlier pilots occurred at a time when Telstra owned the significant infrastructure required to deliver the then USO, making it difficult for other providers to compete (p. 4).

However, Telstra (sub. 30) considered that, with respect to the provision of the current *standard telephone service* USO, it ‘seems unlikely that any efficiency benefits from introducing contestability would outweigh the additional administrative complexity to establish arrangements that would be in place, at most, for just two years’ (p. 22). — that is, until the expected rollout of NBN infrastructure is completed in 2020. Further, it noted that:

... while contestable arrangements in place for the delivery of infrastructure to new estates has led to better cost-recovery by infrastructure providers and timelier delivery of infrastructure, in some cases it has led to customers in those estates becoming confused as to who is responsible for offering them services over that third party infrastructure and their rights over that infrastructure. We anticipate similar issues would arise in an environment that resulted in multiple [universal service providers]. (p. 22)

Not all participants supported competitive tendering unequivocally (Broadband for the Bush Alliance, sub. 6; Ninti One, sub. 16; Communications Electrical Plumbing Union, sub. DR106). The Broadband for the Bush Alliance (sub. 6) noted:

Telstra remains the dominant supplier of a broad range of telecommunications services and is the monopoly supplier of last resort for the domestic transmission carriage service. While co-investment may potentially lead to greater choices available, the reality is that market-based policy and procurement mechanisms have failed in regional and remote areas where there are small, dispersed populations spread over vast distances. (p. 8)

The Australian Communications and Media Authority (ACMA, sub. DR157) considered that, in a highly specialised market, such as the delivery of a voice service, the design of the tender was ‘critical to its success’:

... Should the ACMA be tasked with designing and conducting such a tender, it would be mindful of relevant lessons from the previous competitive tendering processes for contestable USO services and the Extended Zones arrangements. These include the importance of managing the risk that a tender may not be attractive to potential participants, where:

- the tender is divided into small areas or populations that are insufficient to create economies of scale
- functional requirements are unnecessarily prescriptive about what features are to be delivered and how, discouraging cost-efficient or innovative solutions
- one provider already owns a large proportion of existing fixed network infrastructure in a given area, which may give it a competitive advantage due to these costs being sunk
- the tender specifies a predetermined subsidy or contract period that limits the ability to achieve a reasonable return on investment. (p. 8)

An important precursor to deciding whether a tender is required will be identifying those geographic areas where there is no (or minimal) retail provider presence for the delivery of a service. The identification of these areas, and the potential number of consumers in areas requiring a service, will be important to successfully meet the proposed universal service objective. A key issue will be to ensure that any lag in service provision is minimised. Important factors to consider, irrespective of whether or not tendering arrangements are ultimately used include:

- mechanisms to identify consumers requiring a service
- estimating the number of customers and geographical vicinity of those customers to each other
- in the case of voice services, assessing the extent to which existing infrastructure can be adequately utilised to deliver a baseline service. (p. 9)

In the context of telecommunications, competitive tendering could be applied for the delivery of infrastructure (often called ‘procurement’) or retail services, or to select a provider(s) to deliver a USO. With a competitive tender to deliver a USO, the provider would respond directly to customer requests for service while meeting any service standards established in conjunction with the USO.

A procurement approach is typically used in many Organisation for Economic Co-operation and Development (OECD) countries for the delivery of broadband infrastructure, which may also involve some degree of co-funding by the provider (appendix C). Only some OECD countries — for example, Austria, Hungary, Portugal and Slovenia — use competitive tendering to determine a USO provider for voice services. Box 7.3 sets out the details of some international examples of competitive tendering.

Box 7.3 International examples of competitive tendering for telecommunications universal services

Chile

Chile’s budget-funded, but ‘autonomous’ Telecommunications Development Fund targets universal telecommunications access in rural or urban low-income areas by competitively tendering for services where there are market gaps and service needs that are defined by end-users (SUBTEL 2015).

Once a tendering provider is awarded a project, subsidies are paid in instalments as milestones are achieved. Where milestones are not achieved, payment is withheld or the tender for the project is reissued (Ladcomm Corporation 2013).

An overview of approved projects is available online, along with details of funding allocated to each project and regular reporting on each project’s performance against coverage targets, budget and timelines.

New Zealand

New Zealand’s Rural Broadband Initiative 2 and Mobile Black Spot Fund seek to expand high-speed broadband and mobile coverage through competitive tender and government co-funding (MBIE 2017).

A single request for proposal was released in late 2016 allowing providers to bid for either or both programs (Crown Fibre Holdings 2016).

Once finalised, the government will provide grants to winning bids from the Telecommunications Development Levy for investment largely in long-life infrastructure, with recipients encouraged to make any infrastructure open access.

For the broadband initiative program, the request for proposal does not specify a technology. Bids are expected to be assessed against how well they meet a set of service outcomes, including whether providers detail plans to achieve New Zealand’s 2025 broadband connectivity target (99 per cent of residents with access to broadband peak speeds of at least 50 Mbps, and everyone with access to at least 10 Mbps).

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Box 7.3 (continued)

Providers responding to the request for proposal may cluster end users within any identified Rural Broadband Region and/or propose areas for mobile coverage from listed Mobile Black Spot Zones. They can also provide feedback on the identified areas in order to make any 'Area Adjustments'.

Switzerland

The Swiss USO covers telecommunications services, broadband, emergency services, payphones and special services for those with disabilities (SFOC 2017).

A universal service licence, which specifies the obligations of the universal service, is granted through a long-term competitive tender that is national in scope to the candidate who best satisfies the obligations and does not claim any financial compensation (subsidy). If compensation is claimed, it is funded from industry.

The design of the tender favours an incumbent service provider that is dominant in the national market. Threats of financial scrutiny and industry contribution can deter a dominant incumbent from seeking a subsidy. While this means the licensee bears both the delivery and financial risk of universal service, the long-term and national scope of the competitive tender effectively limits potential competition.

If the winner of the tender requests compensation, the regulatory authority, ComCom, verifies the net costs of telecommunications universal service provision by scrutinising the successful tenderer's financial records. That is, the winner does not automatically receive its winning bid. Any compensation is based on benchmarked net costs of efficient service provision. Where there is a lack of bidders or market depth, ComCom designates a licensee and offers compensation, again based on its scrutiny of net costs (Jaag and Trinkner 2009; SFOC 2017).

In 2006, ComCom launched a competitive tender for a new ten-year universal service licence covering all of Switzerland to start from 2008. In 2007, ComCom designated Swisscom, the incumbent licensee, as the new universal service licensee, which did not seek compensation.

In general, if there is a sufficient number of potential providers (or market depth), competitive tendering can create incentives for providers to keep their tender prices close to their best estimates of what would be the technically-efficient cost of delivering the service (chapter 8). If there are few providers capable of delivering the service, the success of the tender in revealing the technically-efficient cost is more questionable. That said, a market with few prospective providers may still be contestable if collusion can be prevented.

However, competitive tendering brings additional risks and costs.

- It may be difficult to motivate providers to act in the best interests of the community in the presence of asymmetric and incomplete information.
- There are transaction costs associated with negotiating and contracting with providers.
- There may be a risk of 'supplier lock-in' — when the government becomes dependent on the provider for a service and is unable to change the provider without incurring significant switching costs. Supplier lock-in can stem from a provider using non-standardised technology, or making significant sunk investments.

-
- There may be some risks that government cannot credibly transfer to a successful tenderer with the result that it wears these ‘residual’ risks.
 - Competitive tendering may also not work in all situations, particularly where there is insufficient competition, or where the scope of the contract or USO is very broad. This appears to have been the case with respect to the unsuccessful trial of competitive tendering in the telecommunications sector for universal services in 2001 where no providers participated (box 7.1).

The design of a competitive tender and resulting tender contract, therefore, requires careful attention to maximise the potential for efficient outcomes for the wider community, including managing financial risks to government (IC 1996). There are a number of important design issues to consider.

- *Specification of service requirements* in the tender (and subsequent tender contract) need to be clear and unequivocal, and may involve the establishment of service quality standards. Specifying service requirements as outcomes rather than as inputs, technologies or processes (as in New Zealand, box 7.3) can encourage cost-efficiency and innovation in service delivery.
- The *size and scope* of the tender will depend on market conditions. A tender could be split by geographic areas or some other market dimension to elicit more competitive bids. However, the desirability of introducing more competitive bids needs to be balanced against administrative complexity and other costs with respect to working out how to split the tender and to how to assess the bids.
- A *multi-stage* approach to tendering could work better than a single-stage approach where there are initially substantial information gaps about service requirements. For example, where service requirements are unclear, complex or specialised, a multi-stage approach can reduce administration and information costs for all parties involved in the tender.
- *Information on the underlying costings and costing methodologies* of a tender bid should be available to the administering government agency so that it can determine whether costings are sound so as to mitigate future financial risks to government.
- The *advantage that an incumbent or dominant providers* have in tendering can be managed by avoiding service requirements that discriminate against alternative providers or by introducing other measures (as in Switzerland, box 7.3).
- The selection criteria against which tender bids are assessed, and the ranking of these criteria, should be clear and effective.
- The tender contract should have *clearly specified performance, reporting and other requirements* to enhance provider accountability with respect to the tender contract and to make it easier for governments to identify whether universal service objectives are being met (as in Chile, box 7.3)
- The use of *financial incentives* in tender contracts can assist in ensuring agreed outcomes and managing financial risks to government. Some incentives include the government withholding payments until agreed outcomes are reached, seeking financial

payments for failing to deliver on agreed outcomes, or providing a bonus payment on exceeding agreed outcomes.

- The *duration* of a tender contract should consider the need for providers to recoup significant sunk costs, the desirability of ensuring continuity in service provision, the possibility of changes in policy, and the need to allow for changes in the market and technologies.
- The risk of supplier lock-in in a tender contract could be managed by: keeping customisation of equipment (and technology) to a minimum, or insisting on the use of technology that complies with international standards; government retaining ownership of some assets; or aligning the length of contracts with the economic life of assets.
- There should be an appropriate *basis for payment* under the tender contract. Where the tender contract is for services that do not involve infrastructure provision, such as a retail service over an existing network, it may be appropriate for payment to be made to a successful bidder on an end-user basis. Where the tender contract involves infrastructure provision accompanied with retail services, there may be a need for a lump sum payment combined with an end-user payment; this would better reflect the fixed and variable cost of the tender.
- There should be *transparency* around the tender contract, and its performance as far as possible — to the extent that it does not refer to commercial data, intellectual property or other commercial assets held by the successful tenderer.
- There should be *effective governance* surrounding the management of the tender, the assessment of bids and administration of the tender contract. This means that the relevant government agency should have relevant capacity, expertise and accountability.

User subsidies

An approach to addressing universal service objectives, particularly accessibility and affordability, is to directly subsidise users of telecommunications services through welfare payments, vouchers, taxation concessions, price discounts or controls, grants to obtain desired services and the like. Specific Australian examples are the Telephone Allowance, Telstra Pensioner Discount and Connected Seniors Program, and tax concessions available to primary producers and to persons living in remote or isolated areas (chapter 4).

User subsidies can enable users to more explicitly determine the amount and type of service they need according to their preferences. They can also encourage competition among providers to acquire users' custom thereby helping to promote innovation and lower costs. These advantages, however, are contingent on the subsidy being untied to particular service providers and technologies, and there being a choice of providers.

User subsidies are typically used to address accessibility and affordability (where services are already available) rather than availability (where services are not yet available). User subsidies may not work so well in the case of availability, as providers need to have a secure

and sufficient source of financing to reflect the relatively high costs of telecommunications services provision, which may be difficult if providers have to raise finance by negotiating with many individual users. That said, user subsidies to address availability could be cost-effective if provided to very large users or a group of users, such as a school, hospital, local council or government agency, rather than to an individual person or household.

7.2 Options to address universal service availability

With these general approaches in mind, the Commission has identified a number of specific options to address universal availability leveraging off NBN infrastructure and mobile networks. Several participants (Optus, sub. 4; Gregory, sub. 9; Vodafone, sub. 46) supported this strategy, particularly given the current role of NBN infrastructure and the substantial government investment in it. There was also broad acceptance for explicitly factoring into this strategy the role of mobile services (Victorian Farmers Federation, sub. DR125; nbn, sub. DR159).

In addition to options that leverage off NBN infrastructure and mobile networks, the Commission has identified specific options relating to mobile services (in particular, the Mobile Black Spot Program) and to payphones and other forms of community telecommunications. An overview of the Commission's proposals for addressing universal availability is given in figure 7.1.

The National Broadband Network

As universal availability of broadband and voice services to premises is largely being met by NBN infrastructure and mobile networks (chapter 6), any further government intervention should be targeted to market gaps, including particular user needs. It should harness a market-driven approach, where possible, rather than the current TUSO approach.

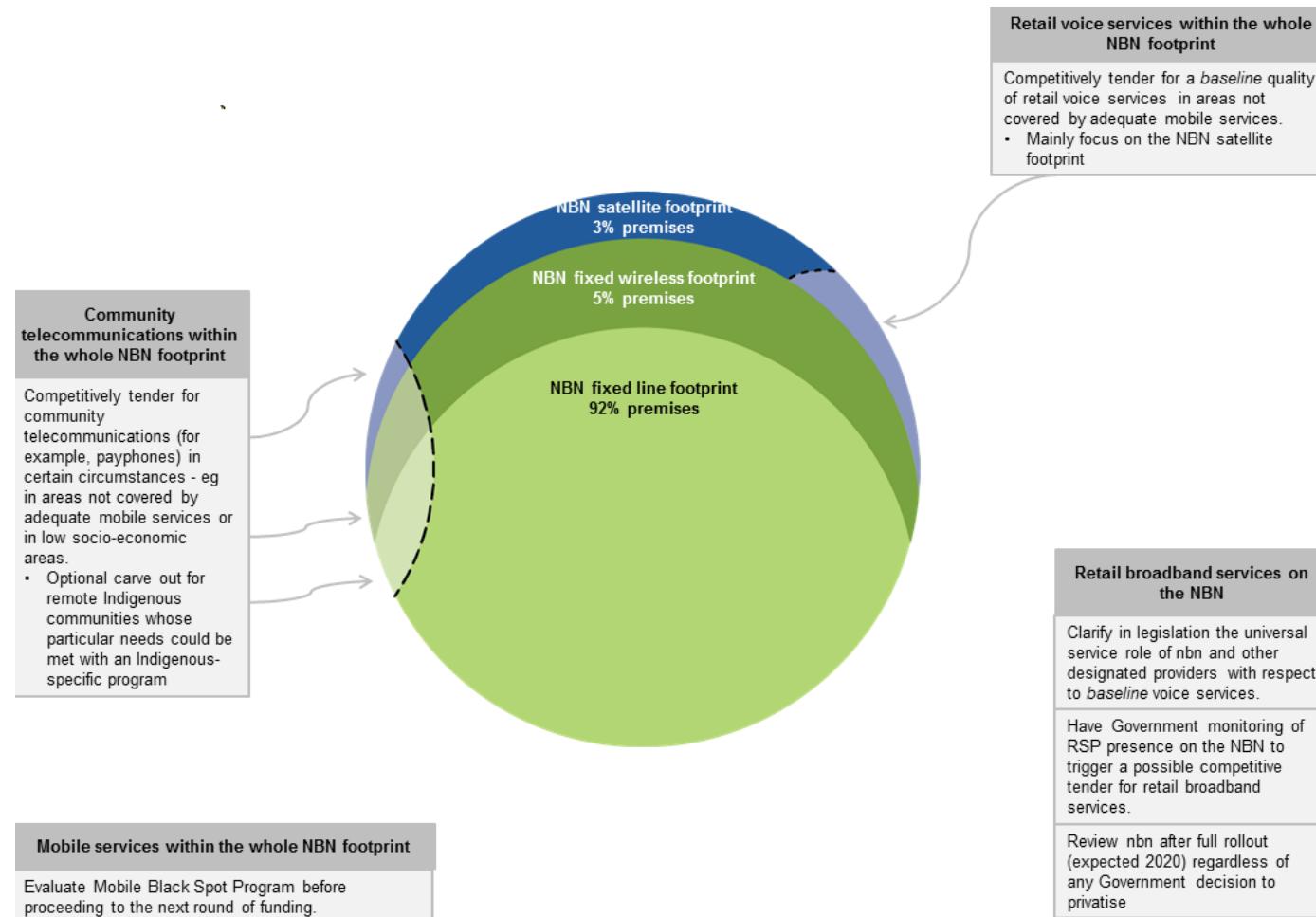
Clarifying the universal service role of nbn

As noted in chapters 4 and 6, nbn is effectively a universal provider of wholesale broadband services.

nbn's universal service role is currently enshrined in a ministerial statement of expectations (revised since 2010), Australian Government policy documents, and nbn documentation (such as nbn's Corporate Plan 2017). These are prone to discretionary changes particularly in relation to the objectives for nbn. The enabling legislation for nbn — the *National Broadband Network Companies Act (2011)* (Cth) — is silent on what is nbn's role.¹⁰⁰

¹⁰⁰ However, the Australian Government's policy intent is laid out in the accompanying explanatory memorandum to the legislation and the regulatory impact statement.

Figure 7.1 The Commission's preferred approach to universal availability within the NBN footprint



It is the Government's stated intention for nbn to be the statutory infrastructure provider (SIP) of broadband services of last resort and it has proposed a SIP regime to this end (appendix B; DoCA 2016b). If legislated, the proposed SIP regime would assist in providing greater community certainty and confidence about nbn's role with respect to the universal provision of wholesale broadband services. Legislative backing to nbn's role is an important prerequisite to nbn being privatised in the future. As noted in the regulatory impact statement accompanying the proposed SIP regime, disadvantages of the status quo include the following:

- As the Statement of Expectations does not have the force of legislation and is subject to change, this option does not provide access seekers and end-users with certainty about NBN Co's supply obligations either during the rollout or after the NBN Co is completed.
...
- As the Government is not able to issue a private company with a Statement of Expectations, this option would not prevent a future privatised NBN Co withdrawing from unprofitable geographic areas or declining to extend the network infrastructure into areas or to premises where it expects to make a loss (DoCA 2016e, p. 7).

However, even with the proposed SIP regime, there is uncertainty (and contention) around the role of nbn (or any other wholesale provider) with respect to the provision of voice services, particularly within the NBN fixed wireless and satellite footprints. Although its infrastructure is capable of delivering voice services generally (chapter 6), nbn (sub. DR159) considered that:

... there has been a clear separation of responsibilities for the provision of voice services. nbn's fixed-line networks have been designed to support legacy voice services. However, Government policy has been for Telstra to provide USO voice services outside nbn's fixed-line footprint ... (p. 1)

Some participants were also concerned about making nbn a universal service provider without referencing *baseline* standards. For example, Better Internet for Rural, Regional & Remote Australia (BIRRR, sub. DR143) considered that the use of nbn as a universal infrastructure provider:

... would cause a massive downgrade of internet connectivity for many [rural, regional and remote] Australians. Although mandated to deliver a minimum speed requirement to every Australian, there is no guarantee, accountability or responsibility given by nbn to deliver reliable, affordable and equitable services. The nbn rollout was not designed or funded or expected to deliver voice services and as such nbn technology is unsuitable to meet the demands and [quality of service] issues that would be placed upon it. (p. 8)

Should the Government agree with the Commission's view of the need for nbn to have a clear and certain role in the provision of voice services, there would be merit in providing that through the proposed SIP regime. For example, the Government may well determine that nbn's voice role be confined to the NBN fixed-line footprint, with another provider designated (following a competitive tender, see next) as providing *baseline* voice services to consumers within the NBN fixed wireless and satellite footprints. This would also mean

that if nbn were not to have a role in delivering *baseline* voice services throughout the NBN footprint, then there should be scope within the legislation to designate another provider as a universal service provider for this purpose.

RECOMMENDATION 7.1

As a matter of priority, the Australian Government should clearly define the role of NBN Co Limited, and any other designated providers, as statutory infrastructure providers of wholesale broadband *and* voice services in legislation (such as the proposed Statutory Infrastructure Provider regime).

A minimal safety net for retail broadband services on the NBN

While it is unlikely that any premises with a connection to the NBN would not have a RSP willing to offer them a retail broadband service (chapter 6), there is merit in giving assurance to communities, particularly in regional and remote areas, that such retail services will be available. Indeed, a number of participants wanted a guarantee of retail service provision on NBN infrastructure, particularly in regional and remote areas, ideally in the form of a USO backed by legislation (for example, Regional Development Australia Wheatbelt, sub. DR77; the Australian Small Business and Family Enterprise Ombudsman, sub. DR110; Cotton Australia, sub. DR133; Crouch, sub. DR138).

If the Australian Government considers it desirable to guarantee retail service provision on NBN infrastructure, this should be in a minimal form by linking the state of retail presence on NBN infrastructure to a trigger for possible further intervention. The intervention should not be automatic, but depend on a Government assessment of its relative cost-effectiveness.

This minimal safety net could consist of the Australian Government monitoring retail service provision on NBN infrastructure and, where it considers this to be absent, to step in to competitively tender (where that is feasible) for service delivery over NBN infrastructure either by:

- putting to a competitive tender the delivery of a retail service
- invoking a legislative reserve power to require a provider to meet a USO to provide a retail service upon request from consumers, with the provider selected through an earlier competitive tender.

This option allows the Government to intervene only after a problem becomes apparent, with the intervention harnessing market forces for service delivery. Of the two forms of intervention, invoking a legislative reserve power to require a provider to meet a USO may give greater certainty to customers that they will receive services within a reasonable time. The existence of a reserve power can also create an incentive for RSPs who are not designated to meet a USO to maintain a retail presence on NBN infrastructure to avoid the

situation of a competitor receiving a subsidy. That said, as noted earlier, the Government should not expect that this form of intervention would allow it to abdicate from all risks, such as in the risk of the RSP becoming bankrupt.

RECOMMENDATION 7.2

The Australian Government should minimise any further intervention with respect to guaranteeing retail service provision over NBN infrastructure. The Australian Government should monitor retail presence on NBN infrastructure and, where this is found lacking, contract one or more retail service providers to service geographic areas following a competitive tender, where feasible.

The monitoring of retail presence on NBN infrastructure could be prioritised to retail services provided through points of interconnection in regional and remote areas to address any community concerns about retail competition risks in these areas (appendix B; chapter 6).

Addressing the provision of *baseline* voice services within the NBN satellite footprint

While most premises will receive voice services of a *baseline* standard through a combination of NBN infrastructure and mobile networks, premises within the NBN satellite footprint without adequate mobile coverage — estimated at up to 90 000 premises — are unlikely to receive a *baseline* voice service (chapter 6).

In the draft report, the Commission identified three options for addressing the provision of a *baseline* standard of voice services to these premises. The options could also address the provision of emergency voice calling services (chapter 6). The three options (discussed below) assume that technical standards underpinning the Commission's proposed functional definition of a *baseline* voice service have been predetermined (recommendation 5.2).

Two features necessary to the implementation of all three options are that they:

- are underpinned by accurate information regarding gaps in *baseline* voice services
- do not crowd out further technological advances in voice communications in remote areas or expansion in mobile coverage.

Participants offered a range of comments on addressing *baseline* voice gaps within the NBN satellite footprint (box 7.4).

Box 7.4 Participants' views on options to address *baseline* voice services within the NBN satellite footprint

Australian Communications Consumer Action Network (ACCAN, sub. DR124) said:

... However, we are not sure why these options specify the technology or body that is used in the delivery of voice services. The chosen technology may vary between geographical areas. The solution should be technology neutral and competitive tendering should target the delivery of an adequate reliable voice service. While determining a suitable voice service in the satellite footprint ACCAN does not support removing the current obligation and service. (p. 13)

Cambium Networks (sub. DR120) said:

Fixed Wireless has a greater role to play in the delivery of high speed broadband services and these services are well suited to including voice. Technology advances over the past 6 years have made this very possible and also cost effective. (p. 2)

Eckermann, James and de Ridder (sub. DR141) considered the reach and limitations of the NBN and mobile services, and proposed 'SafetyNet', which would involve common Long Term Evolution wireless infrastructure to meet public safety and other needs that have a poor business case. This proposal would involve a coordinated response from all governments to manage their communication portfolios (including existing assets).

Great Northern Telecommunications proposed a '21st Century version' of privately-erected lines, which were previously introduced to extend telecommunications services to rural subscribers located from local exchanges.

Basically, it's in-ground fibre optic cable. It's by a standardised design. It's built by accredited contractors, funded by the rural customers concerned. Each customer basically builds from their property, from the upstream side of their property to the downstream side of their property, plus the lead in into their house ... Each customer, ... also funds their own lead in. Then it is gifted to NBN or any other carrier that is interested in getting into this space, e.g. Telstra, for long term operations and maintenance. The summary of all this is, customers have skin in the game. They're putting in towards this, so they obviously contribute towards it, but they take ownership of it too. (trans., 14 February 2017, p. 58)

nbn (sub. DR159) considered that the assessment of the three options needed to factor in implementation complexity, the total cost of implementation and competition benefits.

- Implementation complexity — This is primarily related to the time required to firstly agree what the details of the option look like, and then the time taken to implement it. It may be preferable to select an approach that is feasible to have in place as soon as possible, given the widespread availability of mobile networks, rather than a 'perfect' solution which takes years to finalise.
- Total cost to implement — This will depend on a variety of factors, including the nature of the baseline voice service, the actual footprint that needs to be address (which relates to both the definition of the baseline service and the technical specification of existing networks), existence of infrastructure that can be used to deliver the baseline service, and any benefits flowing to the provider of infrastructure (eg if mobile networks are funded as part of the solution, the additional revenues generated from mobile customers and brand benefits of increased network footprint).
- Competition benefits — To the extent deemed important relative to the first two factors, the implications for competition (either at the infrastructure or retail level) ...

Of the three options identified by the Commission, Option 2 (funding Telstra's ongoing provision of services in areas without mobile coverage) is likely to be meet the first two criteria, as it will already have infrastructure in place to deliver voice services in most locations, and there are already agreements in place that could be adapted for this purposes. However, nbn understand the Commission's concerns about the ability to get the best competitive outcomes with this approach, and why Option 1 might therefore be attractive.

(continued next page)

Box 7.4 (continued)

At this stage, nbn is not convinced that sufficient analysis has been undertaken by the Commission to come to a definitive position on the best option. ... (pp. 6–7)

nbn (sub. DR159) also said:

In the fixed wireless footprint in particular (but also in the satellite footprint where there is mobile coverage) ... mobiles can provide a cost-effective solution for the delivery of voice services in many locations. (p. 2)

Optus (sub. DR146) favoured the use of mobile networks to deliver voice services and said:

An option which should immediately be ruled out is maintain Telstra's full copper network in regional areas to meet this small capability gap. Potential options to consider are further extensions of the Mobile Black Spot programme. (p. 5)

Regional Development Australia Northern Territory (sub. DR115) questioned whether the first option of a competitive tender for the delivery of retail voice services within the NBN satellite footprint would be 'realistically achievable' (p. 10).

While not specifically addressing the Commission's options, Telstra (sub. DR123) noted technological and cost issues associated with deploying mobile and the USOSat in the delivery of the *standard telephone service* USO, which is also relevant to the delivery of a *baseline* retail voice service within the NBN satellite footprint:

... While Telstra does not utilise its mobile network to deliver the USO on a permanent basis, it is an option that is under investigation. However, there are a number of complexities in the delivery of such a solution.

Due to environmental and other factors, determining whether a customer can receive a mobile signal within their premises cannot be definitively determined by observing a coverage map and requires verification at their premises. A mobile Fixed Wireless (FW) solution is also likely to require additional in-premises equipment and, if a signal is weak or unavailable, an external antenna at the premises may be necessary.

These issues introduce costs into use of mobile infrastructure in the delivery of a USO [*standard telephone service*]. These challenges are not insurmountable but must take into account in a product solution and therefore its costs. We note that the NBN FW product was designed to address similar issues. (p. 3)

Telstra (sub. DR123) also said:

Delivering [*the standard telephone service*] USO into the NBN satellite footprint via Telstra's USO SAT solution has material implications for the ongoing costs of USO delivery. We would therefore recommend that the Government, nbn co. and Telstra undertake further work on the extent to which NBN SAT can be optimised to deliver voice. (pp. 3–4)

The Wamboin Communications Action Group (sub. DR151) also did not address the Commission's options specifically, but supported the 'notion of competition to bring affordable, reliable and fit-for-purpose essential service of communications to all areas of the country' and made specific suggestions about how areas deemed not to comply with its proposed new USO could be met through a 'government run Tender pricing exchange' (p. 15).

Wittert (sub. 44) considered there was a role for regional and rural fixed wireless providers in delivering voice and data services.

Option 1: Introduce a competitive tender arrangement for the delivery of a baseline voice service within the NBN satellite footprint where mobile coverage is inadequate

The Government could put to competitive tender the provision of a *baseline* voice service — or the selection of a provider to meet a USO to provide a *baseline* voice service to premises — within the NBN satellite footprint where mobile coverage is inadequate. Telstra, nbn, mobile operators, providers of alternative satellite services and other telecommunications providers could bid for these services. The tender could be broken up by geographic areas or communities.

Under this option, successful bids would be selected on their cost-effectiveness in addressing universal availability regardless of the technology used. Technological solutions that could be considered for the medium term include using Telstra's existing radio, USOSat and copper networks, expanding mobile coverage (at a *baseline* standard), subsidising low earth orbit satellites, or expanding nbn's fixed wireless network. The more remote are premises, the more likely is it that wireless technologies are more cost-effective than fixed-line technologies.

The design of the competitive tender could be led by the Australian Communications and Media Authority (ACMA), given its technical expertise with respect to different technologies, and prior history in designing the USO contestability arrangement in 2001, in consultation with the Australian Competition and Consumer Commission (ACCC), given its expertise in assessing competition in markets. The tender contract should be made public as far as possible.

If the competitive tender were to be truly technologically neutral, and allow for mobile network operators to bid, this option would reduce the need for continued operation of the Australian Government's Mobile Black Spot Program. However, the objectives of that program do not strictly coincide with the Commission's proposed universal service objective. The program is further considered later in the chapter.

Option 2: Fund Telstra's provision of a baseline voice service within the NBN satellite footprint where mobile coverage is inadequate

The Government could continue to designate Telstra as the primary universal service provider of voice services within the NBN satellite footprint using its networks (that is, its radio, USOSat and copper networks), but only in areas without adequate mobile coverage.

While this option provides a more targeted solution to the delivery of a *baseline* voice service than is currently available under the TUSO, it does not encourage competition for the delivery of voice services. It would still involve the funding of a 'parallel network' to that of the NBN, albeit one that provides better voice quality services than those provided over nbn's satellite network.

Option 3: Fund nbn to augment its networks to deliver a baseline voice service within the NBN satellite footprint where mobile coverage is inadequate

This option recognises that the main costs of providing a *baseline* voice service relates to the provision and maintenance of infrastructure, rather than in the provision of retail services. For example, nbn could apply the new funding to reduce the size of the NBN satellite footprint through more fixed wireless infrastructure, or it could invest in low cost satellite technology that offers low latency and/or better reliability. However, this option focuses any further solution on nbn, rather than soliciting competing technological alternatives or competing providers that may be more cost-effective.

The Commission's preferred option

Of all these options, the Commission's preference is for the Government to proceed to a competitive tendering arrangement as set out in option 1. This option, rather than the others, is more likely to promote competition, and with that, productivity, technological innovation and consumer choice. The option does not preclude Telstra or nbn from bidding their infrastructure in the provision of *baseline* voice services — the choice remains theirs to make based on a commercial assessment.

An essential first step before this option can be implemented is for the Government to collect the necessary information in order to determine with more precision the market gaps intended to be addressed by any competitive tender and, indeed, the feasibility of the tender. The Commission has already proposed that the ACMA collect data on the location of premises without adequate mobile coverage (recommendation 6.1). Such information will inform the design of the tender, including whether it targets delivery to individual premises that do not receive a *baseline* voice service in the NBN satellite footprint. It may well be that these individual premises are distributed sporadically through the footprint. As such, the implementation costs of a tender that targeted these individual premises could be greater than a tender that targeted a larger number of premises, including those that already receive a *baseline* voice service over mobile networks.

RECOMMENDATION 7.3

As a replacement for the *standard telephone service* USO, the Australian Government should introduce a competitive tendering arrangement for the delivery of *baseline* voice services where, within the NBN satellite footprint there is inadequate mobile coverage, and it is feasible to do so. This should only occur once the extent of any market gaps is fully determined (recommendations 6.1 and 6.2).

Future review of nbn

Given the key role that nbn is likely to play in the delivery of universal telecommunications services, its public ownership, and the regulatory and funding environment surrounding its operation have important implications for the efficiency and effectiveness of service delivery within the whole telecommunications sector. Some participants and others raised concerns about nbn's impact on competition within the telecommunications sector including its potential to crowd out private infrastructure providers, its public ownership, its wholesale price caps, and its future funding (AGCNCO 2011; Budde 2016a, 2016b; de Ridder, sub. 56; Fletcher 2015; Potter and Mason 2016; Sorensen and Medina 2016; Tsang 2016a).

There is currently scope within nbn's enabling legislation — the *National Broadband Network Companies Act 2011* (Cth) — for a Productivity Commission inquiry into nbn following the full rollout of NBN infrastructure as a precursor to its privatisation (box 7.5).

Box 7.5 Future Productivity Commission review of nbn

The *National Broadband Network Companies Act 2011* (Cth) (the Act) provides for the termination of Commonwealth ownership of nbn after a number of specific events occur:

- the Communications Minister has declared that the NBN should be treated as built and fully operational
- a Productivity Commission inquiry report has been tabled in Parliament
- a Parliamentary Joint Committee has examined the Productivity Commission's report
- the Finance Minister has declared that conditions are suitable for entering into and carrying out of an nbn scale scheme (section 47).

Under the Act, the Productivity Commission inquiry is to cover the following matters, the:

- regulatory framework for the NBN
- impact on future annual Commonwealth budgets of a sale of the Commonwealth's equity in nbn on:
 - future annual Commonwealth budgets
 - the supply of affordable broadband carriage services and other carriage services
 - equity and social inclusion
 - competition in telecommunications markets (section 49 (2)).

In holding the inquiry, and in preparing its report, the Act requires the Productivity Commission to have regard to a number of specific matters, including:

- equity of access to broadband carriage services in metropolitan, regional, rural and remote areas
- competition in, and structural features of, telecommunications markets
- power in telecommunications markets, including whether a NBN corporation has a substantial degree of power in any telecommunications market

(continued next page)

Box 7.5 (continued)

- ownership and control of NBN corporations, and of carriers or service providers by NBN corporations
- structural organisation of NBN corporations
- bundling of services supplied, or proposed to be supplied, by NBN corporations
- retail prices of services supplied using the NBN
- restriction of the investment activities of NBN corporations
- geographical coverage of the NBN
- technology used in connection with the NBN
- the need for maintenance, replacement and upgrading of technology used in connection with the NBN
- any other matters specified by the relevant minister (section 49(4)).

However, the Commission considers that nbn should be reviewed once the full rollout of the NBN is completed, regardless of whether privatisation is contemplated. The review should include the impact of the regulatory framework to which nbn is subject on the economic efficiency of the telecommunications sector, including effects on competition in the wholesale broadband market, and on wholesale and retail prices. The review should also consider those matters set out in nbn's enabling legislation including the impact of any sale of the Australian Government's equity in nbn on the Australian Government's budget, the supply of affordable carriage services and competition in telecommunications markets. This will require changes in nbn's enabling legislation to implement.

RECOMMENDATION 7.4

The Australian Government should amend the *National Broadband Network Companies Act 2011* (Cth) (the Act) to ensure that the planned Productivity Commission review of NBN Co Limited (nbn) occurs once the full rollout of NBN infrastructure is completed regardless of whether or not privatisation of nbn is being contemplated. The review should cover the impacts of nbn on the economic efficiency of the telecommunications sector as well as all the matters already specified in section 49 of the Act.

Addressing consumer confusion about the NBN

Many participants raised concerns that customers are confused and lack information about the NBN, including how to connect to the NBN and who — whether nbn or the RSP — has responsibility for faults (box 7.6). As a media report put it recently:

The trouble with NBN is that there's a huge accountability gap between the network operators and the retailers — no-one can actually force the telcos to buy enough bandwidth from the

NBN to offer a decent service. You can't expect consumers to shop around for a better deal when they assume the actual NBN is to blame, rather than their telco. (Turner 2017, p. 2)

Box 7.6 Participants' comments on consumer difficulties with the NBN

The Australian Small Business and Family Enterprise Ombudsman (sub. 39) provided a case study of small business difficulties with determining responsibility for services rectification.

Australian Communications Consumer Action Network (sub. 48) said:

As the NBN reaches scale, wholesale service standards will be more important as nbn is responsible for the performance of the underlying access network. Existing wholesale obligations do not adequately protect consumers. The Wholesale Broadband Agreement ... is an agreement between nbn and its retail customers (e.g. Telstra, Optus and TPG), and its focus is on network management rather than consumer demand. (p. 16)

It also drew attention to new development outside of Melbourne whose residents had been without fixed or mobile services (sub. DR178). It said:

... For these consumers, nbn was responsible for providing network access. Due to delays in nbn's local network build, the residents have been left months without any connection, no services and in the dark about what was happening. This situation is not satisfactory and results in obvious questions:

- If nbn cannot provide network access (delay/fault), who is responsible for providing an alternative interim broadband service?
- If there is a problem accessing an underlying network, who do affected consumers talk to when they are unable to place an order with a retailer, and they have no direct relationship with nbn? (p. 1)

The Association for Children with Disability (Tas) said:

The Current Government National roll-out of the NBN and serious connectivity issues that have ensued are threatening [the Association's] ability to provide even the most basic telecommunications access to our consumers. (cited in Tasmanian Government, sub. 57, p. 3)

The Northern Tasmania Development Corporation (sub. DR136) provided a case study of how confusion about who bears responsibility for faults can affect businesses and said ' ... if no one entity has overall responsibility then the service installation can end up in a delayed loop of inaction. This is a very expensive outcome for business' (p. 1).

BIRRR (sub. DR143) provided case studies of regional and remote consumer difficulties with the NBN, particularly with *Sky Muster*, and said:

... The very reason for the existence of the BIRRR group is the reluctance of nbn and providers to offer reliable services with efficient customer service and transparent information to RRR [rural, regional and remote] consumers. With over 119 000 website hits and hundreds of requests for help weekly, BIRRR highlights the needs for RRR consumers to access user friendly telecommunications services that meet their specific needs. Other essential service providers in RRR areas manage to do their own troubleshooting of issues, they don't expect a volunteer group to do it for them. ... (p. 9)

Retail Service Providers (RSPs) have experienced an overwhelming demand for support for Sky Muster services. This has led to increased wait times for consumers and lengthy periods where customers are unable to access a connection; thus severely limiting business and education. Providers have had to employ extra staff and have had support reviews and customer satisfaction ratings decline due to Sky Muster teething issues that they have little control over. Even if the issue needs to be fixed by nbn, there is no end user method of contacting nbn to resolve this. Instead a consumer needs to partake in a frustrating buck passing exercise to get a fault lodged for even simple problems such as a faulty power cord on the NTD [Network Termination Device]. (p. 12)

Confusion about the NBN has been said to result in adverse impacts for customers including unnecessary delays in receiving a service, consumers purchasing more services than they need, and inadvertent disconnection of phone services.

Some participants suggested improvements including the introduction, or greater clarity, of legal responsibilities to customers for service quality on the NBN. For example, the National Farmers' Federation (sub. 31) suggested that:

... transparent standards for a minimum service provision between wholesalers (nbn) and retailers, and between retailers and customers should be set. These should be independent of any contractual arrangements and they should be readily available and be written in plain English. There must be a body assigned the responsibility to monitor this and a body for customers to report arising issues. The PC [Productivity Commission] should consider if a declaration of service by the Australian Competition and Consumer Commission is the appropriate means to achieve a service guarantee between telecommunication wholesalers, retailers and customers. (p. 17)

Australian Communications Consumer Action Network (ACCAN, sub. 48) suggested that, where relevant, obligations for fault rectification, connections and appointment keeping should be placed on the wholesale provider (that is, nbn) with these obligations including 'whole of network performance obligations, as well as remedies for individual consumers' (p. 16).

The Northern Tasmania Development Corporation (sub. DR136) preferred that:

... one entity within the chain of command has overall responsibility to act and determine where problems lie, also the ability to delist RSPs or sub-contractors should be part of this responsibility, if they cannot match the expectations of installing or managing the service. (p. 2)

Another suggested improvement was to provide funding to improve assistance to consumers to help them solve their problems. BIRRR (sub. DR143) suggested:

There needs to be serious investment in fully resourced capacity building programs that build digital ability, innovation and effective problem solving for RRR [rural, regional and remote] consumers. (p. 3)

More recently, nbn acknowledged consumer confusion and considered that the whole industry needed to take responsibility.

... Many end-users are confused as to who does what and the industry, including us, must do a better job in providing that clarity. Having gone through some of the customer complaints, it is clear there is too much finger-pointing. Sometimes it is us and sometimes it is the retailer, but more often than not the end user feels like they are getting the run-around. Again, this is an industrywide issue that cannot be fixed by NBN alone. Some retailers are taking strong action already, and it shows in the end user satisfaction scores. ... Again, NBN has its own issues and we acknowledge them. We own them, and we are fixing them. But we need to help more people understand who is responsible for which portions and what they can do to receive the best possible service. (Morrow 2017, p. 103)

The Commission considers that some customer difficulties in relation to NBN infrastructure (box 7.7) are likely to be a transitory problem as the NBN rolls out. It notes nbn's remarks above and that nbn is undertaking a media campaign and various other communication methods to advise consumers on where to seek information about connecting to the NBN (Morrow 2017). nbn also plans to recruit expertise to address ongoing performance issues with *Sky Muster* (Crozier 2017a). ACCAN, funded by the Australian Government, also provides information to consumers through its website on various matters relating to the NBN and accessing a broadband service. For example, its *Get Connected* resource aims to give consumers general information about why they are unable to get a broadband service and tips on how to get a service (ACCAN 2016c). The volunteer-based Facebook group, BIRRR, has emerged to assist individual rural, regional and remote consumers with specific NBN-related questions. The Australian Government has also recently announced that it will fund a new broadband performance monitoring program to provide consumers with 'accurate and independent information' about broadband speeds, including on the NBN (ACCC 2017b).

Box 7.7 Complaints to the Telecommunications Industry Ombudsman about the NBN

In its annual report for 2015-16, the Telecommunications Industry Ombudsman (2016) noted that consumer complaints about faults with the NBN rose by about 150 per cent from the previous year (2014-15), while general complaints about the NBN almost doubled to about 13 400.

The Telecommunications Industry Ombudsman considered that the increase in complaints was to be expected given the accelerating rollout of the NBN. It said that it was 'positive that the rate of growth in the number of active services on the NBN is greater than the growth in complaints about services delivered over the NBN' (2016, p. 15).

The main complaints raised about the NBN were: faults, including slow data speeds, unusable services and drop outs; and connections, including connection delays and missed appointments.

However, the Telecommunications Industry Ombudsman noted that some complaints were not related to the connection or performance of the NBN and may be about a bill or customer service. It also noted that it registered only few complaints against nbn with the majority of complaints against retail service providers 'because these are the organisations that the consumer deals with to order the connection and report faults with the service' (2016, p. 15).

As to possible further government intervention to address the lack of consumer clarity and confusion about legal responsibilities for service quality on the NBN, the Commission considers that high service (high price) RSPs are likely to be more diligent in assisting their customers and providing alternatives (for example, during outages). However, should consumer difficulties persist, the Government could consider introducing further measures such as introducing greater clarity about the roles and responsibilities of nbn and RSPs with respect to service quality. It could possibly do this within the proposed SIP regime, or by expanding the remit of the Telecommunications Industry Ombudsman to wholesale services. Another way through may be for the Government to cofund (with nbn and RSPs) a 'trouble shooting' body or help-line to assist consumers of services on the NBN with their specific

difficulties. These and any other relevant measures should be considered when setting technical *baseline* standards (chapter 5) and/or in the Government's planned review of consumer safeguards (chapter 9).

Mobile services

The mobile sector has developed largely on a market-driven basis (chapter 2). The three network operators — Telstra, Optus and Vodafone Hutchison Australia (Vodafone) — have continued to improve their service coverage, with 99.3 per cent of Australia's population now having access to at least one mobile voice service provider. Coverage, particularly in regional and remote areas, continues to expand through initiatives such as the Mobile Black Spot Program.

Mobile services are seen by many participants and others as having a role — or being an effective alternative to the current TUSO — in addressing universal service objectives, with some arguing in favour of diverting current TUSO funding to expanding mobile coverage (for example, National Farmers' Federation, sub. 31; BAL Consulting, sub. DR62; Country Women's Association of NSW, sub. DR101; Coutts Communications, sub. DR114; Regional Development Australia Northern Territory, sub. DR115; Vodafone, sub. DR150). That said, some participants considered that full geographical coverage by mobile services is unlikely in remote areas no matter how much money is spent (Mitiamo IT, sub. DR118; Camp, sub. DR131).

Participants' options for mobile services in this inquiry have focused on the Mobile Black Spot Program, making better use of the NBN for mobile service delivery and encouraging inter-carrier roaming.¹⁰¹

Mobile Black Spot Program

The Mobile Black Spot Program seeks to extend mobile coverage and competition in regional and remote Australia (chapter 4).

Participants and others offered a range of views about the Mobile Black Spot Program (box 7.8). Some considered that the program has promoted additional mobile coverage and competition, and represented a positive return to the taxpayer. However, other participants expressed concerns, or noted limitations, with the program including that: it allows Telstra to expand its mobile network; the conditions intended to facilitate mobile infrastructure sharing are not workable; and the program is not effective in promoting adequate coverage (either population or geographical-based) or competition in remote communities.

¹⁰¹ While not commenting on the role of mobile services in universal availability, the OECD (2017) recently suggested that competitiveness in the Australian mobile market could be improved by encouraging a fourth mobile operator, for example, via policy on the sale of mobile spectrum or by allowing mobile operators access to the towers being installed for (NBN) broadband in rural areas.

Box 7.8 Participants' views on the Mobile Black Spot Program

In support of the program

Optus (sub. 4) considered that the program 'offers a useful alternative form of targeted funding where gaps in service provision are identified' (p. 26), but that the benefits and costs of its extension should be examined. It supported continual review of, and improvement to, the Mobile Black Spot Program (sub. DR146).

Vocus (sub. 33) supported the co-funding aspect of the program as an 'appropriate funding construct' as it 'better reflects the costs of provision and considers the need for achieving economic returns in a competitive environment' (p. 4).

DoCA (sub. 58) considered that the program was an example of targeted government intervention that was an 'effective response' (p. 4) to market failure, which provides an incentive to network owners to maximise coverage in areas that would not otherwise be commercially viable without negatively affecting competition in the mobile services market.

Telstra (sub. DR123) believed that the Mobile Black Spot Program had been successful in harnessing market incentives to drive private co-investment and had been a success for the taxpayer in terms of 'bank for buck' (p. 19).

Concerns and limitations about the program

MacDonnell Regional Council (sub. 1) noted that two of its communities do not get Black Spot support and have the 'worst' satellite reception in the Northern Territory (p. 2).

McLaren (sub. 18) noted that the program would require significant subsidies to continue to increase mobile coverage in regional and remote areas and will 'never be able to cover all Australians. The geographical challenge is too great and the rollout of mobile networks impractical' (p. 5).

The National Farmers' Federation (sub. 31) considered that the program may have 'inadvertently reinforced Telstra's comparative advantage in the provision of mobile services across regional Australia' (p. 11).

RAI (sub. 50) likened the program to 'fixing potholes in the regional network' (p. 10).

Bebbington (sub. DR107) highlighted issues with the program:

... if it gives a preference for new installations at locations where there is a black spot rather than improving coverage where an existing tower and infrastructure already exists, by changing it from limited direction to omni directional. (p. 6)

Eckerman, James and de Ridder (sub. DR141) noted that the program has cemented Telstra's monopoly with public funding and created 'islands' (p. 4) of alternative mobile network operator coverage that require dual subscriber identity module cards to straddle areas covered by Telstra and Vodafone. They suggested that while 'small incremental benefits have been achieved at the margins, ... the money could be better spent on a more comprehensive solution' (p. 4).

Vodafone (sub. DR150) strongly supported the program but was concerned about the risks of taxpayer funds further entrenching Telstra's dominance in regional and rural areas. It suggested that the program impose more extensive obligations on successful tenderers in future funding rounds, which could involve more active forms of infrastructure sharing, and subsidise operating expenses (subs. 46, DR150).

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Box 7.8 (continued)

Regional Development Australia Far North (sub. DR153) noted that, while the program had seen new towers erected in their region and had been a positive move forward, it had a minimal impact on the region from a geographical coverage perspective.

... The new towers are local cell only covering the two boundaries. They are all Optus and whilst we commend Optus for this service we recognise their coverage limitations in the region, which doesn't make them a preferred supplier for regional residents. (p. 3)

Flinders Ranges Council (sub. DR158) said that the program is not seen by regional communities to be effective in mitigating a lack of coverage and that competitive tendering can 'compound and complicate' the issues for isolated areas:

... An example being recent funding for 'pocket' coverage cells in the Flinders Ranges which were awarded to Optus on a non-share, older technology platform; when most residents would already have Telstra 4G network mobiles for use when travelling and away from home as only Telstra has network coverage in most places between these new cell areas and the rest of the mobile network in populated areas to the south. (pp. 1-2)

The Australian National Audit Office (ANAO) evaluated the first round of the program in 2016 (box 7.9). While it considered that DoCA had established key elements of what is expected of a competitive, merit-based grants program and mainly implemented these elements, it considered that there were several key weaknesses. These weaknesses concerned the program's contribution to new coverage, the lack of appropriate methodology for undertaking technical and financial assessments of applicant's proposals, and the lack of a performance measurement and evaluation framework. The ANAO recommended measures to address these weaknesses and improve the effectiveness of the program including minimum assessment scores for the program's selection criteria. While DoCA agreed to the ANAO's recommendations, it disagreed with the ANAO's apparent focus on the program's objectives being to add to new coverage; rather it noted that the program was also intended to improve the quality of coverage and competition.

The Commission notes that, based on the current version of the program guidelines (DoCA 2016h), the program has a number of features that could, in principle, contribute to its cost-effectiveness in meeting program objectives, including its 'additionality'.¹⁰²

- Applicants are required to make a 'substantial' financial contribution to the capital costs of building each funded base station, and are also 'strongly' encouraged to seek financial or in-kind co-contributions from State, Territory and local governments, local communities and other third parties. This requirement should enable public funding to be directed only to areas where key beneficiaries have 'skin in the game' thereby resulting in a reasonable sharing of financial costs and risks.
- Applicants must certify that any proposed base stations are not at any time part of their forward network expansion plans. This requirement should reduce the risk that public funding is not used to finance previous commercial investment decisions.

¹⁰² The additionality of a government program is the extent to which it contributes to intended outcomes compared with what might otherwise have occurred in the absence of the program.

Box 7.9 ANAO's audit of the Mobile Black Spot Program

The Australian National Audit Office (ANAO 2016a) undertook an audit of the first round of the Mobile Black Spot Program to assess the effectiveness of the Department of Communication and the Art's (DoCA's) assessment and selection of base stations for funding under the round.^a

The ANAO concluded that DoCA established the key elements expected to form part of a competitive, merit-based grants program and, in the main, implemented these elements according to the published first round guidelines. However, it identified the following weaknesses in program guidelines.

- The criteria used by DoCA to assess the merits of each proposed base station did not sufficiently target funding toward the expansion of coverage where coverage had not previously existed. As a result, it considered that public funding had resulted in substantial consolidation of existing coverage provided by applicants, as opposed to extending coverage in new areas.

... While handheld coverage is expected to be extended by 68 000 square kilometres into new areas under the programme, up to 39 base stations were planned to be built in the same or similar areas (according to applicants' forward network expansion plans) without the need for public funding. Further up to 89 base stations provided minimal benefits to consumers in areas that previously did not have any coverage and, as a result, did not score a single point for coverage benefit. The award of \$28 million in state and Commonwealth funding to these 89 base stations undermined the value for money outcomes achieved from the programme. (p. 9)

- Further it said that the guidelines did not require applicants to achieve a minimum or threshold score for any of the selection criteria nor did they establish an overall minimum score that proposals must achieve.

... This approach enables base stations with significant [non-government] co-contributions to achieve high overall scores — and consequently a high ranking — even in those circumstances where they were assessed as having little or no merit against new coverage and coverage benefit. The approach also allows proposals with relatively low overall scores to be assessed as eligible for funding. (p. 30)

- DoCA did not establish appropriate methods for undertaking technical and financial assessment of applicants' proposals.

... The development of such methodologies, tailored to the objectives of the programme, would have improved the rigour of the department's assessment of proposals, particularly in relation to applicant costings. (p. 8)

- The program lacked a 'fit for purpose' performance measurement and evaluation framework, which would affect DoCA's ability to measure the overall impact and effectiveness of the program and report to stakeholders (p. 8).

The ANAO commented on other aspects of the program. On infrastructure sharing, it considered that 'the extent to which competition is improved under the program through the use of infrastructure by multiple operators is yet to be determined by applicants and the department' (p. 9). It noted that applicants in the first round of funding did not include any commitments from an additional operator to co-locate their equipment on proposed base stations, but most (86 per cent) were capable of supporting an additional operator and some (14 per cent) were yet to offer network roaming. As at March 2016, negotiations on co-location between operators had not been finalised.

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Box 7.9 (continued)

On political input, the ANAO considered that, while the involvement of Members of Parliament in an assessment process for a Commonwealth grants program was ‘novel’, the program guidelines indicated that Members of Parliament ‘will have information regarding the specific local issues and the locations within their electorates that are in greatest need of mobile coverage’ (p. 22). However, it concluded that the coverage of Member of Parliament priority nominations ‘was not a significant factor in the success’ of individual proposals (p. 46).

The ANAO recommended that DoCA implement several measures to improve the effectiveness of the program — namely, that DoCA establish minimum scores for assessment criteria, implement a detailed assessment methodology tailored to the program’s objectives, and implement a performance measurement and evaluation framework for the program.

Departmental response

While DoCA agreed with ANAO’s three recommendations (ANAO 2016a, p. 64), it noted that extending new coverage was just one of the aims of the program and that mobile telecommunications infrastructure being funded through the program also achieves the program’s objective of providing the potential for improved competition. It also noted that extending coverage takes into account improvements in areas where existing coverage is poor and the provision of new 4G services where this was not previously available. ‘The department maintains that all base stations achieve value for money against the programme’s objectives’ (p. 64). It disagreed with ANAO’s view that providing funding to expand coverage in areas serviced by other operators displaces the incentive for other operators to extend services in such locations:

... in many regional and remote locations it is only commercially viable for a single operator to provide services given the high capital costs required to build a mobile base station. The programme, by subsidising this initial capital cost, therefore promotes competition and provides consumers with a choice of service provider in areas where this may not otherwise have occurred. (p. 64)

^a The ANAO based its audit on the first version of the program guidelines.

- Weight is given to applications that result in expanding the mobile coverage footprint or benefiting more premises, major transport routes and passenger rail corridors with new mobile coverage. This feature should increase the scope for public funding to result in genuine additional mobile coverage benefits
- Weight is given to applications that promote sharing, co-building and inter-carrier roaming. Successful applicants must give other mobile network operators the opportunity to co-locate and to participate in the detailed design phase using a specified process. Such infrastructure sharing provisions should increase the scope for public funding to enhance spillovers.
- To the extent that the program extends mobile coverage of a *baseline* quality, it narrows the gap in *baseline* voice services within the NBN satellite footprint and addressed by recommendation 7.3 above.

That said, the Commission has a number of concerns about the program.

Dual program objectives

A key concern about the program is the inherent difficulties in addressing its two broad objectives of coverage (whether new coverage or improvements in existing coverage) and competition. On the one hand, a focus on promoting coverage could risk adding to the dominance of a mobile network operator. On the other hand, a focus on promoting competition could mean that there is inefficient duplication of infrastructure, with little gain in terms of improved consumer choice due to high switching costs (for example, arising from the need of consumers to carry multiple SIM cards capable of being used on different mobile networks).

The workability of infrastructure sharing requirements

While the program's infrastructure sharing requirements can, in principle, encourage efficient access to government-funded infrastructure as well as competition and consumer choice, it is unclear whether these are actually working effectively. For example, Vodafone (sub. DR150) said:

... VHA has been enthusiastically offering co-location and nearly half of our round 1 sites will be shared. Unfortunately this has not been our experience when seeking co-location on Telstra's sites. Given that Telstra has now received 75 per cent of the funded sites under 1 and 2, a reformed Mobile Black Spot Program, with clearer requirements for infrastructure sharing and co-investment and improved backhaul access and pricing arrangements, is critical if the Program is to deliver its stated objective of improving mobile competition in regional and rural areas. (p. 18)

However, Telstra (sub. DR123) considered that the Mobile Black Spot Program encourages infrastructure sharing and noted that all its towers have been built under the program with additional capacity to facilitate co-location of another operator's equipment. It noted that it has co-located equipment on 24 Vodafone Mobile Black Spot Program towers (out of 70).

Lack of coordination with other Australian Government telecommunications programs

Another concern about the Mobile Black Spot Program is its lack of coordination with other Australian Government telecommunications funding programs such as the current TUSO, the NBN, or telecommunications services in remote Indigenous communities. The lack of coordination between these programs is inimical to an outcome whereby government funding is directed to the most cost-effective communications alternative for particular locations.

In the Commission's view, while the Mobile Black Spot Program may have increased the reach of new mobile coverage in Australia, taxpayers' share of project costs under the program — currently amounting to over 50 per cent of the total cost of projects funded under the last round — is likely to increase with future funding rounds (chapter 4, table 4.2).

Accordingly, the Commission considers that it is imperative for the program to be independently evaluated as to its benefits and costs from a community-wide perspective before proceeding to any future funding rounds. Such an evaluation should consider measures to improve the program's operation, ensuring value to taxpayers' money. One measure is determining which program objective should have the higher priority: extending mobile coverage (whether new coverage or improving existing coverage) or increasing competition for mobile services. If the priority objective is to extend mobile coverage, the program should be recalibrated to reflect this, with concerns about competition on program-funded infrastructure being dealt with through another measure such as ACCC-regulated roaming (discussed below). However, that is a matter for the ACCC to determine. Another measure to improve the program's operation is ensuring that sites selected for funding are not driven by political imperatives, but based on evidence that they would meet the program's objectives.

RECOMMENDATION 7.5

Before proceeding to the next funding round, the Australian Government should commission an independent evaluation of the Mobile Black Spot Program. Such an evaluation should consider measures to improve the program's operation, to best ensure that the program's objectives are prioritised and site selection is evidence-based.

The use of nbn's networks by mobile network operators

Some participants and others argued for more effective use of NBN infrastructure for the delivery of mobile services. For example, Vodafone (sub. 46) proposed that mobile coverage could be expanded by better leveraging off NBN infrastructure through: improving access to nbn's transmission network and satellite capacity, which could be used for backhaul for mobile base stations; nbn offering its infrastructure to provide services at an incremental cost; improving the sharing of nbn's fixed wireless towers; nbn delivering a wholesale mobile service through its fixed wireless towers; and sharing of nbn's 'gifted' spectrum allowance (pp. 21–2). The South Australian Government suggested that nbn develop a project plan to assist the industry expand competitive mobile services in regional Australia by providing access to NBN backhaul and by upgrading its fixed wireless towers to develop a wholesale 4G regional mobile network (sub. 60).

The Commission notes that:

- the *Telecommunications Act 1997* (Cth) (schedule 1, part 5, section 38) requires all carriers to share sites containing antenna supporting structures where technically feasible, when requested by another carrier
- nbn considered the scope for leveraging off the NBN fixed wireless network to extend mobile coverage in its 2014 fixed wireless and satellite review (nbn 2014b) and noted a

high degree of overlap between the NBN and existing mobile networks. This suggests limited opportunities for co-location

- nbn is already examining the commercial viability of using its backhaul to connect mobile network operators to its cell towers through the NBN fibre network and has released its first agreement for its cell site access services with Vodafone (nbn 2017e)
- the Mobile Black Spot Program encourages consultation with nbn regarding the use of its fixed wireless network vis a vis mobile services, with nbn establishing a contact point for applicants to discuss possible opportunities for co-location of equipment and possible joint participation in the program (DoCA 2016h). DoCA expected 50 proposed base stations to co-locate with the NBN, whereas the ANAO (2016a) estimated that at least 32 were likely to be co-located due to their close proximity to nbn's current or proposed fixed wireless towers
- nbn acquired its original 2.3 gigahertz (GHz) and 3.4 GHz spectrum licences in 2011 for \$121.3 million (nbn 2014b). It spent another \$22.6 million on the reissue of its 2.3 GHz spectrum licence to July 2030. There is no evidence that nbn has been gifted, or otherwise favoured, with respect to spectrum.

The Commission considers that many of the suggestions about the use of nbn's networks for mobile services are matters for nbn to determine in accordance with its commercial assessment. It would be inappropriate for the Australian Government to interfere and require nbn to share its networks or to engage in enabling mobile services where it is not commercially viable for it to do so without due consideration being given to any additional costs or losses to nbn that this may involve.

Inter-carrier roaming

A number of participants and others raised the option of encouraging inter-carrier roaming such as through a declaration by the ACCC or by making that declaration a condition of funding under the Mobile Black Spot Program (for example, Remote Area Planning and Development, sub. 12; Victorian Farmers Federation, subs. 32, DR125; Vodafone, sub. 46; Infrastructure Australia, sub. 51; Wimmera Development Association, sub. DR105). They argued that this would enhance competition in the provision of mobile services, particularly in regional and remote areas; that the lack of competition has resulted in high prices, little consumer choice, and little incentive for the principal carrier (Telstra) to respond promptly and sufficiently to consumer complaints; and that roaming is regulated and operates successfully in other countries such as Canada, New Zealand and the United States. For example, Vodafone (sub. DR150) believed that:

... a domestic roaming declaration by the ACCC would ensure that taxpayers in rural and regional areas get maximum value through the Mobile Black Spot Program. Domestic roaming would mean that there was genuine competition for incremental coverage sites in uneconomic areas. (p. 18)

Other participants considered the downsides of an ACCC declaration. Optus and Telstra, argued that an ACCC declaration may risk undermining incentives for continued competitive investment in regional and remote areas (Long 2016; Warren 2016). A Telstra executive stated:

Where there is lack of choice for regional Australians, it is because our competitors have made the decision not to invest in those areas.

Regulating mobile roaming would take away our ability to offer customers a better experience and bigger mobile network than any of our competitors. Regulated roaming would mean there was virtually no reason for any mobile phone company to invest in new coverage or better technology. (Warren 2016, p. 1)

The ACCC commenced an inquiry in September 2016 into whether to ‘declare’ a wholesale domestic mobile roaming service (ACCC 2016c). The inquiry will focus on such issues as how consumer demands for mobile services are evolving, and whether there are differences in regional areas and urban areas; the likely investment plans of each of the mobile network operators to extend coverage and upgrade technology, absent a declaration; whether there are any significant barriers to expanding the reach of mobile networks; and any lessons from similar experiences with domestic mobile roaming in other countries. The ACCC has previously considered mobile roaming in regional areas in inquiries held in 1998 and 2005. On both occasions, it decided not to regulate an access service as it was satisfied roaming agreements were being commercially negotiated.

The Commission notes the conundrum facing the ACCC as to whether to declare mobile roaming services. In the absence of a declaration, infrastructure competition is discouraged and, further, a mobile network operator may face the incentive to undertake inefficient investment to close the gap in coverage between it and mobile network operators with greater network coverage. While the presence of a declaration encourages infrastructure competition, it reduces the incentive of mobile network operators with superior coverage to undertake further investment in their networks unless the access price is set at a level that does not discourage future investment and allows competition in the market. That said, the investment disincentives associated with an ACCC declaration may be lessened if it is confined to new mobile infrastructure that will be significantly co-funded by government to improve coverage (such as under the Mobile Black Spot Program).¹⁰³ Given the ACCC’s inquiry into mobile roaming, the Commission has declined to make any recommendations in this area.

Payphones and other forms of community telecommunications

Consistent with trends in OECD countries, payphones have declined in number in Australia over the past decade with the take up of mobile phones likely to have been an important influence (appendix C; chapter 2).

¹⁰³ The Commission understands that under previous government funding programs targeting mobile infrastructure, governments have made it a condition of funding for successful applicants to provide inter-carrier domestic roaming on request on commercial terms (Vodafone 2003).

About 50 per cent of OECD countries, including Canada, New Zealand and the United States, have no USO with respect to payphones (appendix C). Some countries rely on their markets to deliver payphone services. And other countries competitively tender for payphone services in certain circumstances. For example, Chile's Telecommunications Development Fund was initially established primarily to support the extension of a payphone network in rural areas through competitive tendering (CITEL 2000).

While the Commission has found that the TUSO is no longer serving the best interests of the Australian community (chapter 3), there may be limited circumstances in which it may be more appropriate and/or cost-effective to deliver a community telecommunications service — such as payphones, community WiFi, mobile phone charging stations, or telecentres — than a premises-based service. For example:

- in remote Indigenous communities, where payphones and community WiFi can meet their cultural needs (Swinburne Institute for Social Research, sub. 45)
- in locations, particularly in remote areas, where there is no adequate voice service such as a mobile service (Telstra, sub. 30; ACCAN, sub. 48; Tasmanian Government, sub. 57; South Australian Government, sub. 60; Victorian Farmers Federation, sub. DR125; Camp, sub. DR131)
- for people who do not own a mobile phone (Remote Area Planning and Development, sub. 12)
- for people who own mobile phones, but lack the ability to charge them (ACMA, sub. DR157) or are unable to roam on existing mobile networks (Flinders Ranges Council, sub. DR158)
- for people who cannot afford to maintain premises-based or mobile phone services (Moree Shire Plains, sub. DR128).

Some State, Territory and local governments are already procuring or entering into partnerships with the private sector to provide community WiFi services (including, the Tasmanian Government, Northern Territory Government with respect to its remote libraries, and Brisbane City Council) that include free voice calling, broadband and charging services (chapter 4). These and other examples of community telecommunications initiatives are set out in box 7.10.

If the Australian Government considers that support for payphones and other forms of community telecommunications is desirable, a specific funding program for community telecommunications would seem advantageous. The program should operate as a competitive tender arrangement (as with the Department of the Prime Minister and Cabinet's current funding of remote community telecommunications).

Participants such as ACCAN (sub. DR124), nbn (sub. DR159) and Telstra (sub. DR123) gave broad support to such a program. Some participants wanted such a program to be underpinned by a legislative guarantee or a USO (for example, Regional Development Australia Northern Territory, sub. DR115).

Box 7.10 Community telecommunications initiatives

A number of community telecommunications initiatives exist in Australia and overseas. They vary in terms of their objectives, scope, sources of funding, and other design characteristics. They may be run by governments, non-government organisations or individuals.

A common initiative is the provision of publicly-available WiFi (chapter 4). In Australia, various State, Territory and local governments have established or are trialling public WiFi networks, through procurement or partnerships with private providers. Community WiFi is often provided within city centres, libraries or university campuses. Examples of such programs can be found in most major Australian cities, including Adelaide, Canberra and Perth (chapter 4).

Similar initiatives have been established internationally. In the City of New York, a network of ‘Links’ called ‘LinkNYC’ provides ‘super-fast’ WiFi, the ability to make free domestic phone calls through a smartphone app, charging devices and displays of public service announcements and maps. This initiative was established by the City of New York and a consortium of private telecommunications companies, and is funded entirely through advertising revenue. Another example is the European Commission’s WiFi4EU program, which aims to support free WiFi for citizens and visitors in public spaces throughout Europe. Local public authorities (such as libraries or health centres) can apply for funding (with EUR 120 million allocated for 2017 to 2019) to cover equipment and installation costs, while meeting ongoing maintenance and internet costs themselves.

Other initiatives have involved the provision of physical telecommunications infrastructure for community use. In 2015, the Australian Government tendered for the supply of 301 WiFi telephones and 245 community payphones to deliver services to remote Indigenous communities (chapter 3). Similarly, the Centre for Appropriate Technology (a not-for-profit body) established a series of ‘mobile hotspots’ across 22 central Australian locations. These utilised antennas to amplify mobile signal strength at the user end, thus increasing existing mobile coverage footprints. While HITnet, an Australian social enterprise, rolled out a series of ‘touch screen kiosks’ in 70 Indigenous communities, which provide free access to information on health issues, and the ability to download this information onto mobile devices.

Another community telecommunications initiative is the establishment in 2002 of an Australian company ‘Southern Phone’, a retail service provider, with an initial \$4.77 million of Australian Government funding through the ‘Networking the Nation’ scheme. The company, which is unlisted and has only local councils as shareholders, specialises in providing telecommunications to regional areas. It pays dividends and offers grants to local council shareholders for the benefit of their local communities.

In remote areas considered non-commercial by established telecommunications providers, community members have co-operated to create their own networks. ‘Red WiFi’ — a small, independent internet provider based in Toowoomba — was initially formed by a group of individuals who were dissatisfied with the reliability and quality of internet access in the region. In the United States, the not-for-profit Institute for Local Self Reliance provides education and support for community groups who wish to build their own broadband networks, while ‘bottom-up’ service delivery is directly subsidised by the Government of Peru through its ‘Fund for Investments in Telecommunications’.

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Box 7.10 (continued)

Community telecommunications initiatives have limitations. They generally cannot be considered as universal services (as they are not premises-based), and there are often barriers related to accessibility or affordability. An initiative that is not freely available may be unaffordable to those on low incomes. There may also be accessibility issues, where initiatives rely on the prior ownership of particular equipment or technologies (such as requiring a mobile device to access free community WiFi). There are also concerns about security and privacy relating to the use of public WiFi networks.

Sources: ABC News (2013); Dukes (2015); European Commission (2017); Elpis (2017); FITEL (2014); ILSR (2012); LinkNYC (2017); and Southern Phone (2017).

The ACMA's detailed comments on the design of the program (sub. DR157) included that:

- the program be flexible in the types of services to be delivered, form of procurement and criteria for approval
- while the program may allow for the continuation of payphones in some areas, it should also facilitate other services including community WiFi and phone charging services
- careful consideration be given to the intended user groups and target locations, and that criteria be flexible enough to meet situations where locations may have mobile coverage but other shortcomings relating to availability, accessibility and affordability exist — for example, ‘public housing in large rural areas with mobile coverage should still have the ability to benefit from such a program ... ’ (p. 14)
- with respect to competitive tendering: consideration should be given to Telstra’s inherent advantages and long history with payphone service provision; appropriate performance requirements will be needed; and there may be value in encouraging participation from medium and smaller RSPs who are familiar with local consumer requirements.

The Commission considers that a community telecommunications program should be designed to ensure that it:

- targets locations where there is a market gap (including a particular user need) — for example, where: premises do not have a *baseline* service including no mobile service; or there is an affordability need or socio-economic disadvantage (as suggested by Moree Plains Shire Council, sub. DR128; ACMA, sub. DR157)
- does not duplicate existing Australian, State, Territory and local government investments in community telecommunications
- is flexible as to the form of community telecommunications to be provided
- reflects the preferences of local communities following appropriate consultation
- involves input from all levels of government with strong local community input
- allows for alternative community telecommunications to be assessed against each other (for example, public WiFi instead of payphones)

-
- involves a competitive tender arrangement where feasible to allocate funding, with the tender designed to maximise the scope for efficient competition while keeping administration costs low — for example, rather than a single tender for the provision of payphones for the whole of Australia, there could be several tenders tied to specific geographic areas or communities.

The Commission’s proposed program could absorb the Department of the Prime Minister and Cabinet’s current funding of remote community telecommunications, which targets remote Indigenous communities (chapter 4).

Alternatively, the proposed program could be limited to communities other than remote Indigenous communities with the latter served by a specific program to meet their particular needs. Such an Indigenous telecommunications program is considered in the next section.

RECOMMENDATION 7.6

As a replacement for the payphones USO, the Australian Government should establish a funding program for a form of community telecommunications (that may involve payphones) that targets communities in areas where there is a market gap (including a particular user need). The program should be flexible in the form of services provided to communities, involve extensive local community input, and involve a competitive tendering arrangement, where feasible, to allocate funding.

7.3 Options to address particular user needs

For some user groups within the Australian community, the options that address universal availability described above (section 7.2) may not be sufficient to meet their particular telecommunications needs.

These groups include members of the community who governments have traditionally chosen to support on social equity grounds: people on low incomes; people with disability or life-threatening conditions; people living in remote Indigenous communities; some older people with limited digital literacy capacity; and people who do not have permanent premises (for example, people who are homeless) (chapter 6). While the needs of these groups primarily concern accessibility and/or affordability, they may also relate to availability — for example, the relatively strong preference of some groups for mobile phones or community telecommunications (such as payphones) over premises-based services because they do not have a permanent residence.

There is already a range of disparate government measures in place to target these differing needs (chapter 4). The Australian Government has also imposed measures on providers such as Telstra (outside of the current TUSO) and nbn to address the particular needs of some consumer groups (chapter 6). Options to improve on these measures, or for new measures, were suggested by participants (box 7.11).

Box 7.11 Participants' suggestions for addressing accessibility and affordability

Revise and update the Telephone Allowance

ACCAN (sub. 48) considered that future affordability measures should be independent of RSPs to give consumers choice in their provider, which could be achieved by: providing financial assistance to consumers for services and devices through a revised Telephone Allowance; requiring all RSPs through their carrier licence conditions to offer low-income support and services; nbn providing eligible end users with a coupon or voucher for discounted services to be redeemed from their choice of RSPs, which could in turn claim from nbn. Carers NSW (sub. DR72) considered that there should be a continued commitment to the Telephone Allowance. While the Telephone Allowance may assist with ongoing costs of an internet or mobile subscription, it may not be sufficient for outright purchases of digital technologies. The South Australian Council of Social Service (sub. DR85) supported a review of an enhanced Telephone Allowance.

Revise and expand the National Relay Service

ACCAN (subs. 48, DR124) suggested that the National Relay Service should be expanded to include services for deafblind and multilingual consumers, with all services offered 24 hours a day. The Australian Communication Exchange (sub. 22) suggested the introduction of a portal to prevent providers from using proprietary products that do not 'talk' to each other could add value to the National Relay Service. It also considered that a registration process for National Relay Service users could be accepted by the hearing and speech impaired community if it meant retaining their equivalent communication services. The Disability Council NSW (sub. DR132) suggested that the National Relay Service includes both a 'relay arm' and an 'outreach arm' (p. 2). Printacall Communications Technology (sub. DR109) considered that TTY provision should be kept in conjunction with the National Relay Service and be gradually phased out as current users diminish over time.

Introduce other measures to support people with disability

ACCAN (sub. 48) considered that the current communications landscape requires a move away from a one-size-fits-all equipment program towards a program that best suits the individual needs of consumers with disability who do not qualify for the National Disability Insurance Scheme. The Disability Council NSW (sub. DR132) and ACCAN (sub. DR124) suggested a one-stop disability telecommunication service to provide communications information, equipment provision, training and support. The Yaraka Isisford Branch Isolated Children's Parents' Association (sub. DR104) suggested a guaranteed right of provision of a telephone service for people with a disability or impairment.

Introduce measures to address the needs of people living in remote Indigenous communities

Broadband for the Bush Alliance (sub. 6) and Ninti One (sub. 16) considered that, in order to address these needs, there should be pre-paid options (both for mobile and internet) in any new USO. The Swinburne Institute for Social Research (sub. 45) suggested mobile services or community WiFi are likely to result in higher levels of internet adoption in remote communities than satellite subscriptions and that there should be a full investigation of low-cost mobile infrastructure with consideration given to micro-cell technologies.

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Box 7.11 (continued)

Cape York Digital Network (sub. 17) considered that governments need to move away from a one-size-fits-all approach towards a flexible approach to address the needs of remote users, particularly in remote Indigenous communities. CAYLUS (sub. 25) considered it crucial to have Indigenous community input into the management of public WiFi availability and content filtering, such as to automate the times the WiFi is available and levels of content filtering (moderate setting excludes searches for porn, hate and online gambling sites), and to apply a daily download limit. Kohen and Spandonide (2016) and Broadband for the Bush Alliance (sub. 6) considered there was a need for targeted Indigenous programs to improve digital literacy. The Indigenous Remote Communications Association supported ‘unmetered’ government services for people in remote Indigenous communities (8 February, trans. p. 45).

Introduce zero-rating of government websites

ACCAN (sub. 48) considered that access to government telehealth, distance education, and government/public services could be facilitated by this approach. Broadband for the Bush Alliance (sub. 6) similarly recommended that the Government create universal unmetered (but not unlimited) online access to health, government services, education services and banking for remote residents and non-government organisations. The ACCC (sub. 40) considered that providing free or unmetered access to government services online is likely to help with accessibility and affordability issues faced by these consumers. The South Australian Council of Social Service (sub. DR85) considered that access to government information and services online should not be metered as part of consumers’ data usage. (As noted in chapter 4, the Digital Transformation Agency aims to improve the Australian Government service experience of Australians by making government webpages accessible to people through low bandwidth broadband connections and with low monthly data usage.)

Other suggested measures

Broadband for the Bush Alliance (sub. 6) suggested digital literacy targeted to older Australians. AgForce (sub. DR149) suggested programs that enable capacity building, or digital ability, particularly for those in regional and remote areas. Moree Plains Shire Council (sub. DR128) suggested a ‘minimum mobile phone service’ for people without permanent fixed address which permits a limited number of outgoing calls as well as some basic data availability through a targeted program (p. 3). The Australian Medical Association (AMA 2017; sub. DR147) suggested several actions to improve high-speed broadband access to health services in regional and remote areas. One action was to prioritise or optimise satellite broadband capacity available for hospitals and medical practices such as by exempting or allocating higher data allowance quotas, or by providing a separate data allowance (as is the case with distance education). The Yaraka Isisford Branch Isolated Children’s Parents’ Association (sub. DR104) advocated for a stipulated mandated minimum data speed to meet the needs of education delivery. Regional Development Australia Northern Territory (sub. DR115) suggested pre-paid internet options for people on low incomes, people who are homeless, and people living in remote Indigenous communities.

A number of participants urged the Commission to make specific recommendations in this inquiry on measures to address accessibility and affordability. For example, the South Australian Council of Social Service (sub. DR85) said:

We note that [the Commission in the Draft Report] supports a review of the Telephone Allowance (among other accessibility and affordability measures). However, without knowing

the outcome of such a review or what the income support might look like — it is arguably inappropriate to frame the other recommendations around the USO. Essentially, the Draft Report is putting recommendations about the USO forward on an assumption or hope that affordability issues for the particular groups identified will be looked after elsewhere. But in the absence of an income support system that is properly addressing telecommunications affordability, the Draft Report should not make that assumption, nor simply assume that the affordability issue can be simply shunted off to the tax-welfare system. (p. 5)

The Commission acknowledges that accessibility and affordability measures are an important adjunct to measures addressing universal availability in this inquiry. However, it notes that a number of existing and proposed measures will be considered by DoCA in its current review of communications accessibility, which covers the National Relay Service, and its planned review of telecommunications consumer safeguards (DoCA 2016a; sub. 58). As noted in chapter 9, the Commission's understanding is that these reviews are not intended to consider measures outside of DoCA's responsibility such as the Telephone Allowance, the role played by the National Disability Insurance Scheme, and the current consumer protection roles of the ACCC, the ACMA and the Telecommunications Industry Ombudsman. As such, the Commission considers that all accessibility and affordability measures pertaining to the telecommunications sector be examined in the Government's planned review of consumer safeguards (chapter 9).

That said, the Commission agrees with a number of participants (ACCC, subs. 40, DR152; nbn, sub. 47) that, as a general principle, measures to address accessibility, affordability and other particular needs of user groups should be targeted and flexible, facilitate informed consumer choice, be technologically neutral, and promote efficient competition and innovation. They should also be underpinned by evidence and involve consultation with affected parties before being introduced. It also considers that, in relation to many accessibility and affordability concerns, user subsidies (including welfare transfer payments) are likely to be more cost-effective than subsidies channelled through providers (chapter 8).

A remote Indigenous telecommunications program?

The Commission's proposed community telecommunications program is likely to also benefit people living in remote Indigenous communities. As Telstra (sub. DR123) noted:

Given the nature of a program focused on remote communities outside of mobile coverage, Indigenous Australians are likely to be a beneficiary of such a program. Such a service would not only help address indigenous disadvantage, but also assist remote communities who are outside of mobile coverage more generally. (p. 6)

Some participants, however, supported more targeted solutions for people living in remote Indigenous communities (ACCAN, sub. DR124; Indigenous Remote Communications Association, trans., 8 February 2017, pp. 39-51; Regional Development Australia Wheatbelt, sub. DR77), noting that their needs extended beyond availability to accessibility and affordability concerns (see also the Commission's review of Indigenous needs in chapter 6). For example, the Indigenous Remote Communications Association said:

We endorse the proposal of targeted Indigenous telecommunications programs, and particularly to meet the digital inclusion challenges in Indigenous communities, but this needs a very holistic approach. Obviously we've got a range of challenges, and we know this firsthand through our own program delivery around not only availability and accessibility to services, but digital literacy, relevant content, appropriate training and support, and that requires a well-funded program which is currently very different to what is being set up, or what is on offer through the remote Indigenous IT activity within the government under the Department of Prime Minister and Cabinet. (trans., 8 February 2017, p. 42)

These needs could be addressed by a remote Indigenous telecommunications program that operates in close tandem with the Commission's proposed community telecommunications program. An Indigenous telecommunications program could allow for the funding of a broad range of telecommunications services to be delivered to remote Indigenous communities, including mobile services and community telecommunications such as payphones, as well as address the accessibility and affordability concerns of this group. If an Indigenous telecommunications program were established, the Department of the Prime Minister and Cabinet's current funding of remote community telecommunications would need to be reconsidered. Further, any new Indigenous program would need to be evaluated in accordance with the Prime Minister's recent statement to Parliament on the *Closing the Gap* report (Turnbull 2017).

7.4 Towards a universal service fund?

Many or all of the options considered in sections 7.2 and 7.3 can be implemented on a stand-alone basis or in combination. They could also be consolidated under the umbrella of a universal service fund (appendix C; ITU 2013; Ladcomm Corporation 2013).

Two notable international examples are the US Federal Communications Commission Universal Services Fund, which addresses the availability of infrastructure services to high cost (rural) areas as well as affordability for low-income customers, and health providers, schools and libraries in rural areas, and the Canadian Radio-television and Telecommunications Commission's (CRTC's) proposed establishment of a mechanism to fund 'basic telecommunications services' in underserved areas (box 7.12).

The Australian Government previously introduced versions of a universal service fund. One example, is its \$2 billion Communications Fund in 2005, which was intended to ensure rural, regional and remote Australians could access affordable and reliable telecommunications (Paul Budde Communication 2007). That Fund was closed in 2008-09 with the monies transferred to another fund (the Building Australia Fund) (Australian Government 2008).

In its most recent review of regional telecommunications in Australia, the Regional Telecommunications Independent Review Committee (2015) recommended the establishment of a Consumer Communication Fund to support 'necessary loss making regional infrastructure and services' (pp. 52-4). The Australian Government (2016b), however, considered that it was premature to support the Regional Telecommunications Independent Review Committee's recommendation.

Box 7.12 International examples of universal service funds

The United States' Universal Service Fund

In 1996, the US Congress passed the Telecommunications Act, which mandated the creation of the Universal Service Fund. The Fund was established by US Federal Communications Commission (FCC) in 1997.

Under the Act, the Fund seeks to support universal service and promote delivery of telecommunications services to under-served rural and urban areas (section 714). The universal service principles set out in the Act include that: quality services should be available at just, reasonable and affordable rates; access to advanced telecommunications and information services should be provided to all regions; and consumers in all regions, including low-income consumers and those in rural, insular, and high cost areas, should have access to advanced telecommunications and information services that are reasonably comparable to those services provided in urban areas and that are available at rates that are reasonably comparable to rates charged for similar services in urban areas (section 254).

The Fund provides for universal services through four programs — a:

- high cost support mechanism that provides support to certain qualifying telephone companies that serve high cost areas
- low-income support mechanism that assists low-income customers by helping to pay for monthly telephone charges as well as connection charges to initiate telephone service
- rural health care support mechanism that allows rural health care providers to pay rates for telecommunications services similar to those of their urban counterparts, making telehealth services affordable
- school and library support mechanism (known as the E-Rate) that provides a range of telecommunications services to eligible schools and libraries.

The Fund is administered by the Universal Service Administrative Company. The functions of the Company include: administering each of the programs; billing contributors, collecting and disbursing universal service support; and reporting quarterly to the FCC on disbursements. The Company has a 19 member board of directors representing different interest groups affected and interested in universal services. Members are nominated by their respective interest group and approved by the FCC Chairman. The Company also has an executive team that manages the day-to-day operations of the Fund, formed by experienced professionals with expertise in business, administration, accounting and legal matters.

All providers of interstate and international telephone and voice over internet protocol services must contribute to the Fund. Contributions are based on projected quarterly earnings reported to the Company. However, providers are exempt where reported revenues are such that their calculated contribution is less than US\$10 000.

Canada's proposed fund

The Canadian Radio-television and Telecommunications Commission (CRTC) intends to establish a mechanism to fund continuing access to 'basic telecommunications services' in underserved areas. Basic telecommunications services are defined as fixed and mobile wireless broadband Internet access services as well as fixed and mobile wireless voice services.

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Box 7.12 (continued)

A third party is to operate the fund at arm's length from the CRTC, with competitive processes used to distribute funding. The fund will commence with C\$100 million and increase annually by C\$25 million over the following four years until it reaches an annual cap of C\$200 million. Up to 10 per cent of the total annual limit of the funding mechanism is allocated to satellite-dependent communities for the first five years of the fund's operation in recognition of the telecommunications needs and challenges facing these communities.

In submitting funding proposals, applicants need to demonstrate: they are meeting the universal service objective in underserved areas; the proposal would not be viable without CRTC funding; a minimal level of financial support from a government entity; and a minimal level of their own investment in the project.

The two main functions of the fund are the implementation and operation of the competitive process as well as management of the funding agreements, and the collection of contributions and distribution of funds. Administration of the fund could be by a single administrator, or separate administrators for each function. The CRTC will retain oversight of the fund and approve the projects to be funded.

Sources: Appendix C; CRTC (2016c); Federal Communications Commission (2016b); and ITU (2013).

Some participants supported a universal service fund. Coutts Communications (subs. 5, DR114) recommended a universal service fund to help fund 'non-commercial but socially important telecommunications infrastructure' (p. 2). Vodafone (sub. 46) considered that, if any ongoing universal service funding is retained, this be redirected to the fund as recommended by the Regional Telecommunications Independent Review Committee. It (sub. DR150) preferred the establishment of a 'flexible, technology-neutral fund' over the Commission's proposed community telecommunications program. The South Australian Government (sub. 60) considered that a universal service fund should be used to improve mobile coverage and choice in regional Australia. However, DoCA (sub. 58) questioned the benefits of establishing a Consumer Communication Fund solely for any new USO.

A universal service fund could be established to address the universal service objectives of availability, accessibility and affordability and consist of two parts.

The first part would address universal availability. Funding would be allocated for the provision of telecommunications infrastructure and/or retail services where no *baseline* services are available. Proposals would be sought from providers, government agencies and communities, and assessed on a competitive basis according to their cost-effectiveness in addressing availability regardless of the specific technology used.

This part of the fund could work together with any of the options reviewed above where they are relevant to universal availability, including any potential competitive tender for the provision of retail voice services to premises within the NBN satellite footprint. It could apply to the provision of community telecommunications (such as payphones), mobile services and other relevant telecommunications technologies. It could also address particular user needs within the community.

The second part of the universal service fund would address accessibility and affordability. Funding would be allocated to measures to support people on low incomes, people who are homeless, people living in remote Indigenous communities, people with a disability, and older people with respect to telecommunications services that are already available.

If universal availability is primarily addressed by NBN infrastructure (as well as the funding arrangement associated with that), a universal service fund could address remnant market gaps. Indeed, it could consolidate existing disparate Australian Government programs that relate in part or in full to telecommunications services such as the Mobile Black Spot Program, the National Stronger Regions Fund, the Department of the Prime Minister and Cabinet's funding of remote community telecommunications, the Telephone Allowance and the National Relay Service.

An important advantage of a universal service fund is it would enable the flexible assessment of a wide range of alternative telecommunications services to address universal service objectives — something that is currently absent from the TUSO and other programs relating to universal service.

The cost-effectiveness of a universal fund in addressing universal service objectives depends crucially on its design and size. With respect to governance, ideally, the fund would be administered by an independent statutory agency with relevant expertise — (say) to assess the cost-effectiveness of competing proposals and technologies — and a predictable source of funding. A possible candidate for this role is the ACMA (with its expertise in communications technology). However, assigning the ACMA with this role would need to be consistent with the final outcomes of DoCA's current review of the ACMA. DoCA (2016n) proposed in its draft report a full 'stack' approach to communications regulation, with the ACMA's remit to cover all layers of the communications market, including infrastructure, transport, devices, content and applications, rather than be tied to 'siloed' industry structures (p. 8). A future role for the ACMA with respect to a universal service fund could be in keeping with DoCA's draft proposal. The final report of that review is currently under Government consideration.

Other important design elements of the fund are that it involves competitive tendering for services provision, that the measures deployed are themselves proven to be cost-effective, and that the fund has a predictable source of funding.

Although a universal service fund has conceptual appeal, the Commission considers that the administrative effort involved in its establishment and getting its governance right is likely to be problematic relative to the likely size of the fund. Assuming that NBN funding remains separate from a universal service fund, the size of the universal service fund is likely to be relatively small. It would be better for the Government to ensure that measures to address market gaps are trialled and evaluated before any universal fund of significant breadth is established.

8 Funding

Key points

- Estimating the cost of providing a universal telecommunications service arrangement can be fraught given the information asymmetries often at play.
 - Competitive tendering induces potential suppliers to reveal their best estimate of the efficient cost of service provision. However, for competitive tendering to work effectively, it must be supported by sufficient market depth and careful design.
 - Where the market is not contestable, an independent process with properly validated costing, performance benchmarks and reporting requirements can mitigate the risks of cost-padding by service providers.
- There are two broad funding options considered for universal service arrangements: general government revenue or an industry levy. These options are not mutually exclusive.
- The choice of funding approach is affected by the nature of the program to be funded (whether it is consumer- or provider-based, or targeted at an industry activity), the quantum of funding required, and the extent to which the industry is undergoing rapid change.
 - Consumer subsidies to address *affordability* and *accessibility* are best funded through general government revenue. This allows individual requirements to be considered in providing the support, including means-testing.
 - *Availability* gaps could be funded from either an industry levy or general government revenue. An industry levy can be justified as services notionally benefit all users. Telecommunications services also have a wide user base, which reduces the per-unit burden of a levy. An industry levy can also increase scrutiny by informed industry participants to reduce cost-padding by universal service providers. However, a levy can be difficult to design well and costly to administer, and more so when the industry is dynamic. In comparison, funding programs from general government revenue at the Australian Government level also has the benefit of a wide funding base (taxpayers) and the opportunity for regular scrutiny, avoids the inherent design risks of an industry levy and is easier to administer.
- The narrow scope of the Commission's proposed universal service policies means that distortionary impacts are likely to be modest irrespective of the funding model adopted. This means that issues of design, implementation and administrative costs of the funding models should be considered more closely. Accordingly, the policies recommended in this inquiry should be funded principally through general government revenue.

How any universal telecommunications service policy is funded can affect broader market efficiency through the incentives it creates on either the demand-side or supply-side of the telecommunications market.

Universal services can be funded through general government revenue, government or industry investments, industry levies, or user charges. Each funding approach has different impacts on economic efficiency to the extent that it distorts investment and consumption decisions. Different funding approaches also have inherently different levels of accountability and transparency.

This chapter considers funding options for the Commission's proposed policies to address universal service objectives (chapters 5 and 7). It starts by briefly reviewing the scope of funding associated with universal service policies (section 8.1). It then presents key guiding principles that should underpin funding approaches to incentivise efficient service provision (section 8.2). The trade-offs between different funding approaches for universal service policies and related policies are considered against the funding principles (section 8.3). These principles are then applied to approaches for funding the Commission's proposed policies and any consequential impacts (section 8.4).

8.1 What is being funded?

A highly-targeted approach to universal service policies

In chapter 6 the Commission set out the case for targeting Australian Government intervention to meet the particular telecommunications needs of specific user groups, rather than through the current overarching universal service obligation approach.

National Broadband Network (NBN) infrastructure, complemented by mobile coverage, is expected to mostly address the objective of universal service *availability* for broadband and voice. Nonetheless, additional funding may be required to address remaining availability gaps, as well as universal service *accessibility* and *affordability* gaps (chapters 6 and 7).

Any availability gaps are best addressed by specific programs that fund providers to supply the missing service (chapter 7). Where possible, such programs should be commissioned through a competitive tender. This may include the provision of infrastructure for a *baseline* voice service for areas without adequate mobile coverage (most likely within the NBN satellite footprint). Competitive tendering for these services could be broken up by geographic areas for these communities or according to different user groups (chapter 7).

In contrast, programs that aim to address affordability (and some accessibility) objectives are better delivered through subsidies targeted at eligible users. Funding should be allocated to measures to support disadvantaged groups and should target the particular needs of these users. This includes, for example, directing subsidies to support people on low income, people who are homeless, Indigenous people living in remote communities, people with disability and older people with respect to telecommunications services already available. These programs should be flexible, facilitate choice, and promote competition (chapter 7).

Addressing these potential gaps in availability, accessibility and affordability is likely to cost less than the current funding envelope for the telecommunications universal service obligation (TUSO). For instance, in terms of availability gaps, the Commission estimates that up to 90 000 premises (largely in the NBN satellite footprint) would have inadequate access to *baseline* voice services (chapter 6). The size of this gap is significantly smaller than the 810 000 copper-based fixed voice services that were estimated to be in commercially unviable areas for the Telstra USO Performance Agreement (TUSOP Agreement) (Paterson 2011; chapter 3). Meeting potential availability gaps could involve funding community telecommunications (box 8.1).

On the whole, the Commission's assessment is that the size of any market gaps or gaps in responding to particular user needs in telecommunications is likely to be small (finding 6.5). Correspondingly, the amount of funding in question for any additional policy intervention is likely to be smaller than that involved under the current funding arrangements for the broad-based TUSO.

Box 8.1 The cost of funding community telecommunications

The Commission proposes a program to fund community telecommunications services such as payphones and public WiFi. The cost of these services can vary significantly and depends on several factors. These include access to electricity and core transmission networks, the type of technology used and quality of hardware, the technical requirements of the service, the number of people supported, and the geography and location of the community.

Costs include both the capital and the operational expenditure of a service. Capital costs include equipment and materials (such as cabinets, cabling, switches and towers) as well as the labour costs involved in constructing, installing and connecting the service. Operational costs include ongoing maintenance, upgrades and service support, as well as site rental, electricity, spectrum, and core network licences and charges.

Community telecommunications services generally involve significant capital costs to deploy and connect infrastructure, particularly in remote areas where there are added costs in sourcing labour and ensuring that equipment is durable enough to withstand harsh conditions. Operational costs tend to be much lower but can still be significant if services require on-site maintenance. These costs can be particularly high if services involve funding for ongoing access to electricity and core transmission networks.

There is scant public information on the costs of community telecommunications services. This limits the extent to which services can be compared or considered for further expansion. For instance, capital expenditure to provide community WiFi can range from around \$10 000 in small communities to over \$100 000 in regional centres and to several million dollars for the most extensive networks in urban areas. Operational costs are lower and range from around \$1000 to over several \$100 000 each year depending on the size of the network and what is provided.

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Box 8.1 (continued)

Some examples of costs include:

- \$6500 per WiFi access point to deploy and support public WiFi across the Coal Creek Historic Park, funded by the South Gippsland Shire Council
- \$134 500 to deliver WiFi services in the remote Indigenous communities of Docker River, Imanpa and Mutitjulu, funded by the Northern Territory Government
- \$11 million on a five-year pilot program to roll out public WiFi in three cities. The service will cover more than 600 000 square metres in central parts of Melbourne, Ballarat and Bendigo (or around \$18 per square metre of WiFi coverage), funded by the Victorian Government.

The amount of funding required for community telecommunications services will depend on the capacity to recover costs through revenue. Some services may be commercially viable (wholly or partially) through a user pays system or some degree of co-investment, or revenue could be supplemented through other sources such as advertising. However, funding might be required to support the initial infrastructure rollout. Ongoing funding may also be required in cases where there are few potential customers, or where cost recovery is limited by the need to ensure that an affordable service is available.

Sources: Bureau of Communications Research (2016a); Centre for Appropriate Technology (pers. comm., 22 February 2017); Department of the Prime Minister and Cabinet (pers. comm., 24 January 2017); Easyweb Digital (pers. comm., 8 February 2017); Giles and Price (2016); MAV Technology (2014); Optus (sub. DR146); Vodafone Hutchison Australia (sub. DR150); Victorian Minister for Regional Development (2015).

FINDING 8.1

Given the narrower scope of government intervention required following the full rollout of NBN infrastructure, the funding required for universal service programs is likely to be smaller than currently provided for the telecommunications universal service obligation.

8.2 Key funding principles

At a broad level, a number of guiding principles should apply to the funding of all government programs, including programs that target universal service objectives. Funding mechanisms should be cost-effective, efficient and transparent to stakeholders and to the public.¹⁰⁴ Funding should also be simple to administer, minimise compliance burdens, and be responsive to technological, market and policy developments.

¹⁰⁴ Cost effectiveness is a measure of the extent to which the cost of resources used to deliver a program has been minimised (chapter 5). A program is cost-effective if it has the lowest cost of all the ways of producing the same service. Efficiency is attained when people maximise their utility given the available resources. It is a measure of the increase in net benefits that covers how well resources are produced and allocated to meet current and future preferences (PC 2013c).

As outlined in chapter 1, the funding of a universal service policy should:

- seek to reflect the efficient costs of service provision
- minimise distortions to investment and consumption choices
- be transparent
- have regard to administrative simplicity and compliance burdens
- be flexible to respond to future changes and be appropriately time-limited while providing enough certainty for investment decisions.

Determining the cost of policies

Determining the cost of policies is an important step in ensuring that taxpayers and/or consumers receive value for money. An accurate assessment of costs is needed for assessing net benefit and for reducing the scope for cost-padding.

However, getting an accurate estimate of costs can be difficult. A provider generally has far better information on the cost of the services it delivers than governments or a third party. In addition, future costs are largely unknown and providers can only estimate these costs.

Governments can help to reveal the efficient costs of service provision in two ways, by:

- requesting the market to provide a price, which, if the market is competitive, should indicate the efficient cost
- applying a methodology to accurately estimate the cost.

Harnessing competition can reveal efficient costs

Competitive tenders can be used to discover a ‘market’ price for universal service policies. Competition provides an incentive for providers to keep their tender prices close to their best estimate of the technically-efficient cost of delivering the service. If there are few providers capable of delivering the service, the ability of the tender in revealing the technically-efficient cost is more questionable. That said, a market with few prospective providers may still yield a competitive tender process if collusion between providers does not occur.

However, a competitive tender by itself does not necessarily lead to a cost-effective service. Careful design of the tender is important for ensuring that the program provides value for money and that financial risks are properly managed by the relevant parties (chapter 7). In particular, a tender bid’s underlying cost information should be made available for review and public scrutiny. Program risks should also be mitigated by regular monitoring once contracts are in place.

In the absence of a contestable market, cost estimates should be validated

A lack of contestability in the market can lead to cost-padding and limit scrutiny, particularly where funding agreements are opaque (Bougheas and Worrall 2012; PC 2013b). As a result, funding could be directed to unnecessary features — such as the ‘gold-plating’ of infrastructure or services, which ultimately distorts investment decisions. This ultimately exposes the government and/or consumers to higher costs.

Such activities may be identified through exposure to industry review, especially where an industry levy is used as the funding arrangement. However, a good costing methodology is also critical to identifying where cost-padding might occur.

In the absence of market contestability, an independent assessor can benchmark costs as a means of validating estimates, as well as undertake a rigorous costing process.

Benchmarking draws on comparisons of similar projects, or comparisons between providers or other entities to measure inefficiency. While an inexact tool, benchmarking can promote efficient conduct as providers do not want to be identified as behind the leaders (PC 2013b). It can help to identify best practice processes, set targets for improvement, and measure progress against objectives (PC 2008).

There are two main types of benchmarking:

- performance benchmarking — measuring and comparing indicators of performance across programs, and over time, without reference to any specific standards
- standards benchmarking — comparing performance against best practice standards or policy targets.

Defining cost benchmarks, such as the capital and operational expenditures of supplying services, typically requires bringing together top-down and bottom-up costing methodologies. This requires regular and in-depth data, which may be difficult to obtain, particularly for services that are not routinely provided. Supplying cost data can be burdensome for providers that cannot easily estimate their costs. These costs can vary and may not be straightforward to compare across the services delivered, for example to different geographic areas and consumers. Furthermore, benchmarks should be forward-looking to anticipate changes in service costs (for example, shifts in technology and consumer needs), which can be challenging for industries undergoing rapid change.

In order to enable an independent rigorous costing, cost data should be made transparent to an independent assessor (such as a regulator). For example, the Bureau of Communications Research (the BCR, now the Bureau of Communications and Arts Research) acknowledged that regularly publishing the process for determining ‘the estimated magnitude of the [NBN non-commercial services] loss over the relevant time horizon’ will go some way to improving transparency around NBN non-commercial services (BCR 2016a, p. 8).

Certain cost information could be treated as commercial-in-confidence in cases where providers are reluctant to publicly disclose costs that could put them at a competitive disadvantage.

While recognising the need to balance commercial confidentiality and accountability, governments should make public as much information as possible to enable interested parties to assess contracting decisions — including cost, other criteria for tender evaluation, and assessed performance against those criteria (IC 1996). Indeed, as noted in the Commission's *Public Infrastructure* inquiry report:

Even where data are provided by private participants, the normal presumption of transparency should prevail as a condition of involvement in government-backed projects. (PC 2014b, p. 105)

To properly benchmark costs, an assessor would also need specific skills and knowledge of the industry. Such skills may not be available outside of the industry supplying the service, and so there can be challenges in selecting an independent assessor that is accepted by industry and by the community.

An optimal approach to benchmarking should therefore weigh up the costs involved in supplying and validating cost data against the extent to which improvements in transparency and accountability will promote efficient conduct.

Assessing the costs of programs with universal service objectives

Ideally, any cost assessment should be designed to limit the incentives for the universal service provider to:

- cross-subsidise other non-universal service activities
- underprovide infrastructure maintenance and replacement, passing on poor quality infrastructure at the conclusion of the contract (run down the capital stock)
- use the contract to reduce competition by other providers
- cost-pad or gold-plate — inflate costs or provide services beyond what the government has contracted
- crowd out the private provision of services, noting that as technology changes, what can be considered commercial and non-commercial can also change.

In the first instance, the Australian Government should test the market through a well-designed open tender to identify the costs of service provision (chapter 7). This approach was supported by some participants (box 8.2). In the absence of sufficient competition, the Government could invite a potential provider to submit their price for delivering the service, while managing the risks of market dominance or incumbency advantage through the design of any contract. The provider should supply a cost basis for this price to an independent assessor who can scrutinise its accuracy. The use of cost benchmarking and transparent reporting can also minimise the provider's incentive to

cost-pad and so ensure that public funds are used efficiently. That said, there can still be significant information asymmetries between the Government and service providers, and cost monitoring is likely to be less effective than a fully competitive model in reducing the extent of cost-padding.

Box 8.2 Participants' views on calculating the costs of universal services

Optus (sub. 4):

Where required, the [telecommunications universal service obligation (TUSO)] should be cost-based and this must be substantiated before receipt of payments to the [universal service provider]. The [Australian Competition and Consumer Commission (ACCC)], as an expert independent body, would be best placed to assess any such costs. (p. 44)

Vodafone Hutchison Australia (Vodafone) (sub. 46):

... funding of the delivery of universal services should ideally reflect the true underlying net costs of provision. While that principle is clear, determining this amount is rarely a straightforward exercise. Experience suggests that the optimal funding amounts are unlikely to be discovered through competitive tendering exercises, and estimates of net costs are beset by information asymmetries between the cost estimator and the firm supplying the service. (p. 30)

Infrastructure Australia (sub. 51):

Providing greater transparency through increased financial performance reporting would allow the government to identify efficiencies, and provide incentives for innovation in delivering services that better meet the needs of users. Increased transparency could help to provide assurance to taxpayers and industry of the fairness and efficiency of the [TUSO] as a means of safeguarding telecommunications service quality for all Australians. (p. 3)

The ACCC (sub. DR152):

Where government funding is directed to targeted interventions, such as the Mobile Blackspot Programme, we consider that the design of any tender process will be critical to meet the objectives of universal service. Principles such as promotion of competition, the efficient use of infrastructure, and the long-term interests of end-users would assist in improving the outcomes of such programs. Interventions should also be appropriately targeted and designed to minimise market and competitive distortions. (p. 3)

RECOMMENDATION 8.1

The Australian Government should use competitive tendering wherever feasible to deliver targeted telecommunications universal service programs. As a first step, the Government should test the depth of relevant market segments.

Where market depth is lacking and a competitive tendering process is not feasible, the Government should establish benchmarks against which to assess whether costs are acceptable. At a minimum, the Government should subject all proposed program costings to an independent and transparent validation process.

Choosing the best cost methodology is a fraught issue, particularly in a non-contestable environment

A key challenge in determining the cost of any universal service policy is choosing the most appropriate cost methodology. Cost refers to the *net cost* of service provision which takes account of the revenues received from providing the service.

Even in a contestable market, selecting a cost methodology is important as it helps governments to understand the scope of services to be funded and how actual costs should be allocated.

The former Department of Communications, Information Technology and the Arts (now the Department of Communications and the Arts — DoCA) stated in its 2004 Review of the TUSO:

... since 1991 there has been no consensus on the approach and methodology for estimating the costs of the [TUSO], and decisions on subsidy amounts have been based on a variety of approaches, including through consultation between major participating carriers. (DCITA 2004, p. 83)

Broadly, there are four cost methodologies, with each leading to different cost estimates (box 8.3).

The cost measurement approach applied to a universal service policy will affect the quantum of costs to be funded by governments or industry (and, ultimately, taxpayers and consumers) and the incentives driving universal service providers. This is influenced to a large extent by the allocation of common or joint costs across non-commercial and commercial services.

In principle, a *marginal cost* methodology provides the basis for estimating the additional cost of providing the universal service (SCNPMGTE 1994). In practice, however, this is difficult to measure as the cost of universal service provision involves an array of variable costs and fixed costs, as well as lumpy costs shared between services, not all of which are used to deliver the universal service.

The *avoidable cost* approach has been the Australian Government's preferred method of measuring net universal service costs in non-commercial areas, and is the approach largely favoured by industry (BCR 2016a; infoDev and ITU 2016; SCNPMGTE 1994). The Commission has also previously recommended using the avoidable costs methodology as it reduces incentives to include common costs from other functions within a provider (for example, overhead costs) (IC 1997; SCNPMGTE 1994).

Box 8.3 **Methodologies for calculating the net cost of universal service programs**

Broadly, there are four methodologies for calculating and then allocating the costs of services that aim to meet universal service objectives — in this context, the costs to provide non-commercial telecommunications services. The different methodologies can lead to very different estimates of costs.

The **fully-distributed cost** methodology includes the total costs to an enterprise of all the different activities it undertakes, including those not directly attributable to the universal service. This methodology does not provide a direct measure of the cost responsibility of the particular universal service, or how much costs change when output of the service changes.

The **marginal cost** methodology accounts for the cost of producing one more unit of a service, although it can equally account for the cost that would be saved by producing one less unit. There are difficulties in easily defining and measuring the marginal cost of universal services and so this methodology tends not to be used in practice.

The **avoidable cost** methodology calculates all costs (including capital costs) which would have otherwise been ‘avoided’ had the service not been provided. This is essentially a practical measurement of marginal cost as well as additional capacity costs, while retaining the causality between increases in output and related costs. Avoidable cost will usually be the preferred approach to measuring the costs of a universal service policy, although there can be problems in identifying the precise level of costs that are avoidable and can require significant judgment.

The **standalone cost** methodology calculates the costs associated with the provision of a service in isolation. The reduction in costs available from economies of scale is not captured in the standalone cost, and so it tends to over-estimate the cost of providing the service.

Sources: BCR (2016a); CCNCO (1998); IC (1997); SCNPMGTE (1994).

8.3 Who should pay?

The principle of ‘those who benefit should pay’ that applies to cost recovery in situations such as fisheries management or financial services regulation does not hold for universal service policies. The logic of this principle is that if the beneficiaries also face the cost of service provision, they will impose discipline on the providers to deliver a cost-effective service (PC 2001). However, universal service policies benefit at least some that government assesses cannot or should not pay, at least the full attributed cost. This presents a challenge in developing a funding model that is seen to be fair, and that provides the discipline required to prevent cost-padding and gold-plating by service providers.

The Commission has considered two broad funding options for programs to address gaps in universal services — for both targeted programs and any other consequential impacts:

- general government revenue, which is largely sourced from direct taxes, the cost burden of which taxpayers bear
- industry levies, allocated to industry players to pay for universal services, but some proportion of which is ultimately passed on to telecommunications consumers.

Some combination of these options is also possible (as in the present TUSO), but it is also notable that governments in many countries provide no compensation to universal service providers to provide mandated services (appendix C).

Programs that address universal service objectives are typically funded through either general government revenue or an industry levy, and there are arguments for and against each. Other funding options include private sector financing through debt or equity, either from users of the service or through private markets. Industry co-investment can also be viable for some programs — for example, the Mobile Black Spot Program features investment from providers, governments and community organisations to improve mobile coverage in regional areas (chapters 4 and 7). On the whole, however, financing universal service objectives through private markets may be more challenging given the need for a project to be profitable.

Taking into consideration the principles outlined earlier, a framework for determining the optimal funding approach is provided in figure 8.1.

Minimising distortions through discipline

All funding models impose some level of distortion

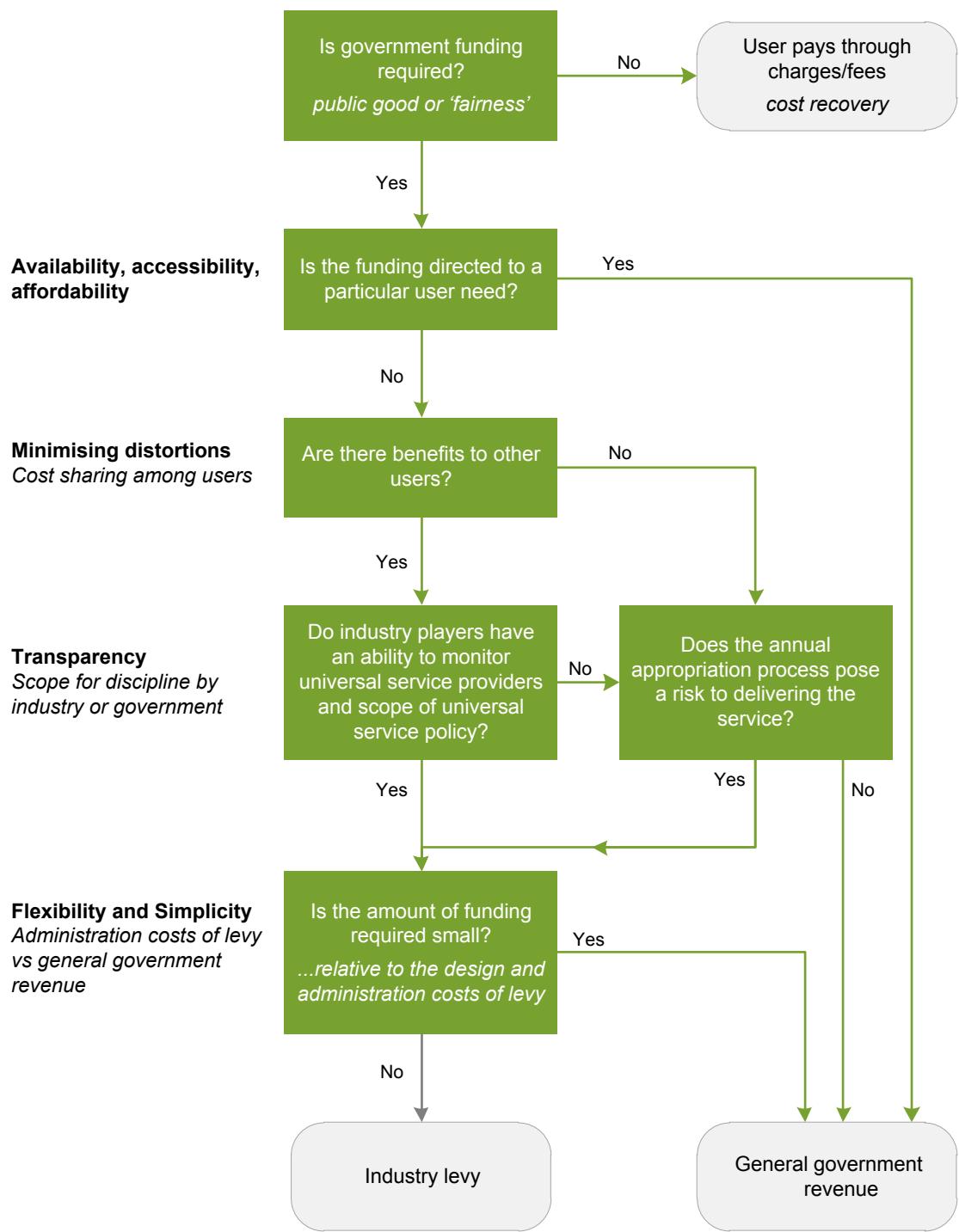
All funding models for universal service policies impose some level of distortion — that is, they can alter investment and/or consumption behaviour and prevent resources from being put to their most valued use. For telecommunications, the main concern with funding models is their effect on incentives to:

- cost-pad or gold-plate the services — where the funding model does not impose discipline on the provider to be cost-effective
- distort the use of the telecommunications services by consumers — if they face a price that is higher or lower than it would have been in the absence of the funding arrangements.

Cost-sharing with taxpayers versus users

Distortions at the industry level are the main risks that must be managed in designing an industry levy. However, placing increasing pressure on funding through general government revenue can also create broader adverse impacts on efficiency (box 8.4). Given this, funding through general government revenue is only justified when the overall costs of an industry levy are greater than those associated with raising revenue. These costs include any adverse efficiency impacts and the costs of administering the levy.

Figure 8.1 A framework for selecting funding options



Box 8.4 The efficiency of general taxation

Most taxes result in some loss of economic efficiency. For example, a tax may reduce incentives for people to work or invest or induce them to alter their consumption patterns. This leads to losses in consumer welfare, which can be expressed relative to the amount of revenue raised. An efficient tax system involves taxes that result in relatively low losses in consumer welfare per dollar of revenue raised (Henry et al. 2010).

General government revenue is largely sourced from direct taxes (taxes imposed on individuals rather than any particular transaction). Direct taxes are typically raised from a broad base. But challenges are emerging for the direct tax base due to demographic changes. A projected increase in the population and the higher proportion of older Australians bring rising costs of new economic and social infrastructure, health and aged care (PC 2013a).

The proportion of Australians in work or looking for work is projected to decline by the middle of this century, increasing Australia's age-dependency ratio (the ratio of those who do not pay income tax to those who do). Australia's total dependency ratio increased from around 48 per cent in June 2006 to around 52 per cent a decade later (ABS 2017). Similarly, while the Australian population grew by almost 18 per cent in the decade since June 2005, the number of people with taxable income increased by only around two per cent to ten million in the same period (ABS 2017; ATO 2017). These pressures exacerbate the loss of economic efficiency associated with income (and other) taxes. The higher the tax rate, and the narrower the tax base, the greater the reduction in economic efficiency.

Increasing pressure on the direct tax base is likely to result in higher income tax rates (Henry et al. 2010; PC 2013a). This can distort people's choices between work and leisure, a distortion that is not necessarily insignificant (Abelson 2012; Robson 2004; Triest 1990).

A number of studies estimated the efficiency costs (or 'marginal excess burden') of general taxation in both Australia and overseas (Cao et al. 2015; KPMG 2010; Murphy 2016; SCNPMGTE 1994; Triest 1990). These estimates typically showed that the marginal excess burden associated with raising tax ranges from a minimum of 10 cents to well in excess of \$1.00 for each additional dollar of revenue raised through a variety of taxes.

Focusing on income tax, in its 2011 disability services inquiry the Commission estimated that, for an extra dollar of income tax revenue in Australia, 24 cents is lost through inefficiency (PC 2011). The 2010 Henry Tax Review had a similar estimate (KPMG 2010). Internationally, raising an extra dollar in OECD countries has been estimated to cost the wider economy between \$1.20 and \$1.30 (Robson 2004). Estimates of the efficiency costs of income tax in the United States included estimates of 40 per cent and as high as 78 per cent (Feldstein 1999; Vedder and Gallaway 1999). At the lower end of the spectrum, a study of New Zealand taxes found that the marginal excess burden of labour taxes in the early 1990s increased from 5 cents to 18 cents per additional dollar of revenue raised (Diewert and Lawrence 1994).

Some participants — particularly carriers that contribute to the current telecommunications industry levy (TIL) — said that universal service programs should be funded from general government revenue. They contended that 'public good' investments are best funded through a broad-based taxation arrangement (box 8.5). However, from one perspective, a broad-based industry levy could share the cost of meeting the universal service arrangement across more people than funding through general taxation. Australia's 'telecommunications consumer tax' base is potentially broader than the Australian

Government's income tax base as there are now more mobile voice services than people in Australia, while demand for data over fixed broadband services also continues to increase (chapter 2).¹⁰⁵

Some participants also supported an industry levy, but had differing views on how this levy should be collected (box 8.5).

These comments point to the complexity of the issues, and suggest that a one-size-fits-all approach to funding universal service arrangements may not be the best approach. This is particularly the case given that the overarching policy objective of universal service provision can be divided into different elements addressing availability, accessibility and affordability (chapter 5). What is clear is that funding arrangements should be designed to minimise distortions (for consumers and providers of the services) and impose the lowest possible administrative costs.

Industry levies can affect consumer behaviour

The incidence of any industry levy in the telecommunications sector can be expected to be (at least partially) passed on to the broader telecommunications consumer base through higher prices. How much of the levy service providers absorb through lower profits or pass on to consumers (or suppliers) depends mainly on market conditions.¹⁰⁶

The evidence suggests that consumers may not be particularly sensitive to changes in the price of telecommunications services, at least for basic access to these services (box 8.6). However, although price changes might not affect a person's decision to purchase access to telecommunications services, both price and income changes tend to affect the volume of telecommunications services people consume. A small change in price can be expected to have a less distortionary effect than a large one, so on this basis a wide base for the levy (levied across more consumers and across more related services) is preferred to a narrow base.

105 The telecommunications consumer tax base is not as broad as the consumer tax base for all goods and services.

106 The incidence of a levy can be passed on to suppliers where there is a single (or dominant) buyer with 'monopsony power'.

Box 8.5 Participants' views on who should fund universal services

Some favoured Australian Government funding

Optus (sub. 4):

Optus' preferred option would have [NBN Co Limited (nbn)] continue to cross subsidise the provision of services to net-cost areas through its uniform access prices. There would be no need for a separate [TUSO] funding arrangement. (p. 44)

Telstra (sub. 30):

When it comes to the imposition of taxes or levies to support government policies, the least distortionary and hence most efficient approach is to recover from as broad a base as possible. For that reason we recommend that the [TUSO] move to a fully funded obligation on the budget rather than a tax on telecommunication carriers and end-users. This would remove distortions and reduce administration costs for government and the telecommunications industry. (p. 5)

TPG Telecom (sub. 38):

If the [TUSO] is scaled back as suggested, it is likely that the cost of [the TUSO] will correspondingly reduce, perhaps to such an extent that ascertaining a funding arrangement is not required. For example, the [National Relay Service] should be funded from general government revenues. (p. 3)

Vodafone (sub. 46):

Since the scope of the services requiring subsidies necessarily reduces over time as [nbn] delivers universal access, it is entirely possible that the residual universal service funding can be covered by the [Government's] \$100m contribution and no industry levy is required. (p. 29)

Others favoured an industry levy

OptiComm (sub. 13):

The existing [TUSO] funding is well established and has worked reasonably well. We consider that it should remain in place. With regards to the industry contribution, it should apply as broadly as possible across the industry and include all carriers and carriage service providers with revenues above a set minimum annual threshold of recurring revenue of telecommunications business, which we believe should [remain] at \$25 million per year. (p. 5)

Department of Communications and the Arts (DoCA) (sub. 58):

Any impact on consumers in terms of higher costs for the delivery of telecommunications services should be transparent in the design of the funding model. ... Given wider Commonwealth Budget pressures we do not consider that increased Budget funding of any new universal service obligation is a viable option. (p. 5)

RDA Northern Territory (sub. DR115):

In terms of the funding mechanism we strongly disagree with the Commission's view that a new universal services policy/program(s) be funded from general revenue. ... This misses the fundamental point about a TUSO; that is, that it provides certainty for consumers regardless of their geography or other circumstances. ... Simply funding from general revenue would leave universal service program(s) vulnerable to budget cuts and real risk the program(s) would be cut altogether. (pp. 13–14)

Aldridge (trans., 14 February 2017):

I think there is great risk to regional consumers of having a politically driven or a budget driven investment by governments in relation to dealing with market failure of telecommunication networks ... Budget funding probably presents greater capacity, but I think it also presents greater risks. (p. 49)

Box 8.6 Who ultimately pays for the levy?

Passing on the levy incidence — consumer responsiveness to price

The proportion of the levy that is passed on to consumers depends on **price elasticities** — the responsiveness of consumers to a change in price (price elasticity of demand) and providers to a change in price in terms of selling the service (price elasticity of supply); and, ultimately, how these interact. If demand for the service is ‘perfectly price-inelastic’ (does not respond to a price change), then the levy would be entirely passed through to consumers. On the other hand, if demand is ‘perfectly price-elastic’, none of the levy would be passed through to consumers.

Consumer demand for *basic* access to telecommunications services appears to be relatively insensitive to changes in price (demand inelastic) (Abelson 2012; OECD 2003; Vertigan Panel 2014). A 2003 New Zealand review of literature on demand elasticities found that demand for basic telecommunications access was relatively inelastic (Vodafone New Zealand 2003). Similarly, a 1998 study found that demand price-elasticity for basic access to telecommunications services in the United States was extremely low (Hausman 1998).

Determining the levy base — substitutability

Whether a service is a substitute or complement depends on its **cross-price elasticity** — the extent to which a price change in one service affects the demand for another service. If services are highly substitutable, customers can trade off one service for another. Alternatively, if services are complementary, then an increase in price will reduce demand for both services. It becomes more important to ensure a levy is broad-based in a competitive sector with substitutable products.

For voice services, mobile and fixed technologies are close substitutes.

- Evidence from the European Union found that fixed-to-mobile substitution is significant (Barth and Heimeshoff 2014a, 2014b; Grzybowski 2014; Vertigan Panel 2014).
- In Australia, the proportion of mobile-only users for voice continues to increase over time, growing by 7.6 per cent over 2015-16 alone (ACMA 2016d).

For broadband services, mobile and fixed technologies, while complementary, are becoming increasingly substitutable.

- With increasing speeds and capacities of mobile networks, fixed and mobile broadband technologies continue to converge (chapter 2).
- European studies considering fixed and mobile technologies found that the two are substitutable to varying degrees across different jurisdictions, with increasing substitutability on average (Cardona et al. 2009; Grzybowski 2014; Grzybowski and Verboven 2016; Srinuan, Srinuan and Bohlin 2012).
- Higher prices on fixed networks increase substitution to mobile networks. The Vertigan Panel (2014) described the demand for high-speed broadband services, especially top speed tiers, as relatively sensitive to changes in both price and income.

The extent of complementarity appears to depend on income and product offerings.

- Some European studies found that incumbents in fixed markets are able to leverage their position into mobile markets, increasing product complementarity in certain jurisdictions (Grzybowski and Verboven 2016).
- In Australia, while mobiles are generally preferred for voice and accessing internet, fixed broadband is preferred when downloading bandwidth-intensive content given current prices and data allowances (ACCC 2016, 2017).

A levy should also be broad-based in a competitive sector with substitutable products. As technologies in the telecommunications market converge and new alternatives continue to emerge, consumers will be able to increasingly substitute technologies. A narrow-based levy (such as one imposed mainly on premium services) risks affecting overall market competitiveness (Laffont and Tirole 2001). By disproportionately affecting prices, a narrow-based levy could discourage providers from further investing in or entering the segments of the market where the levy applies. For example, higher prices for fixed-line broadband services may encourage people to opt for wireless, possibly undercutting the return on the original investment in broadband infrastructure.

Providers can charge different prices to minimise consumer distortion

Based on market conditions, providers could charge different prices to minimise the distortionary effects of a levy (“price discriminate”). One option is through a ‘two-part tariff’, where providers charge different prices for access and ongoing use of telecommunications services. Traditionally, access charges are fixed while use charges vary by volume. So, given the relatively high willingness to pay for access, passing on the levy through an access fee is unlikely to change most people’s decisions to access telecommunications services (provided that the price increase is not prohibitive).

Alternatively, higher prices could be charged on premium services if consumers who generally use more data and premium broadband services are less price sensitive. Either approach could go some way towards reducing distortions in consumption decisions (Abelson 2012; Bellinger 2015; Laffont and Tirole 2001).

Where industry levies are used to fund the delivery of a universal service policy objective it is usually left to providers to determine how they want to pass on the cost to their customers, as happens now with the TIL (chapter 3). While the government could potentially regulate to restrict behaviour in this regard, service providers are in the best position to set prices and decide on infrastructure investments in a competitive environment, based on their expected demand and costs.

On balance, a broad-based industry levy could potentially be less distortionary for each dollar raised given its broader base and the ability for telecommunications service providers to set prices that capture both willingness and ability to pay. Industry levies are also favoured internationally for funding universal service programs that largely target telecommunications availability (appendix C).

However, the narrow scope of the Commission’s proposals to target availability gaps is likely to impose minimal distortions whether funded through an industry levy or general government revenue.

As such, administrative costs (including those incurred in designing a broad-based levy) are likely to make up a larger share of the costs of providing universal services. There is therefore a commensurately greater need to minimise these costs.

Scope for transparency and discipline from government versus industry

Transparency about the cost of meeting a universal service policy can impose a discipline on government and providers, regardless of the funding approach adopted.

The annual budget process provides the opportunity for regular scrutiny of funding — whether it is within the current funding envelope or through raising taxes (Chan et al. 2009; Henry et al. 2010; PC 2013b). This process allows the public to access information on changes in funding of universal service policies and to compare this against other budget priorities (such as funding healthcare). The transparency that comes from the contest in the annual budget process can impose a discipline on government spending, which is sharpened when there are limited fiscal resources. However, it is not enough to rely on fiscal pressures alone to drive efficiencies. Moreover, given the large number of programs funded by government, the funding of universal services is unlikely to come under close scrutiny and may also be sensitive to political influences (Mueller 2003).

Funding universal telecommunications services through general government revenue means that government and, ultimately, taxpayers bears the entire cost of service provision, with the universal service provider less likely to be scrutinised by industry. This also increases the risks that arise from the telecommunications sector knowing more about the cost to deliver the service than government (information asymmetry).

In contrast, an industry levy is likely to be closely scrutinised by the industry that pays for it. This is particularly the case where providers in the industry must bear at least some of the levy incidence. Competing providers in the telecommunications market can, to some extent, hold the universal service provider to account for levy costs. This discipline does not replace a robust costing process and contractual arrangements, but it adds an additional layer of scrutiny.

However, industry levies can be susceptible to political pressure too. Different groups of stakeholders could seek to increase the effective cross-subsidisation of their services if governments view this as a costless exercise — that is, the funding has no direct cost to the government budget. Ensuring consumers understand how an industry levy affects prices is an important means of providing countervailing pressure.¹⁰⁷

¹⁰⁷ Transparency can also be improved by publishing the cause of price changes in consumer invoices. However, submissions to the BCR's NBN non-commercial services levy report argued that this would be of little benefit to consumers, instead confusing them and increasing administrative burden in order to explain possibly only a small increase in prices (BCR 2016a).

Flexibility and simplicity

Funding models need to be low-cost to administer and adapt to future changes

Funding from general government revenue is inherently low-cost to administer as it is achieved through a budget allocation. It generally does not impose significant compliance and administration costs, although the size of these costs is not well known.¹⁰⁸ An industry levy faces collection costs, which vary with the design of the levy. For example, as providers are obliged to report the information required to calculate their share of the levy, their compliance costs increase, as do regulators' costs of ensuring this information is accurate.

Funding from general government revenue can also offer flexibility in the amount and length of time a program is funded. The existing architecture for collecting income tax allows funds to be deployed and withdrawn relatively quickly. However, fiscal and political dynamics can undermine the certainty of general government revenue as a source of ongoing funding, as a program could be replaced by other budgetary priorities.

A levy can give more certainty about the availability of funding for universal service objectives over time. Industry's scrutiny can also curb incentives government might have to maintain the levy even once the need for funding has weakened. But a levy needs to be sufficiently flexible to adapt to changing circumstances — for example if the costs of providing the service change or the need for a service is relieved by market developments. As a basic principle, governments should not continue to collect a levy if they are no longer facing a cost of providing a service. Nor should they be able to require industry to substantially raise the levy if they decide to expand the services provided under a universal service arrangement without substantial consultation and agreement.

Simple levy design matters for efficiency

Two important factors in designing an industry levy are the:

- base to which it applies
- point in the value chain at which it applies.

Choosing the base for the levy

A levy base should ideally capture all those who benefit from the services that it funds. Where these beneficiaries are difficult to identify or by definition are not required to pay, as broad a base of potential beneficiaries as possible should be captured.

¹⁰⁸ Compliance costs cover a range of both monetary and non-monetary costs that taxpayers incur in order to fulfil and adjust to their tax obligations. Administration costs cover the costs of implementing tax policy and revenue collection.

To further minimise distortions, the base should also include all providers in the levy that supply services that are close substitutes, particularly where there is evidence of convergence in telecommunications services. In circumstances where services converge, a narrow-based levy risks granting a competitive advantage to one sector over another and distorting the market. Consumers in the paying sector (who ultimately bear at least some of these levy costs through higher prices) would tend to adjust their demand for services and buy substitute services that do not attract the levy.

However, as the telecommunications sector continues to rapidly evolve, there are new challenges in defining a broad levy base and maintaining its stability.

The broader the base, the higher the costs of administering and enforcing the levy. For example, telecommunications network operators and other participants frequently raised that Over-the-Top (OTT) providers are not subject to the same regulatory, taxation and levy regimes as traditional network operators (Telstra, sub. 30; Vocus, sub. 33; nbn, sub. 47; de Ridder, sub. 56), but it is not clear whether OTT providers substitute or complement broadband service providers. On the one hand, they deliver some similar services (such as voice), but on the other hand, they can also increase the demand for some services (such as data) delivered by existing providers.

Developing equivalent regulation for OTT providers, let alone including them in an industry levy base, also presents practical challenges. OTT providers also tend to have different, often global, business models compared with traditional telecommunications services (Godlovitch et al. 2015).

This can compound the practical challenges of feasibly extending existing licensing regimes to these new entrants, without being too administratively demanding or creating accidental loopholes to bypass the regime.

There is also a risk that extending existing regulatory arrangements to OTT providers may discourage efficiency among incumbent (as well as new) market players. While these new services can disrupt the market, they can also benefit consumers and apply competitive pressure on existing market players. Rather than extending existing regulations, governments should use such disruption as an opportunity to reassess risk and adjust regulation accordingly (PC 2016b). Simply extending regulation without an assessment of its consequences and differences in risk between traditional and new business models could quash innovative new approaches, reducing choice and resulting in consumers paying higher prices than they otherwise would (PC 2016b).

Choosing the value base: wholesale or retail?

Determining where to apply the levy in order to minimise distortions to investment or incentives for minimising costs raises a number of complex issues.

A levy can be applied at the infrastructure or retail level. However, it should be on one or the other as having both wholesalers and retail service providers pay the levy could risk taxing some ‘factors of production’ twice (SCNPMGTE 1994; nbn, sub. 47).

Similarly, passing a levy through different levels in the value chain risks increasing mark-ups at each level and imposing significant inefficiencies — a risk where providers have significant market power (‘double marginalisation’) (Landsburg 1998; nbn, sub. 47). As a result, the market could see some providers vertically integrate to avoid paying higher levies.

In principle, a levy could apply to where the service gap is — a levy at the wholesale level where there is an infrastructure gap, or a levy at the retail level where there is a retail service gap. However:

- while applying the levy at the wholesale/infrastructure level means that all retail service providers would be captured in the pass-through, a decision about how to allocate the cost of the levy to the wholesaler would still be required. A wholesaler that holds a significant market share can compound the issue of double marginalisation¹⁰⁹
- applying the levy at the retail level could avoid the issue of double marginalisation, particularly where the retail sector is competitive. But where the availability gap is at the wholesale level, a levy at the retail level could distort infrastructure use through an altered price signal.

Choosing the value base: a fixed fee, or a share of revenue or profit

A further consideration for the design of a levy is whether it should be issued as a fixed fee for services in operation, or as a share of each provider’s revenues or profits.

A fixed fee can be based on the number of services in operation — a possible measure of market share. While a fixed fee can be simple to administer for the regulator, it is regressive as it charges the same fee regardless of the level of revenue of the provider, so smaller providers pay a higher share of their revenue as a levy. Moreover, it can penalise more efficient providers charging lower prices. These providers would bear a disproportionately higher burden of the levy than those charging higher prices for the same level of output.

Some participants suggested that industry levies be issued on profits, stating it is fair and avoids double-taxing ‘factors of production’ (TPG Telecom, sub. 38; Vodafone, sub. 46, DR150; nbn, sub. 47). However, profits can be a poor measure of market share — providers in a competitive market with some profits may be efficient and not necessarily the largest market players. As a result, levies based on profit can penalise more efficient

¹⁰⁹ This could be less of an issue where a wholesaler is subject to price regulation.

providers.¹¹⁰ Moreover, ‘creative accounting’ can allow the level of profits to be manipulated to reduce the final levy amount paid.

Deductions from revenue to provide an ‘eligible revenue’ measure may go some way to excluding factors of production from being levied, particularly if the levy is applied at the retail level. For example, where a levy is applied to revenue at the retail level, the provider would be paying a levy on revenue received to also cover their infrastructure costs.

The current TIL is applied on a definition of eligible revenue, which includes some deductions for infrastructure and customer equipment revenue. Robust reporting requirements can ensure that industry provides accurate information on revenue, but this can increase enforcement costs.

Setting minimum eligibility thresholds to qualify for levy payments can reduce the administrative burden of compliance and collection on smaller carriers. The current TIL only applies to ‘participating persons’ with eligible revenue greater than \$25 million (chapter 3). The threshold was first implemented for the 2010-11 eligible revenue assessment, after being announced in 2009 as a red tape reduction measure. At that time, it was assessed that telecommunications providers that fell below the threshold accounted for less than 1 per cent of total eligible revenue in the industry (ACMA, pers. comm., 2 November 2016).

The gains in administrative efficiency from such thresholds need to be balanced against the costs of forgoing revenue and the need to ensure the market remains competitively neutral. When these thresholds interact with eligible revenue definitions, providers can inadvertently be exempted from paying the levy. For example, a number of fixed-line broadband operators currently do not contribute to the TIL. The wholesale nature of the broadband services allows these operators to deduct a significant proportion of their revenues as infrastructure costs, with the downstream retail service provider’s revenue (with these wholesale costs captured) instead accounted for as part of the eligible revenue base (ACMA, pers. comm., 2 November 2016).

It is not always clear whether such complexities in definitions support or undermine how competitively neutral a market is or inhibit providers’ incentives to grow. This again emphasises the need to revisit definitions and thresholds on a regular basis, which in turn increases complexity and enforcement costs.

Even where the architecture for administering an industry levy exists and some costs have already been incurred, there is no guarantee that the levy design is efficient. A new levy could take advantage of existing arrangements but may still need to be altered. Furthermore, if a new levy is introduced it is important to consider how it interacts with

¹¹⁰ In a perfectly competitive market, economic theory posits that there will be zero economic profit. However, competitive markets are seldom perfectly competitive, with a swing in the balance of market power and profits across firms. In a non-competitive market, however, profits represent economic rents as a result of excessive market power, which are a sign of inefficiency, and which economic theory accordingly suggests should be taxed.

existing levies. The subsequent distortions and complexities these impose would need careful consideration.

On the whole, a continuously evolving telecommunications industry is likely to exacerbate the design challenges discussed and, in turn, the costs of administering the levy. Getting the design right is not easy, and getting it wrong can risk both higher market distortions and a weakened discipline on service providers.

Funding consumer subsidies

The Australian Government's existing income support system, funded through general government revenue, provides the administrative simplicity, flexibility and transparency required for funding subsidies targeted at eligible users, while minimising distortions.

Where specific measures aim to address accessibility and affordability, the same targeted eligibility criteria and/or means-testing mechanisms as the broader income support system can be used, an authority which telecommunications providers have neither the mandate nor information to exercise (PC 2011, 2013b). By means-testing consumer subsidies and aligning them with existing income support payments, the Government can monitor changes in effective marginal tax rates and people's choices between work and leisure. Despite the political difficulties, the existing income support system also provides scope to withdraw subsidies (or erode their value) as choice in the market grows and telecommunications services continue to become more and more affordable (chapters 2 and 6).

Industry levies are better suited for funding specific industry activities to address market failures or missing markets that result in availability gaps, which can potentially benefit all users. Funding direct income transfers through an industry levy, on the other hand, would potentially distort price signals and may not achieve affordability.

8.4 Putting funding options into context

The funding approaches considered in this chapter have trade-offs in terms of efficiency, transparency, flexibility and simplicity. But this does not mean these approaches are mutually exclusive.

Programs that target universal service objectives are currently funded through both general government revenue and industry levies. For example, the Australian Government funds the Telephone Allowance from general government revenue, while the TUSO is substantively funded through an industry levy.

Different funding models are likely to be better suited to different types of programs given their relative strengths. A mixed approach to funding could be optimal when considering the nature of the program objectives — consumer-based programs to address affordability

and accessibility and provider-based programs to address availability (and some aspects of accessibility) — and its overall size and variability within the broader context of the dynamics of the telecommunications sector.

There are arguments in favour of providing funding to address gaps in universal service provision from a levy. A telecommunications levy can have a broad base of consumers that can minimise distortions. As long as consumers are not too price-sensitive, such levies could arguably impose fewer distortions than general government revenue. Industry levies can also provide incentives for providers to monitor costs, which can further improve cost-effectiveness. But industry levies can be difficult to design well and costly to administer in a sector like telecommunications where the players (and hence the levy base) are constantly changing.

On the other hand, funding through general government revenue is likely to provide the necessary flexibility and administrative simplicity for policies to respond to possibly diverse and evolving expectations of universal service. Moreover, applied to programs that have a re-distributional objective (such as affordability measures), funding from general government revenue means that the same targeted eligibility criteria used for many other distributional policies can be applied to telecommunications.

Funding targeted programs

The narrow scope of the Commission's proposed universal service policies means that distortions are likely to be modest irrespective of the funding model adopted. This takes the assessment of the relative merits of the two funding approaches largely to issues of administrative cost and design challenges, tipping the balance in favour of funding through general government revenue.

The fiscal and political risk associated with budget-funded measures, as well as the risks of cost-padding and gold-plating, could be managed through competitive tendering and an independent and transparent costing process with regular review. Placing providers under competitive pressure and scrutiny is critical to improving efficiency in service delivery.

The scope to test the market to provide these targeted programs and their relatively small expected cost imply that the current TIL should ultimately be removed, with the remaining 'public interest' programs such as the National Relay Service and the Emergency Call Service to also be funded solely through general government revenue.

FINDING 8.2

Small programs to meet telecommunications universal service objectives do not justify incurring the administrative costs and design challenges inherent to a broad-based industry levy. Funding these programs through general government revenue is likely to be simpler and less costly to administer.

RECOMMENDATION 8.2

The Australian Government should fund targeted measures to meet telecommunications universal service objectives principally through general government revenue rather than an industry levy. This would imply the ultimate removal of the Telecommunications Industry Levy.

Funding consequential impacts of the proposed reforms

For reasons outlined in chapter 6, the Commission considers that any cost implications of reforms to universal service policy for nbn are likely to be contained. To the extent that nbn can substantiate major cost implications to them as a result of the reforms recommended in this inquiry, these should be accurately and transparently validated by independent authorities. This will be critical in ensuring efficient funding levels for nbn while it delivers on its stated objectives. Such an assessment should distinguish cost increases of the proposed reforms from other costs incurred through broader market dynamics (such as those associated with changes in consumer preferences and evolving technology choice, and with longer-term population movements). The assessment should also separate these proposed reform costs from the possibility that nbn may have underestimated the take-up of its fixed wireless and satellite services.¹¹¹

RECOMMENDATION 8.3

The Australian Government should seek information from NBN Co Limited (nbn) on the potential incremental costs to nbn of the proposed reforms to telecommunications universal service policy. This should occur after *baseline* standards have been specified (recommendations 5.1 and 5.2) and nbn's role in providing *baseline* services is clearly defined (recommendation 7.1).

This information should be independently and transparently validated and exclude factors that nbn would be required to consider as part of its normal business operations.

The funding of nbn's non-commercial services should, moreover, not be considered independently of universal service policy reforms. In this context, the Commission has faced a unique challenge in responding to announced proposed government policy on nbn

¹¹¹ To make an informed assessment, there is scope for the Australian Government to gather such information from nbn under various legislative and regulatory frameworks. These include ACCC and ACMA general powers for information-gathering and record-keeping rules, discussed in chapter 9. nbn, as a wholly-owned Government corporation, is also subject to more specific transparency requirements under both the *Public Governance, Performance and Accountability Act 2013* (Cth) and the Commonwealth Government Business Enterprise Governance and Oversight Guidelines August 2015. There are also provisions in the *National Broadband Network Companies Act 2011* (Cth) for nbn to provide information on its operations where the Government owns only some shares in the company.

funding of non-commercial services — the Telecommunications (Regional Broadband Scheme) Charge Bill 2017 (box 8.7) — before the conclusion of this inquiry.

Broader NBN funding issues

Assessing broader NBN funding arrangements is largely beyond the scope of this inquiry. However, to the extent that reforms to universal service policy could affect these funding arrangements, these should be more closely considered. Any cost implications to nbn as a result of changes to universal service policy could affect the size of the net losses in non-commercial service areas (chapter 6). And if these costs are significant, the Commission considers that the Government would need to review these funding arrangements from an efficiency and sustainability perspective.

The Government has proposed that the Regional Broadband Scheme (at least initially) include only a narrow levy base — it will apply only to ‘superfast’ fixed-line services in operation, not measures of revenue or profit (box 8.7). Both the BCR and the ACCC have argued for a narrow levy base as they considered that it would maintain incentives for nbn to contain costs and improves productive and dynamic efficiency (BCR 2016a; DoCA 2016c).

However, the Commission considers that, in line with the principles-based approach to funding outlined in this chapter, the choice of funding model should prioritise minimising distortions in the telecommunications market and be flexible, simple and transparent. In this context, alternative funding arrangements — such as through general government revenue and/or a broad-based industry levy — should be looked at more closely before implementing a long-term narrow-based funding model in a dynamic industry. The implications of any financial assistance from long-term funding arrangements should also be considered by nbn and the Government in the context of meeting nbn’s Competitive Neutrality obligations (AGCNCO 2011).

Funding through general government revenue

The relative merits of using general government revenue to fund any material additional costs to NBN non-commercial services as a result of universal service policy reforms should be assessed, including in the context of other levies such as the TIL. This should include detailed assessment of the possible impacts relative to industry levies, as well as the cost burden on taxpayers. Government funding could be provided in different ways, including through: direct funding to nbn through general government revenue; debt or asset write-offs; or government accepting a lower rate of return for nbn services.

The Vertigan Panel considered that consolidated revenue was ‘by far the best option for funding any ongoing subsidy’ (2014, p. 21). However, DoCA did not consider this a viable option for universal services given wider Commonwealth Budget pressures (DoCA, sub. 58). The Government did not ask the BCR to consider general government revenue

funding as part of its assessment of funding options for NBN non-commercial services (BCR 2016a) while DoCA's Regulation Impact Statement only briefly considered this option (DoCA 2016c). Its assessment found that both direct government funding and the proposed narrow-based levy of the Regional Broadband Scheme would likely have an equivalent impact in meeting funding objectives but noted that 'the precise difference in net benefits of these options is not able to be measured' (DoCA 2016c, p. 23).

The Commission also notes that if NBN services were funded only by the Government, nbn's cost discipline and product offerings in non-commercial areas would need to instead rely on market drivers and policy and regulatory intervention. This includes relying on rigorous costing processes. In the absence of infrastructure-level competition in these non-commercial areas to drive efficiencies, it places greater pressure on getting these settings right.

Funding through a broad-based industry levy

To the extent that nbn costs may increase as a result of universal service policy reforms, broadening the proposed levy base and applying it to eligible revenue deserves further consideration.

A broad levy base can compel more scrutiny to the costing process — as is illustrated by the attention that the broader industry pays to the TUSO through TIL funding. It would also allow the Government further scope to recover nbn's non-commercial losses more quickly, should it wish to.

A broadened industry levy base could include the wholesale mobile market (as well as the growing fixed wireless market) as fixed and mobile services are becoming increasingly substitutable (box 8.6, chapters 2 and 6, appendix B). While the degree of substitutability varies depending on price and product offerings, there is a risk that a fixed-line only charge will lead to market exit or entrench barriers to entry in this segment. Participants pointed to the risks of distortions in the broadband market and the competitive advantage granted to the mobile and fixed wireless markets as a result of being exempted from the levy base (Coutts, trans., 8 February 2017, p. 35; Laffont and Tirole 2001; OptiComm, sub. 13). This contradicts the 'competition ready' outcomes the Government is currently seeking through proposed changes to the *Telecommunications Act 1997* (Cth) and *Competition and Consumer Act 2010* (Cth), and may ultimately not be in consumers' long-term interests.

To the extent that mobile, fixed-line and fixed wireless broadband may not be perfect substitutes, there may be scope to have a levy designed to account for varying degrees of substitutability to manage distortions in the market. However, this would need to be considered against any increase in the complexity of the levy design.

Box 8.7 The Regional Broadband Scheme

In December 2016, the Australian Government released draft legislation to establish the Regional Broadband Scheme — a proposed levy to apply to eligible fixed-line ‘superfast’ broadband networks to fund non-commercial aspects of NBN networks (fixed wireless and satellite services). The levy forms part of a broader telecommunications reform package that the Government has intended to implement from 1 July 2017.

The proposed scheme is largely based on a review undertaken by the Bureau of Communications Research (the BCR) within DoCA. The BCR was asked by Government to consider options for industry to fund NBN non-commercial services. The BCR delivered its final report to Government in March 2016.

The BCR report was itself part of the Government’s response to the Vertigan Panel’s recommendation that any cross-subsidies of NBN non-commercial services be made efficient and transparent.

The BCR estimated funding amounts for the levy based on projected costs and revenues for a 30-year period to 2040. This time period was used to align with the Special Access Undertaking and smoothing losses. Estimates were based on information in nbn’s corporate plan to 2018 and nbn’s financial estimates to 2022, where available.

Applying an avoidable cost framework, the BCR modelled non-commercial services using a discounted cash flow approach. It estimated the net present value loss as approximately \$9.8 billion, representing a per-month subsidy of approximately \$110 for each satellite premises activated and \$105 for each fixed wireless premises activated in 2015 real terms.

The BCR recommended an ‘NBN equivalent’ funding arrangement where only operators of high-speed fixed-line broadband access would pay the levy. It recommended the levy be applied to the number of these fixed-line services in operation within the NBN fixed-line footprint. The BCR calculated that each high-speed fixed-line service would contribute around \$6.80 per month in 2015 real terms, around 17 per cent of nbn’s fixed-line wholesale average revenue per user.

The total annual contribution across industry is expected to increase as the rollout of the NBN and other fixed-line networks progresses. nbn is expected to continue to make the largest contribution (96 per cent once it reaches its steady state) to fund fixed wireless and satellite losses.

The BCR also explored a broader industry funding approach aligned to the existing Telecommunications Industry Levy for comparison. Under a broader industry funding base, the BCR estimated nbn would fund 13 per cent of losses by 2022, largely because mobile operators are included in the funding base.

For transparency and review, the BCR recommended:

- publishing the process for determining the overall NBN non-commercial service loss and contribution per service in operation
- that nbn should account for cash outflows and inflows relating to the NBN non-commercial services funding arrangement as part of its accounting separation requirements
- that funding requirements should be recalculated every five years, as part of ongoing regulatory review points.

Sources: BCR (2016a); DoCA (2016b); and Vertigan Panel (2014).

Regulation across mobile, fixed wireless and fixed-line broadband markets would need to be consistent and coherent as changes to the levy base are considered. The structural differences between the mobile, fixed wireless and fixed-line broadband markets are reflected in current regulatory settings. As a result of nbn's Special Access Undertaking and the Local Bitstream Access Services and Superfast Broadband Access Service declarations, price controls apply to the fixed-line broadband sector, but not to the mobile or fixed wireless sectors. This may allow mobile and fixed wireless network operators greater scope to pass through the levy incidence to their end consumers in the near term. However, price regulation in the fixed-line broadband market is necessary to manage nbn's scope to recover more than the cost of the levy by virtue of its market dominance. With adjustments to any industry levy base, commensurate regulatory adjustments would need to be considered to ensure the regulatory settings across market segments are competitively neutral. As discussed earlier, applying a levy at the wholesale level means that all retail service providers are captured in the pass-through, but a network or infrastructure operator (a wholesaler) that holds a significant market share can compound the issue of double marginalisation. This risk can be managed where a network or infrastructure operator is subject to robust competition (as in the mobile sector) or price regulation (as in the fixed-line superfast broadband sector). To this end, the interactions between broader regulatory settings and how an industry levy base is defined will need close scrutiny to ensure they do not unduly distort markets.

A levy based on services in operation, rather than eligible revenue, also risks distorting infrastructure competition given its regressive nature. Smaller superfast broadband wholesalers may end up having to commit a larger proportion of their revenues to the industry levy than larger industry players. An eligible revenue approach may instead simplify the process of extending the levy base across different market segments while avoiding the collection burden and potential distortions that come with a profits-based levy.

Regular review points are critical, but getting policy settings right from the outset is better

DoCA has proposed to undertake policy reviews for the Regional Broadband Scheme as needed, but not less than once every five years; while the ACCC intends to review the charge at least every five years (DoCA 2016c). The BCR has recommended that the Government revisit the issue of fixed-to-mobile substitution and other design issues at these policy review points (BCR 2016a). Should the Government decide to persist with industry levies, rather than general government revenue, then such reviews will be critical in ensuring that the levy continues to operate efficiently. It reduces the risk that the Government takes a 'set and forget' approach to what could become an easy way for the Government to move NBN costs off its ledgers, without regard to the distortions that a poorly designed levy could create.

That said, industry would derive greater certainty if the levy design issues are resolved *before* implementing the proposed Regional Broadband Scheme. This would not only ensure that any long-term industry funding arrangement is not unduly distortionary, but

also provide an opportunity to consider how any universal service policy reforms might affect NBN non-commercial service losses. This consideration would need to be balanced against the costs of delaying the levy, which DoCA argued would reduce the efficiency and equity of the funding arrangements (2016c). However, the risk of policy inertia is high once a policy is implemented, given a demonstrated preference among policymakers for default policy settings.

9 Transitional arrangements

Key points

- The Telstra USO Performance Agreement (TUSOP Agreement) locks the Australian Government and Telstra into long-term, inflexible and opaque arrangements for the provision of voice services under the telecommunications universal service obligation (TUSO) until 2032. The total cost of the Agreement is \$3 billion (in net present value terms over 20 years).
- While the Agreement has some scope for its contractual arrangements to be reviewed, the review provisions are restricted and mostly centre on the identification of cost-saving opportunities for Telstra (which can only be passed on to the Government under certain conditions). It is unlikely that the Commission's proposed reforms to universal service policy can be achieved within the scope of the current Agreement.
- To achieve the Commission's proposed reforms, the Government and Telstra should work outside the confines of the Agreement's narrow review provisions and renegotiate the scope, payment and duration of the modules of the TUSOP Agreement relating to the standard telephone service USO (module B) and the payphones USO (module C).
- The terms of any contract renegotiation are ultimately a matter for the Government and Telstra. While there will be costs to renegotiation (including a possible financial penalty to the Government), a sensible transition strategy should be carefully staged around timing, stakeholder engagement, legislative requirements and other key considerations.
- The case for immediately ending the payphones universal service obligation (USO) is strong. The Government and Telstra should immediately commence negotiations to terminate the payphones USO.
- In renegotiating provisions for the standard telephone service USO, an optimal transition strategy involves winding up the obligation once NBN infrastructure is fully rolled out (expected in 2020). Prior to this, the Government should lay the groundwork for reform by announcing its intentions, gathering information, and bedding down the wider framework of consumer safeguards policies.
- Renegotiation of the TUSOP Agreement should be informed by robust data on the cost and scope of TUSO services. These should be requested formally from Telstra using existing information-gathering mechanisms.
- The Commission's proposed reforms to universal service policy must also be supported by reforms to the broader telecommunications consumer protection policy and regulatory framework. These reforms should be undertaken from a whole-of-government perspective. To this end, the Government's foreshadowed review of telecommunications consumer safeguards should be expedited and expanded in scope, and should establish a clear regulatory framework for future universal service arrangements.

Recent years have seen dramatic changes in the use of technology and communications, influenced by technological advances, market developments and government policy (chapter 2). Consumer requirements for telecommunications universal service arrangements in Australia have shifted accordingly and just as rapidly. Against this rapidly evolving backdrop, it is unfortunate that the current universal service arrangements were locked into an inflexible 20-year contract (until 2032). As outlined in chapter 3, the Commission's assessment is that the telecommunications universal service obligation (TUSO) is ineffective and outdated. In the few years since the commencement of the Telstra USO Performance Agreement (TUSOP Agreement) in 2012, market conditions, technological developments and consumption patterns have moved in a direction that is vastly at odds with the assumptions underpinning these contractual arrangements.

Submissions to this inquiry and to past reviews (RTIRC 2015) have overwhelmingly acknowledged that these contractual arrangements are untenable in the long term, and should not remain in place until 2032 (chapter 3). The arrangements also lie in strong contrast to the market gaps (and particular user needs) identified in chapter 6, and the proposed new universal service objective and arrangements in chapters 5 and 7. In addition, the design of the current arrangement adversely affects the efficiency of the telecommunications sector more broadly (chapter 3).

This chapter examines key considerations for the Australian Government in planning a path from the current arrangements to a more effective, sustainable and appropriately-funded model for universal services. Section 9.1 examines the TUSOP Agreement and the capacity for transition within the parameters of that Agreement. Section 9.2 follows with a set of principles which should underpin the transition to a new arrangement. Sections 9.3 and 9.4, respectively, examine the timing of transition paths for the payphones universal service obligation (USO) (module C) and *standard telephone service* USO (module B) within the TUSOP Agreement, noting that these two obligations have unique considerations which affect the optimal timing and scale of transition. Section 9.5 outlines the two main streams of activity for the Government, which will inform future negotiations and provide a clear consumer safeguards framework to underpin future universal service policies. Section 9.6 closes with a proposed timeframe for transition activities, noting that prompt action will be needed to achieve a full transition to a new universal services framework in 2020.

9.1 The TUSOP Agreement

The TUSOP Agreement, negotiated between the Australian Government and Telstra in 2011 and which commenced in 2012, provides the basis upon which Telstra receives payment for performing its regulated obligation as Australia's TUSO provider. The Agreement is one of a series of separate, yet interrelated, agreements signed by the Government, Telstra and NBN Co Limited (nbn) to enable the construction and operation of National Broadband Network (NBN) infrastructure.

Under the Universal Service Regime set out in the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth) (the TCPSS Act), Telstra has a regulated obligation to ensure that *standard telephone services* and payphones are accessible to all people in Australia.

The TUSOP Agreement reflects this obligation, and specifies the terms under which Telstra would receive payment from the Government for fulfilling the TUSO until 2032,¹¹² being \$253 million and \$44 million per year — including the goods and services tax (GST) — for the supply of the *standard telephone service* and payphones USOs, respectively. Under the Agreement, Telstra is contracted to:

- fulfil the standard telephone service USO in accordance with the TCPSS Act — that is, to ensure that standard telephone services are reasonably accessible to all people in Australia on an equitable basis, wherever they reside or carry on business
- supply, install and maintain USO payphones in accordance with the TCPSS Act
- maintain ‘copper continuity’ in areas outside the NBN fixed-line footprint (known as the ‘copper continuity obligation’, or CCO).

The TUSOP Agreement, with its 20-year duration and limited scope for amendment (box 9.1) presents a significant hurdle to the Australian Government and policy makers in implementing a new framework for universal service arrangements. If the Agreement were to run its full course, with no reduction in payments, it would ultimately cost \$3 billion (in net present value terms over 20 years) for the delivery of the *standard telephone service* and payphones USOs over the duration of the Agreement. Telstra itself would be liable for a significant contribution towards the Telecommunications Industry Levy (TIL) under the terms of the Agreement; however, the subsidy that Telstra receives per universal service delivered is likely to increase as the demand for *standard telephone services* and payphones continues to decline (chapter 3).

Elements of the TUSOP Agreement are out of this inquiry’s scope

There are some elements of the TUSOP Agreement that are not discussed in this chapter. These include modules relating to the supply of the emergency call service and provisions relating to the migration of public interest services to NBN infrastructure. As with the TUSO, Telstra receives funding for these other services from the TIL — including up to \$22 million annually for the emergency call service (chapter 4).

The terms of reference for this inquiry do not cover the non-TUSO elements of the Agreement. Additionally, the review and cost-saving clauses in the TUSOP Agreement (discussed below) generally do not apply to non-TUSO modules of the Agreement, indicating a lesser degree of flexibility in those other arrangements generally. However, as

¹¹² As discussed in chapter 3, this payment is funded from a combination of general government revenue and the Telecommunications Industry Levy.

discussed in section 9.5, the Commission considers that the Government's foreshadowed review of telecommunications consumer safeguards should be expedited and widened in scope — and notes that these non-TUSO elements of the TUSOP Agreement could be captured within that exercise.

The TUSOP Agreement lacks critical flexibility

Analysis in chapters 3 to 5 suggests that the Government should move to new universal service arrangements once NBN infrastructure is fully deployed. To deliver these new arrangements, chapters 7 and 8 recommend approaches that are starkly different to those that underpin the current TUSOP Agreement.

Mechanisms for negotiating changes within the TUSOP Agreement are highly restricted (box 9.1). They provide for limited options for review and mostly centre on cost savings for Telstra.

For example, while there is a cost-saving proposal mechanism in **clause 6** of the Agreement, it states that Telstra would not retain any of the costs saved while its current levy contribution factor is more than 50 per cent.¹¹³ This suggests that, under current conditions, there is little incentive for Telstra to propose, or agree to, the implementation of cost-saving proposals under this mechanism. (However, any reduction in contract payment amounts would also reduce the amount of the TIL that industry, including Telstra, would be required to pay each year.)

There is also a review mechanism under **clause 5**, which provides for an independent review in 2021 (anticipated to occur after the completion of the NBN rollout) of the technologies and systems used to deliver the TUSO. This review mechanism is limited to identifying where a net reduction in Telstra's costs for delivery of the TUSO can be achieved through using alternative technologies and systems.

Another key contractual mechanism, **subclause 7.2 — adjustment of payment amounts for change in scope of services**, provides an opportunity for the Government to achieve significant cost revisions, in accordance with any legislative scope changes to the *standard telephone service* and payphones USOs under the TCPSS Act. However, amending the scope of the TUSO without first reaching an express agreement by the parties concerned may be contentious.

Given the limited scope within these clauses to substantially change the current TUSO model, the TUSOP Agreement is a fundamental roadblock to implementing policy reforms.

¹¹³ Telstra's contribution to the TIL in 2015-16 was above 60 per cent (ACMA 2016m).

Box 9.1 Summary of key clauses in the TUSOP Agreement

Clauses within the TUSOP Agreement relating to transition include:

- **Clause 5 — Review.** This clause provides that a review of the technologies and systems for delivery of the Universal Service Obligation (*standard telephone service* and payphones) must commence in July 2021 and be conducted by an independent third party. The review must examine the availability of alternative technologies or systems that could deliver the services at a net reduction in Telstra's costs, and subsequently a reduction in the contract payments. The review would also examine how the terms of the Agreement would need to be varied to accommodate the use of alternative technologies or systems
- **Clause 6 — Cost-saving proposals.** This clause allows either party to the Agreement to present proposals for a reduction of Telstra's costs incurred in delivering the USO as per the terms of the Agreement. The extent to which savings found under this clause are passed on to the Australian Government are determined by the percentage of Telstra's Telecommunications Industry Levy (TIL) contribution factor. As Telstra currently contributes over 50 per cent of the annual TIL, the Agreement states that Telstra would not retain any of the savings found under this clause (unless otherwise negotiated by parties). Cost-saving proposals can be put forward by either party at any time
- **Subclause 7.2 — Adjustment of payment amounts for change in scope of service.** The payment for the TUSO modules of the Agreement can be adjusted in the event of a change of the scope of the TUSO. The scope of the TUSO is set by reference to the obligation(s) in the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth) (TCPSS Act)
- **Clause 9 — Termination.** Either party may terminate the TUSOP Agreement if a Permanent Cessation of the NBN rollout occurs, and on the date of that permanent cessation, the NBN rollout has passed less than 20 per cent of premises.^a Additional circumstances are available for the Government to terminate the Agreement if Telstra has committed a material breach of the Agreement
- **Module B — Standard Telephone Service.** Under this module, Telstra is required to fulfil the *standard telephone service* USO as per the TCPSS Act. In particular:
 - **subclause 25.3** provides for the parties to agree to a variation to the TUSOP Agreement, in the event of a scope change to the relevant legislation
 - **clause 26** sets out the Copper Continuity Obligation (chapter 3)
- **Module C — Payphones.** Under this module Telstra is required to fulfil the payphones USO as per the TCPSS Act. In particular:
 - **subclause 28.3** provides for the parties to agree to a variation to the TUSOP Agreement in the event of a scope change to the relevant legislation
 - **subclause 33.2 — Payment adjustment for changes in the Payphone List** provides for a five-yearly review of the payphones payment amount (next due in 2017),^b however reviews will only be triggered if overall payphone numbers increase or decrease by at least 2000 units in the preceding five years.

^a In April 2017, nbn announced that it has passed 4.6 million premises, which exceeds 20 per cent of the overall target. ^b Recent payphone reporting numbers indicate that the scheduled 2017 payphones payment review is unlikely to be triggered.

Source: Unpublished information from the Department of Communications and the Arts.

In light of this, the Commission considers that the only reasonable option remaining is for parties to negotiate material changes to modules B and C of the TUSOP Agreement, without the constraints imposed by the existing review and payment adjustment clauses. This would allow the Government to ensure that the new arrangements — which are policy-based, rather than based on cost savings — are well placed to meet the social and economic policy outcomes they seek to achieve.

FINDING 9.1

The Commission's proposed reforms to universal service arrangements are incompatible with the current Telstra USO Performance Agreement.

The Agreement's review and payment mechanisms offer limited capacity for the parties to amend the contract in a way that aligns with these reforms. A significant renegotiation of the terms of the Agreement is likely to provide the most effective transition path to a fully overhauled universal service arrangement.

There are risks, such as financial penalty, for the Government in renegotiating or terminating the TUSOP Agreement before 2032. Even though the commerciality of *standard telephone services* and payphones is currently unclear to Government, compensation to Telstra may be justified, as the TUSOP Agreement would have guided a range of long-term investment decisions, particularly in relation to maintenance of Telstra's copper network.

Another consideration revolves around the legislative processes that the Government would need to undertake to ensure that the outcomes of contractual negotiations are reflected in adjustments to Telstra's regulated responsibilities under legislation. The renegotiation of the TUSOP Agreement would need to be conditional on passage of amending legislation to keep the contractual and legislative frameworks consistent. This involves an additional layer of implementation complexity.

However, the Government should balance these risks, complexities and possible costs against the opportunities that arise from reforms. A cancelled or renegotiated contract might warrant compensating Telstra for investment costs and lost future earnings; but would also reduce the Government's costs for the continued supply of outdated services, and reduce other distortionary impacts on the telecommunications sector and the wider economy. It would also remove the need for Telstra to continue investing in outdated voice-only infrastructure, providing an opportunity for investment to be in more advanced data networks with voice capability.

An effective renegotiation of the Agreement could achieve a range of benefits such as:

- a shortened contract term that would better leverage off the NBN infrastructure rollout
- an amended scope that more accurately targets market gaps and particular user needs
- a funding level that reflects the efficient costs of these targeted programs

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- the introduction of more effective governance and reporting obligations under any new contract
 - an opportunity to relinquish the payphones obligation immediately, allowing both the Government and telecommunications providers to better invest those funds into more targeted initiatives (such as community telecommunications infrastructure in specific locations).

9.2 Transition principles

While the terms of any contract renegotiation are ultimately a matter for the Australian Government and Telstra, a range of considerations should be intrinsic to an effective transition strategy. Some key principles should apply.

As noted earlier, at a broad level, the Government should balance the risks, complexities and possible costs of reforms against the opportunities that arise from reforms. Considerations that must be taken into account include:

- the information basis required to inform a meaningful renegotiation
- the ability for the Government and Telstra to agree upon contract changes and a revised course forward
- the risks to the Government of incurring financial penalties for changes to the contract, including shortening its term (from 2032) and changing its scope
- any other identified legal implications for an early conclusion of the TUSOP Agreement.

Also of critical importance is determining an appropriate timing strategy for the transition, particularly given that the telecommunications landscape is already undergoing significant transformation as NBN infrastructure is rolled out. By ensuring that the transition is transparent, subject to clear timeframes and supported by effective stakeholder and community engagement strategies, the Government can help industry and the wider community adjust. This should aim to give stakeholders a clear understanding of the new industry landscape and their changed roles in that landscape.

The community should also receive clear guidance about relevant safeguards, and would benefit from a transition that is carefully designed to mitigate the risks of loss of access to critical telecommunications services.

These considerations have led the Commission to adopt the following set of guiding principles in implementing any new universal service policy. The transition to any new universal service policy should:

- be fully supported by access to relevant information
- aim to achieve an appropriate balance between the benefits and costs of shifting to a new arrangement as soon as possible, relative to within a longer timeframe

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- be sufficiently transparent and subject to clear timeframes to enable effective business decision making
 - incorporate effective stakeholder and community engagement strategies
 - be carefully managed to mitigate the risks of loss of access to critical services.

9.3 The payphones USO

For payphones, the case for winding back Telstra’s contractual obligations immediately is relatively clear. Chapter 3 established the case for removing the payphones USO. This was supported by evidence of almost full saturation of consumer uptake of mobile phones, coupled with mobile coverage of over 99 per cent of the population and mobile carrier competition for around 98 per cent of the population (chapter 2). The combination of declining payphone usage and the ubiquity of mobile phones provides a strong case for an overhaul of the payphones USO.

In terms of contractual review mechanisms, the TUSOP Agreement provides for a review of the payphones payment amount if Telstra reports a decline in the overall number of payphones of more than 2000 units over a five-year period. The current five-year period concludes in mid-2017. Reporting to date (ACMA 2016d) indicates that while there has been a steady decline in USO payphone numbers, the current rate of decline is unlikely to trigger a review of the payphones payment in mid-2017, with the next scheduled review date in mid-2022. Therefore, the restrictions and infrequency of payment adjustment opportunities make the value of this particular review mechanism minimal.

Irrespective of the rate of decline in payphone numbers, the Commission considers the evidence on the decline in payphone usage to be sufficiently persuasive of the need for more targeted solutions for community-based telecommunications services. Telstra (sub. DR123) acknowledged the declining use of payphones and the impact of mobile services, noted consumer preference for investments in regional mobile coverage and quality, and stated their support for change:

We remain open to begin negotiations on the termination of Module C with the government. It is likely that an exit of payphones would require transition arrangements that cover matters such as the decommissioning of the relevant infrastructure. (p. 6)

There are also likely to be benefits of an early termination of the payphones USO to Telstra. In addition to a reduced TIL liability and regulatory impost, Telstra would gain the opportunity to re-purpose its national payphones network with a more commercial focus, unconstrained by statutory and contractual obligations. The 2015 launch of Telstra Air — Telstra’s WiFi network — gives an indication of the commercial possibilities available in this sphere. This opportunity should bear weight in any negotiations between the parties regarding any penalty or lost earnings for early termination of the payphones USO.

Given these factors, the Commission recommends that the Government commence negotiations with Telstra as soon as practicable for an early termination of the payphones component of the TUSOP Agreement. This activity should be reflected by legislative amendments to also remove Telstra's statutory obligations for payphones. The removal of these contractual and legislative payphones obligation(s) should coincide with the Commission's proposed introduction of a targeted scheme for provision of community telecommunications such as payphones and public WiFi (recommendation 7.6).

RECOMMENDATION 9.1

The Australian Government should:

- commence negotiations with Telstra with a view to terminate module C (payphones USO) of the Telstra USO Performance Agreement as soon as practicable
- amend the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth) and subordinate legislation to ensure Telstra's statutory obligation for the provision of payphones is terminated in line with its contractual obligation.

9.4 The *standard telephone service USO*

The process for transitioning away from the current *standard telephone service* USO is likely to be more complex. Information request 9.1 of the draft report set out a range of transition options for comment:

- **Option 1: Amend the legislative scope of the *standard telephone service* obligation immediately**, which entailed amendments to the TCPSS Act to reduce or remove the scope of the obligation for the USO, triggering a renegotiation of the TUSOP Agreement
- **Option 2: Wait until the NBN rollout is complete before changing the scope of the obligation**, continue with the current standard telephone service USO arrangements in place until at least 2020 (or whenever the rollout is complete)
- **Option 3: Wind back the *standard telephone service* USO gradually**, adopt a staged approach in parallel with the rollout of the NBN in order to realise some immediate cost savings.

Participants' views

Participants put forward a range of views regarding the transition away from the current universal service arrangements (box 9.2) with key considerations including:

- the opportunity to capitalise on the rollout of NBN infrastructure

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- the opportunity that would arise from immediate reductions in TIL liabilities, enabling funds normally paid towards the TIL to be reinvested by industry into areas of greater community benefit (such as expanding mobile networks)
 - overwhelmingly, the need to adopt caution as an overly complex transition may ultimately compromise consumer safeguards.

Both parties to the TUSOP Agreement — the Australian Government and Telstra (subs. 30 and DR123) — expressed a preference for Option 2, that NBN infrastructure should be fully rolled out to all premises before removing the *standard telephone service* USO. The Department of Communications and the Arts (DoCA, sub. 58) said:

It is important ... that these changes are implemented in a considered and careful manner. It would be expected, in such circumstances, that there would be an appropriate period of time to allow for necessary changes to be made to the existing USO and connected contractual arrangements and implementation of any new arrangements. Accordingly, it would be expected that changes to the existing USO, and implementation of any new arrangements, would not occur until the NBN rollout was complete. According to [nbn]'s latest Corporate Plan, the rollout is scheduled to reach 100% of Australian premises by 2020. (p. 6)

While stopping short of indicating a preferred transition option, the Australian Communications and Media Authority (ACMA, sub. DR157) also expressed reservations about the potential negative impacts of Option 3 on consumers:

Option 3 would enable a rapid start to phasing out the [*standard telephone service*] USO with consequential cost savings in USO payments. However, the ACMA believes there is a risk that a less-than-careful implementation of this option may lead to consumer confusion and increased complexity in administering the USO. If the [*standard telephone service*] USO is gradually removed, it potentially creates a scenario where different universal arrangements would apply, depending on whether NBN services were available ... keeping track of the areas where requirements under the current USO apply, and where [*standard telephone service*] USO requirements had been removed would be complex. It could involve administering two different sets of regulatory (and potentially contractual arrangements), the application of which would be in constant flux while the NBN rollout is in progress.

The ACMA also considers that implementation of option 3 would also need to be carefully managed to avoid consumer confusion about their rights. It could lead to erroneous perceptions of a two-tiered system, where certain citizens have better protections than others, depending on where they work or reside. (pp. 11–12)

Conversely, some participants had a different perspective. For example, nbn (sub. DR159) supported Option 3, encouraging an approach that would commence winding back of the *standard telephone service* USO immediately:

With the removal of the obligation to deliver voice services in most locations, the TUSOP arrangements should also be wound back, and any funding programs directed at areas in which there are premises without mobile coverage ... and to compensate infrastructure owners for cost increases that arise from changing the current TUSO and TUSOP [Agreement]. Given the current availability of voice services over mobile networks, it would be reasonable to commence winding back these arrangements now. (p. 9)

Box 9.2 Selected participants' views on transitioning away from the standard telephone service USO

The Competitive Carriers' Coalition (sub. DR121) supported Option 1:

The TUSO should be withdrawn by stages, by changing the legislative scope of the [standard telephone service] and automatically applying the changed definition to areas where the NBN has been fully deployed. ... The concerns expressed by the Commission that such a change in legislative scope might be considered heavy handed are unwarranted. The proposed changes should be seen in the context of the decades of over-generous compensation to Telstra and how comprehensively and manifestly the present arrangements fall short of appropriate standards and expectations of public spending. (p. 4)

Telstra (sub. DR123) voiced its opposition to the staged approach set out in Option 3:

Option 3, which would progressively stage a wind back of the USO would be too administratively complex to implement and negotiate, for example:

- parties would have to determine and agree on the cost reductions on a region by region basis;
- actual cost reductions in areas where nbn co. has rolled out fixed infrastructure are likely to be minor;
- nbn co.'s fixed rollout does not constitute uniform polygons of coverage, there are many instances of individual blocks and premises within NBN's fixed footprint that remain Telstra's responsibility and cost until the designated date;
- even within areas which are 'nbn connected' there is no statutory obligation that will in practice deliver a service on request, as a result customers would be without a service on request; and
- within the NBN wireless footprint, the consumer protections required to be offered by the [standard telephone service] are incompatible with the [wholesale broadband agreement] – i.e. there would be no [standard telephone service] protections for those customers. (p. 14)

Australian Communications Consumer Access Network (ACCAN, sub. DR124) supported Option 2:

A clear transitional path should not put any consumer at risk from losing services. ACCAN is in favour of Option 2; removing the [standard telephone service] USO in all areas once the NBN rollout is complete, as it would allow time for transition and for the new programmes to be established. However, this could be flexible if the other elements of the safeguards are not in place, or are in place earlier than the completion of the nbn rollout. (p. 5)

Better Internet for Rural, Regional & Remote Australia (sub. DR143) disagreed with all options:

None of the three options listed in the Draft Report on the Telecommunications Universal Service Obligation are feasible alternatives for the provision of voice services in [regional, rural and remote] Australia. ... The Productivity Commission has falsely assumed, that the nbn Network is a suitable replacement for current fixed line services. It is not. (p. 68)

Vodafone Hutchison Australia (Vodafone, sub. DR150) supported Option 1:

... the most direct way of achieving change in a timely manner is via legislative amendments. [Vodafone] therefore considers the Commission's Option 1 is the most appropriate method for transitioning away from the [standard telephone service] USO in its current form.

As discussed below, we do not consider that Option 1 would amount to a disproportionate exercise of legislative power given that the TUSOP Agreement specifically contemplates the possibility of a scope change under the legislative framework during its term. (p. 20)

The Commission's view

While there would be merit in staging the transition over the next three years (Option 3), there would also be risks that would need to be carefully managed. The Commission acknowledges the administrative complexity of transitioning to a new arrangement in stages, particularly given the ongoing transition already involved in the deployment of NBN infrastructure.

On balance, the Commission's assessment is that the termination of the *standard telephone service* should occur when the NBN rollout is complete (Option 2); expected in 2020 on current nbn plans.

But this does not mean that the parties should wait until 2020 before commencing negotiations. On the contrary, it would be fruitful for the parties to commence negotiations as soon as practicable to ensure a smooth transition to the new arrangements.

Although this path would see a continuation of payments to Telstra under the TUSOP Agreement for a further three years (potentially in excess of a further \$750 million in contractual payments), this would allow for some stability of consumer safeguards throughout the NBN rollout.

As with the payphones USO, any removal of Telstra's contractual obligations for *standard telephone services* under the TUSOP Agreement would need to be mirrored by a repeal of the corresponding statutory obligations under the TCPSS Act. However, while the payphones obligation is relatively contained and straightforward, the *standard telephone service* USO is less so. The *standard telephone service* serves as a cornerstone for a number of ancillary voice-only consumer safeguards. Its removal may have flow-on effects to other legislation dealing with a wide range of matters, including retail service standards and fault repairs (see also recommendation 5.2), equipment provision, the provision of services for the hearing impaired and carrier licence conditions such as Priority Assistance. Therefore, another benefit of waiting until 2020 is to provide sufficient time for the Government to review and amend the wider framework before undertaking contract negotiations (section 9.5). This may facilitate more optimal conditions for sound policy formation. Contract negotiations could then be conducted against a more considered, informed and detailed long-term framework.

The Commission also notes advice from the ACMA (sub. DR157) regarding the potential for the current *standard telephone service* obligation to change in the event of a ministerial declaration made under section 8J of the TCPSS Act.¹¹⁴ Although the statutory obligation for the TUSO should be terminated, it is important that this only occurs in tandem with the removal of the corresponding contractual obligation. To make a ministerial declaration under section 8J prior to renegotiation of the TUSOP Agreement would send an

¹¹⁴ Section 8J of the TCPSS Act would allow the Minister to make a declaration to remove the statutory obligation for standard telephone services, on the basis that the TUSOP Agreement provides satisfactory alternative contractual arrangements for the provision of those services.

inconsistent message regarding the Government's intentions with the future of the Agreement, and may also compromise the ACMA's capacity to collect information on Telstra's performance of the TUSO (section 9.5). On this basis, the Commission urges that the current bilateral contractual/statutory framework for *standard telephone services* remains fundamentally unchanged until negotiations of the TUSOP Agreement commence.

RECOMMENDATION 9.2

The Australian Government should:

- commence negotiations with Telstra with a view to terminate module B (*standard telephone service USO*) of the Telstra USO Performance Agreement shortly after the NBN is fully rolled out
- amend the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth) and subordinate legislation to ensure Telstra's statutory obligation for the provision of the *standard telephone service* is terminated in line with its contractual obligation.

9.5 Transition activities

Transition from the TUSO to a new universal service framework is a complex task, and the Commission has made a number of recommendations in earlier chapters outlining the steps that should be undertaken in establishing a new framework for implementation in 2020. This section focuses on those tasks necessary for the Government to undertake in order to wind up the TUSO. With the main hurdle — the renegotiation of the TUSOP Agreement to terminate Telstra's obligations for the *standard telephone services* and payphones USOs (recommendations 9.1 and 9.2) — in sight, the Commission recognises that effective renegotiation will require some detailed preparatory work in the form of two parallel streams of activity required between now and renegotiation of the TUSOP Agreement:

- stream 1: formally gather information from Telstra relating to the provision of the *standard telephone service* and payphones USOs
- stream 2: undertake a wider consumer safeguards review, conducted from a whole-of-government perspective, to bed down a full, unified framework of regulatory and policy mechanisms, and which is complementary to the Commission's proposed reforms of universal service policies.

Stream 1 — formal information gathering

What data are needed to inform the transition?

This report has identified pockets of data and information that should be collected for the purposes of informing implementation of the Commission’s future universal service framework (chapters 5 to 7). These include information identifying:

- ‘gaps’ in the delivery of *baseline* voice services, with a focus on those in the NBN satellite footprint
- locations or particular user groups in need of a community telecommunications program
- the particular needs of people in remote Indigenous communities for the possible development of an Indigenous telecommunications program.

In addition to these activities, the Government should also seek to gather the requisite information and data regarding the TUSO that would be needed to underpin well-informed, effective and efficient negotiations of the TUSOP Agreement.

Data on standard telephone services

The Commission noted earlier (chapter 3) that there is a dearth of data regarding the true scope and cost of Telstra’s supply of the *standard telephone service* USO. A detailed breakdown of the costs of efficient service provision and revenue from *standard telephone services* is needed to enable the Government to negotiate effectively on termination of module B of the TUSOP Agreement (and identify the possibility of any penalty payments). In order to determine whether such penalty payments should be made (and if so, how much), negotiations must be informed by mutually accessible evidence about the cost implications of the proposals to Telstra.

The Commission considers that for the Government to be able to make a reasonable assessment of Telstra’s costs for supplying *standard telephone services*, it should apply a systematic approach to predetermining its data requirements for a TUSOP Agreement renegotiation. This should include:

- first and foremost, an evaluation of the most appropriate costing methodology for determining the net costs of the TUSO. This should be conducted as a means of setting a clear framework for determining data requirements (and gaps). The Commission has previously recommended using an avoidable cost methodology to determine the costs of efficient service provision, which the Bureau of Communications Research had also employed to estimate the net costs of non-commercial NBN services (chapter 8). This may provide a useful starting point
- a subsequent stocktake of data availability, including publicly available data and data already gathered by the Government

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- a subsequent identification of data gaps, which would ultimately characterise requests for data directed to Telstra.

Informed by independent advice

Given the complex range of technical and economic expertise required to conduct this task, the Government should also consider seeking independent review, advice or analysis of costing methodologies and any data collected, such as commissioning independent expert advice on the probity of the data or cost modelling (chapter 8). This might be sought from a number of sources, for example, through industry regulators, technical experts or independent representatives on an advisory panel.

Data on payphones

In addition to accessing data about the costs of *standard telephone services*, the Government should consider whether it would be beneficial for TUSOP Agreement renegotiations to also seek data from Telstra about the payphones USO. Although the ACMA currently collects some data on payphones, the addition of locational data regarding usage and revenue (including advertising revenue earned by content displayed on Telstra payphone booths) would assist the Government in negotiating an early termination of module C of the TUSOP Agreement. Such information may also aid decisions about future targeted funding for community telecommunications services.

How might these data be accessed?

The Commission notes that accessing these data is not likely to be straightforward. The conduct of this inquiry is insightful in this regard, in that it has been constrained by an opacity of evidence surrounding the *standard telephone service* USO, noting that neither contractual nor regulatory requirements compel Telstra to maintain (or provide to Government) detailed records relating to the costs and revenue of that service.

Nonetheless, the Commission considers that a telecommunications carrier of Telstra's size could reasonably be expected to have maintained (or be able to generate within the transition period) records that would go some way towards revealing the net costs of the *standard telephone service* and payphones USOs. Despite the absence of any contractual or regulatory obligation to do so, it is conceivable that Telstra has developed and maintained an internal framework for assessing ongoing expenditures on its *standard telephone service*.

In order to access this information, a range of information gathering mechanisms are available to the Government.

Existing powers of the Australian Communications and Media Authority (ACMA)

Currently the ACMA has a range of powers in relation to obtaining information from telecommunications carriers and carriage service providers that fall within its regulatory scope, including under the *Telecommunications Act 1997* (Cth) (the Telecommunications Act), which provides it with powers to:

- obtain information from carriers and carriage service providers if the ACMA has reason to believe that the information or documents are available (section 521)
- make record-keeping rules requiring one or more specified carriers or carriage service providers to keep records (section 529).

These powers can be used to gather information, documents or records on the condition that they are relevant to the performance of any of the ACMA's telecommunications functions or powers. (The Commission notes that the ACMA has functions and powers relating to the TUSO under the TCPSS Act, as well as more general functions under the *Australian Communications and Media Authority Act 2005* (Cth) (the ACMA Act) advising the Minister in relation to the telecommunications industry, and matters affecting consumers of carriage services.) Non-compliance by carriers or carriage service providers can attract civil and/or criminal penalties.

In order to utilise these powers, the Minister for Communications could direct the ACMA to request the relevant information from Telstra (or make record keeping rules, if no existing records are understood to be kept by Telstra) in order to inform future negotiations on the TUSOP Agreement.

Under the Telecommunications Act and the ACMA Act, the ACMA is permitted to share the information it gathers under these provisions with certain parties, including the Minister and DoCA (which represents the Australian Government in negotiating the TUSOP Agreement).

Existing powers of the Australian Competition and Consumer Commission (ACCC)

The ACCC (sub. DR152) has powers to create record keeping rules under section 151BU of the *Competition and Consumer Act 2010* (Cth). The power is broad, with the ACCC able to make record keeping rules by written instrument (including what records are kept, how they are prepared and when they should be provided) and require carriers and carriage service providers to comply. Though the ACCC does not currently collect information in relation to the *standard telephone service*, it stated:

... We support the [Productivity Commission]'s observations of the need for more publicly accessible information about telecommunications infrastructure and will give further consideration to how this information can be collected under the current [record keeping rules].
(p. 4)

The ACCC detailed the current range of infrastructure-related information that is collected under record keeping rules in its submission (sub. DR152).

Contractual mechanisms under the TUSOP Agreement

There is limited capacity for collection of information under the TUSOP Agreement. Clause 19 of the TUSOP Agreement sets out a requirement for Telstra to answer questions and provide assistance to DoCA in relation to reasonable requests concerning the performance of the contract. However, the clause also contains a narrow requirement for record-keeping, limiting the required records to ‘books and records in sufficient detail to enable the amounts payable by the Department under this Agreement to be determined’. Given that payments under module B of the Agreement are determined broadly, with no reference to the number of *standard telephone services* provided, it is unlikely that the requisite information needed for renegotiations would be collected under this clause of the Agreement.

Does the Government need to legislate for additional information gathering powers?

The Government could seek to rectify the information void by utilising the ACMA and/or the ACCC’s existing powers to make record keeping rules requiring Telstra to maintain and provide records about the fulfilment of the *standard telephone service* USO. This would enable, as a minimum, a few years of data about costs, revenues and scope to help inform renegotiations of the TUSOP Agreement.

Alternatively, the Government could create a new legislative requirement for Telstra to maintain and provide the information sought. However, given the scope of existing ACMA and ACCC powers, the Commission does not consider the case for creating new or stronger legislative powers to be compelling.

An information-gathering exercise may benefit from a more co-ordinated approach within Government to exercising those powers and gathering data. The Commission’s draft report on *Data Availability and Use* set out draft findings and recommendations in relation to the way the Australian Government collects, uses and shares data between agencies. Such recommendations aim to ensure a more streamlined, effective and open approach towards data sharing between Government agencies, making data collection and use more efficient, and reducing red tape.

Along this vein, the Government should look to apply those principles to data collection and sharing between DoCA, the ACMA and the ACCC in the context of the renegotiating the TUSOP Agreement. This may help to maximise the effectiveness of existing powers, and speed up the process of seeking information from Telstra regarding its TUSO activities.

FINDING 9.2

To be effective, any renegotiation of the Telstra USO Performance Agreement needs to be informed by robust evidence on the net costs of services provided under that Agreement.

RECOMMENDATION 9.3

The Australian Government should, as a matter of priority, undertake a detailed assessment of its data requirements for engaging in a future renegotiation of the *standard telephone service* and the payphones universal service obligations.

The Government should then direct the Australian Communications and Media Authority, and the Australian Competition and Consumer Commission, to utilise their existing information-gathering powers, where appropriate, to require the necessary information from Telstra.

Stream 2 — a comprehensive consumer safeguards review

Stream 2 of the transition to be undertaken prior to negotiations is a comprehensive cross-portfolio consumer safeguards review, complete with wide-ranging adjustments to the legislative framework underpinning telecommunications provision within the new NBN-enabled market.

The Commission’s proposed reframed universal service objective (to include broadband) (recommendation 5.1), the development of associated technical *baseline* standards (recommendation 5.2), and the repositioning of universal service policy to a highly targeted approach (recommendation 7.3) implies that many existing policies and measures designed to supplement the availability, accessibility and affordability of *baseline* universal services outside of the TUSO will also require reform.

One vehicle for pursuing these wide-ranging reforms is the Government’s foreshadowed review of the telecommunications consumer safeguards framework. DoCA (sub. 58) outlined the Australian Government’s intention to conduct a telecommunications consumer safeguards framework review (in parallel with this inquiry) focusing on accessibility, affordability and other consumer safeguards that sit outside the TUSO.

The Commission underscores the importance of expediting this foreshadowed review once technical *baseline* standards are defined, given the strong integration of the TUSO with other consumer safeguards. Bedding down a future framework for consumer safeguards before commencing renegotiations of the TUSOP Agreement would provide clear context to negotiations. It would also allow the Government to determine any consequential or additional changes to Telstra’s statutory responsibilities that may bear some influence on the outcome of negotiations.

Many participants were supportive of the Government's foreshadowed consumer safeguards review (Bebbington, sub. DR107; Optus, sub. DR146; Vodafone, sub. DR150; nbn, sub. DR159) expressing support for its swift resolution to provide comprehensive, stable support to the future framework.

Expanding the scope of the Government's foreshadowed consumer safeguards review

To enable a coherent and efficient transition, any consumer safeguards reforms need to be developed from a whole-of-government perspective in light of the intended removal of the TUSO and renegotiation of the TUSOP Agreement. Key areas emerging from this inquiry, which the Government's foreshadowed safeguards review should examine, include the:

- future of the Customer Service Guarantee (CSG), which sets standards and benchmarks for connection, repair and appointment keeping times (discussed further below)
- future of Telstra's carrier licence conditions, including a low-income measures strategy and Priority Assistance services
- effectiveness of the Australian Government's Telephone Allowance and other affordability measures
- future of the National Relay Service for people who are deaf, hearing and/or speech impaired, and specialised equipment for people with disability
- needs of other groups that may require targeted accessibility programs, including people who are homeless and those living in remote communities
- consumer protection roles of various relevant bodies
- delineation of responsibilities for service quality over NBN infrastructure.

These expanded elements for the review are wide in scope, and capture a number of areas that extend beyond DoCA's portfolio. For example, the Department of Social Services has a strong policy alignment to both *accessibility* and *affordability* issues, and given the recent introduction of the National Disability Insurance Scheme, may have scope to contribute significant policy reforms in this area. The review may also relate to existing policies and programs targeting Indigenous communities administered by the Department of the Prime Minister and Cabinet.

Similarly, the Commission notes the ACCC's recent announcement (Sims 2017) of the broadened scope of work in relation to consumer guarantees for telecommunications, specifically in relation to broadband speeds, including the reliability of broadband speed delivery and potential avenues for consumer guarantee redress. While this ties in closely with the ACCC's Broadband Performance Monitoring Program (ACCC 2017b), the Commission notes that this work may have significant implications for consumer safeguards policies.

A proposed widened scope for this review suggests that it is best undertaken from a whole-of-government perspective. There are a number of ways this may be achieved, including through interdepartmental committees represented by all key government stakeholder agencies; an independent inquiry by an external panel; or through review by a lead agency (such as DoCA) working in close consultation with other departments.

Retail level safeguards — the existing Customer Service Guarantee

Of key importance to the Government's foreshadowed consumer safeguards review is the future of the CSG. The CSG currently provides the primary means against which the provision of *standard telephone services* is measured. The CSG provides the only statutory safeguards that consumers may rely on in relation to connection, repairs and appointment keeping.

Given the close interconnection between the CSG and *standard telephone service* USO, the future of the CSG is intrinsically linked to the negotiation of the TUSOP Agreement and the future of the TUSO, as well as the development of *baseline* standards for broadband and voice services once the NBN is fully deployed.

The evolution of the telecommunications market over the past decade, as well as the NBN infrastructure rollout, has significantly reduced the CSG's effectiveness and relevance as a safeguard (chapter 4). These will be reduced even further should the Commission's reform proposals be accepted by the Australian Government. Chapter 4 outlined some reasons for the steady decline in the number of voice services protected by the CSG, including:

- the consumer shift away from the *standard telephone service* to other voice technologies, including voice over internet protocol and mobile voice services
- an increase in CSG waivers by customers, as more consumers move to retail service providers (RSPs) other than Telstra
- emerging commercial and statutory complications, such as current market conditions which prevent RSPs offering CSG-protected services over nbn's fixed wireless or satellite networks (thus excluding over a million premises from CSG protection).¹¹⁵

The Commission considers that a newly-developed technical *baseline* standard for broadband and voice services (recommendation 5.2) will go some way to addressing these anomalies. In particular, the *baseline* standard should be formulated to set technology-neutral minimum reliability standards for connection and repair timeframes, which would supersede a large part of the current consumer safeguards. Therefore, in proceeding with its foreshadowed consumer safeguards framework review, the Government should pay primary attention to the new technical *baseline* standards and ensure that review of surrounding consumer protections complement that standard, while capturing and retaining any legacy elements that the *baseline* does not deal with (for

¹¹⁵ As indicated in table 3.2 of chapter 3, an estimated 1 020 000 premises are in nbn's fixed wireless and satellite footprint.

instance, as discussed in chapter 5, the Commission questions whether appointment-keeping timeframes should remain in the *baseline* standard).

Chapters 5 and 7 also discuss the considerations for Government in developing complementary wholesale and retail roles for enforcement and compliance of *baseline* standards. One key consideration in this process should be ensuring clarity about the roles and responsibilities of nbn and RSPs with respect to service quality on NBN infrastructure. The results of this exercise will form a fundamental component of the framework for reviewing complementary consumer safeguards.

Clarifying roles and responsibilities for service quality and oversight

The proposed expanded review could also provide an opportunity for the Government to clarify the various roles of Government agencies and bodies relating to consumer protection and telecommunications services generally. The roles of the ACCC, the ACMA, and the Telecommunications Industry Ombudsman should be reassessed as part of the intended review, and a clear statement of their roles and responsibilities released, for the benefit of both consumers and industry throughout the NBN transition.

FINDING 9.3

A transition path away from the current telecommunications universal service obligation would need to be supported by necessary adjustments to the surrounding regulatory framework. Such adjustments include changes to consumer safeguards, Telstra's carrier licence conditions, and other policy measures. This would ensure that consumer safeguards are adequately considered, while removing inefficiencies and outdated mechanisms.

RECOMMENDATION 9.4

The Australian Government should proceed with its foreshadowed review of the telecommunications consumer safeguards framework once technical *baseline* standards are defined (recommendation 5.2). The review should be undertaken from a whole-of-government perspective, and expanded to include an assessment of:

- what, if any, future retail safeguards are necessary
- what changes should be made to Telstra's carrier licence conditions
- the future role of accessibility and affordability measures, including the Telephone Allowance, the National Relay Service and relevant elements of the National Disability Insurance Scheme
- the consumer protection roles of various bodies including: the Australian Competition and Consumer Commission; the Australian Communications and Media Authority; and the Telecommunications Industry Ombudsman
- the need to clarify responsibilities for service quality (including fault repair) on the NBN.

The nexus with other government reviews and legislative activities

The Commission notes the strong interconnection across a wide range of siloed policy reviews that are ongoing or have been conducted in recent years (chapter 1).

Notably, some of those processes have occurred in tandem with this inquiry. The recent exposure drafts for the Telecommunications Legislation Amendment (Competition and Consumer) Bill 2017 and the Telecommunications (Regional Broadband Scheme) Charge Bill 2017 — dealing with the proposed Statutory Infrastructure Provider (SIP) regime and the proposed Regional Broadband Scheme (RBS) levy, respectively — both have elements of policy which hold key significance to considerations that are pertinent to this inquiry.

For example, while the Commission is supportive of clearly defining nbn's role as a universal service provider (recommendation 7.1), it considers that a number of key recommendations in this report would affect the drafting of legislation for the proposed SIP regime. In particular, the recommended characterisation of wholesale services (as providing both broadband and voice) and the suggested application of a technical *baseline* standard (chapter 5) might both, if accepted by Government, affect the proposed legislation. Chapter 8 makes similar observations regarding the recommendations for funding of universal services, the future of the TIL, and the potentially problematic timing of the legislation for the proposed RBS levy.

FINDING 9.4

The current pattern of ongoing discrete telecommunications policy reviews and proposed legislative measures raises concerns about the coherence of telecommunications policy development, with implications for the transition to, and the effectiveness of, any new universal service framework.

Looking forward, the Government should take steps to clearly focus resources and efforts on implementing the Commission's recommendations. The need for other separate policy review activities should be carefully considered, where their purposes may overlap or duplicate activities recommended by this inquiry report, or where their value may not be fully achieved whilst conducted during a transitional period.

For instance, a Regional Telecommunications Independent Review Committee is established every three years under Part 9B of the TCPSS Act, to conduct reviews into telecommunications in regional, rural and remote Australia. The next Regional Telecommunications Review is scheduled to occur in 2018. Given the significant overlap in subject matter with this inquiry and the transitional nature of the telecommunications policy landscape that will follow in the coming years, the Commission considers the Government's resources would be better directed towards addressing the transitional activities identified by the Commission. Transitional activities include commencing with the information gathering processes, and completing the Government's consumer safeguards review, prior to commencing negotiations with Telstra on the TUSOP Agreement.

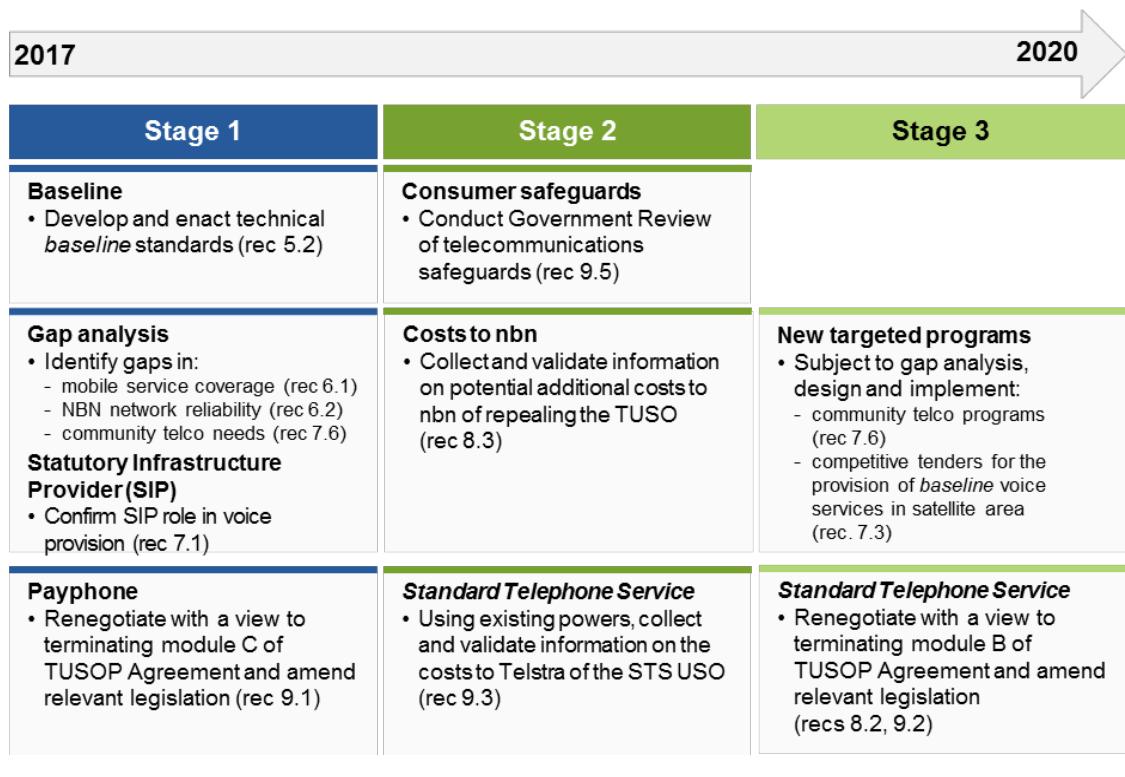
RECOMMENDATION 9.5

The Australian Government should defer the next Regional Telecommunications Review, next scheduled for 2018. Any future reviews required under relevant legislation should only be conducted after the NBN is fully rolled out.

9.6 A staged approach to transition

The Commission recognises that the transition timeframe set out in this report will require several concurrent streams of ongoing activity occurring between the Government's consideration of the Commission's recommendations and their implementation — with a final transitional sequence of events (including removal of the existing TUSO arrangements, and introduction of a new universal services framework) to coincide with the conclusion of the NBN infrastructure rollout. A staged approach for this transition is proposed in figure 9.1.

Figure 9.1 A staged approach to transition



A Inquiry conduct and participants

This appendix describes the stakeholder consultation process undertaken for the inquiry and lists the organisations and individuals that have participated.

Following receipt of the terms of reference on 28 April 2016, an initial circular advertising the inquiry was distributed to industry organisations and individuals and the inquiry was advertised in a national newspaper.

The Commission released an issues paper on 7 June 2016 to assist interested participants in preparing their submissions. There were 61 public submissions received by the Commission prior to the release of the draft and a further 118 public submissions were received after the release of the draft report (table A.1).

The Commission met with a number of government agencies, business groups, community organisations and academics in Australia and New Zealand (table A.2). It also held roundtables in regional and remote communities (table A.3).

Public hearings were held in Cairns, Dubbo, Melbourne, Perth, Port Augusta and Sydney (table A.4).

Table A.1 Public submissions received

<i>Participant</i>	<i>Submission No.</i>
AgForce	DR149
Aldridge, Hon. Martin MLC	DR155
Australian Communications Exchange	22
Australian Communications and Media Authority	49, DR157
Australian Communications Consumer Action Network	48, DR124, DR178
Australian Competition and Consumer Commission	40, DR152
Australian Medical Association	DR147
Australian Small Business and Family Enterprise Ombudsman	39, DR110
BAL Consulting	54, DR62
Balranald Shire Council	DR112
Bandara, Priyanka	DR168
Barcoo Shire Council	41
Bebbington, Bruce	DR107
Bellingham, Susan	DR71
Better Internet for Rural, Regional & Remote Australia	DR143
Birrell, Peter	DR76
Blacket, Jacqueline	DR78
Bourke Shire Council	DR83
Bradshaw, Kate	DR94
Brindley, Rachel	DR66
Broadband for the Bush Alliance	6
Burke Shire Council	DR116
Butler, Claire	DR88
Cambium Networks	DR120
Camp, Ernie & Kylie	DR131
Cape York Digital Network	17
Carers NSW	DR72
Central Australian Youth Link Up Service	25
Central Highlands Regional Council	37
Communications Electrical Plumbing Union	DR106
Competitive Carriers' Coalition	DR121
Connelly, Mae	DR79
Connolly, Peter	DR165
Cotton Australia	DR133
Country Women's Association of NSW	DR101
Coutts Communications	5, DR114
Cradduck, Lucy	28
Croft, Anthony	DR80
Crouch, Andrew	DR138
Croydon Shire Council	DR102
de Ridder, John	56
Department of Communications and the Arts	58

(continued next page)

Table A.1 (continued)

<i>Participant</i>	<i>Submission No.</i>
Denham, John	DR170
Digital Industry Group Incorporated	DR135
Disability Council NSW	DR132
Donecker, Peter	DR64
E.C. Throsby Pty Ltd	DR99
Eckermann, Robin, James, Robert and de Ridder, John	DR141
EMF Aware Alliance	DR179
Fernie, Cathie	DR140
Flinders Ranges Council	29, DR158
Gardiner, Philip	DR177
Glasson, Susan	DR97
GQI Consulting	DR172
Great Northern Telecommunications	2, DR173
Gregory, Mark	9, DR122
Gulf Savannah Development	DR111
Gunnedah ADSL Upgrade Community Action Group	DR98
Harris, Joy	DR74
Infrastructure Australia	51
Internet Australia	43
Isaac Regional Council	26
Isolated Children's Parents' Association NSW	DR117
Isolated Children's Parents' Association Qld	14, DR86
Isolated Children's Parents' Association of Australia	11, DR126
Johnson, Ian	DR95
Kansoly Telecom Expense Management	DR175
Kerin Physio Co.	DR166
Kirsch, Maureen	DR163
Lamond, Bob	DR134
Limestone Coast Local Government Association	24
Longmire, Lee	DR84
MacDonnell Regional Council	1
Macquarie Telecom	27
Maher, Norm	DR148
Marsh, Arthur	36
McLaren, Gary	18
Microsoft	20
Mid West Development Commission	DR167
Mistake Creek Area Progress Association Inc.	DR144
Mitiamo IT	DR118

(continued next page)

Table A.1 (continued)

<i>Participant</i>	<i>Submission No.</i>
Moffatt, Geoffrey	DR93
Moore, Malcolm	53, DR68
Moree Plains Shire Council	DR128
Murphy, Jo	DR69
Name withheld	DR161
Nationals Farmers' Federation	31, DR129
National Rural Health Alliance	DR89
NBN Co	47, DR159, DR176
Newton, Rose-Marie	DR119
Ninti One	16
Northcliffe Community Resource Centre	DR70
Northern Regional Development Australia Alliance	34
Northern Tasmania Development Corporation Limited	DR136
Northern Territory Government	59
Northern Territory Isolated Children's Parents' Association of Australia	21
NSW Farmers' Association	DR108
O'Connor, Anita	DR82
O'Connor, Anny	DR87
O'Halloran, Marianne	DR96
OptiComm	13
Optus	4, DR146
Pastoralists' Association of West Darling Inc.	DR162
Piggott, Catherine	DR156
Pitman, Robert	DR63
Polson, Paula	DR145
Powis, Alan and Tina	DR92
Printacall Communications Technology	15, DR109
Rea, Ross	DR113
Regional Australia Institute	50
Regional Development Australia Central West	42, DR103
Regional Development Australia Far North	DR153
Regional Development Australia Northern Territory	10, DR115
Regional Development Australia Townsville and North West Qld	23
Regional Development Australia Wheatbelt	55, DR77
Remote Area Planning and Development	12
Rural, Regional and Remote Coalition	DR130
Ryan, Gabrielle	DR154
Sensis	DR127
Shanti, Fiona	DR174
Slattery, Peter	8
South Australian Council of Social Service	DR85
South Australian Government	60
South Burnett Regional Council	35

(continued next page)

Table A.1 (continued)

<i>Participant</i>	<i>Submission No.</i>
Stephens, Michele	DR164
Stokes, Karen	DR67
Stop Smart Meters Australia	DR100
Swinburne Institute for Social Research	45
Tasmanian Government	57
Taylor, Thomas	DR139
TeleBiz	DR137
Telecommunications Industry Ombudsman	52, DR91
Telstra	30, DR123
Tennant Creek Regional Economic Development Committee	3
TPG Telecom	38
Turner, Fleur	DR81
Twist, Kate	DR75
Victorian Farmers Federation	32, DR125
Victorian Government	61
Vocus Communications	33
Vodafone Hutchison Australia	46, DR150
Wakelin, Barry and Christine	DR160
Wamboin Communications Action Group	DR151
Washpen Bush Fire Brigade	DR142
Weller, Steve	DR171
Wells, Noni	DR65
Western Division Councils of NSW	DR90
Western Downs ICPA Branch	7
Wilson, Sue	DR73
Wimmera Development Association	DR105
Wittert, Roy	44
Wood, Catherine	DR169
Yaraka Isisford Branch Isolated Children's Parents' Association	19, DR104

Table A.2 Consultations

Individual or organisation

ACN Pacific
Activ8me
AgForce
Australian Communications and Media Authority
Australian Communications Consumer Action Network
Australian Competition and Consumer Commission
Australian Council of Social Service
Australian Government Department of Communications and the Arts
Australian Government Department of Infrastructure and Regional Development
Australian Government Department of Social Services
Australian Government Digital Transformation Agency
Australian Mobile Telecommunications Association
Australian National Audit Office
Australian Small Business and Family Enterprise Ombudsman
Broadband for the Bush Alliance
Bureau of Communications and Arts Research
Cleary, Jen
Communications Alliance
Coutts Communications
Cutbush, Greg
de Ridder, John
EasyWeb Digital
Eckermann, Robin
Enex TestLab
Ergas, Henry
Ericsson Australia
GQI Consulting
Gregory, Mark
Infrastructure Australia
Internet Australia
Isolated Children's Parents' Association
James, Robert
Lateral Economics
Macquarie Telecom/Competitive Carriers' Coalition
Martin, Ian
Microsoft
National Farmers' Federation
NBN Co Limited
New Zealand Government Commerce Commission
New Zealand Government Ministry of Business, Innovation and Employment
NSW Department of Industry
Optus
Outback Communities Authority

(continued next page)

Table A.2 (continued)

Individual or organisation

Queensland Government Department of State Development
Regional Australia Institute
Royal Flying Doctor Service
South Australian Department of State Development
Swinburne Institute for Social Research
Telecommunications Industry Ombudsman
Telstra
TPG Telecom
Victorian Farmers Federation
Vodafone Hutchison Australia

Table A.3 Roundtable details and participants

5 July 2016 — Marree

June Andrews – Marree Health Services
Cindy Mitchell – Muloorinna Station
Phil Turner – Marree Hotel
Anne Morphett – Callanna Station
Peter Litchfield – Mundowdna Station
Lizzie Kahn – Marree Progress Association
Jan Whyte – Arabunna Centre
Reg Dodd – Arabunna Centre
Irene Zada – Local resident
Lyall Oldfield – Marree Post Office; general store and café owner

5 July 2016 – Blinman

Sally Henery – Blinman Progress Association
Warren and Barbara Fargher – Wirrealpa Station
Karen Cains – Blinman Post Office
Carmel and Brendan Reynolds – Willow Springs Station
Martin and Lyn Phillips – Blinman Progress Association
Tony Smith – Rawnsley Park Station
Kym Geue – Rawnsley Park Station
Susan Pearl – Blinman Heritage Mine
Mary Fisher – Blinman Heritage Mine
Maureen Cutri – Blinman Hotel
Lesley Slade – Moolooloo Station
Lisa McIntosh – Gum Creek Station

(continued next page)

Table A.3 (continued)

6 July 2016 – Alice Springs – Indigenous Organisations

Andrew Crouch – Centre for Appropriate Technology
Blair McFarland – Central Australian Youth Link Up Service
Jennifer McFarland – Central Australian Youth Link Up Service
Fran Kilgariff – Ninti One and CRC for Remote Economic Participation
Daniel Featherstone – Indigenous Remote Communications Association

6 July 2016 – Alice Springs – Other

Scott Lovett – Department of the Chief Minister (NT)
Tiani Cook – Northern Territory Isolated Children's Parents' Association of Australia
Ron Saint – Department of Corporate and Information Services (NT)
Anjali Palmer – Mental Health Association of Central Australia
Jennes Walker – Industry Capability Network

7 July 2016 – Alice Springs – Business / Development /Government

John Gaynor – Central Desert Regional Council
Stephen Schwer – Tourism Central Australia
Robin Gregory – Regional Development Australia Northern Territory
Ruth Elvin – Desert Knowledge Australia
Chris Kendrick – MacDonnell Regional Council
Vin Lange – Centafarm

Table A.4 **Public Hearings**

30 January 2017 – Dubbo

Geraldine and Alston McKay
Woodstock Orchard
Washpen Bush Fire Brigade
Isolated Children's Parents' Association of Australia
Regional Development Australia Central West
Country Women's Association of NSW
Telstra

31 January 2017 – Sydney

Malcolm Moore
OptiComm
Internet Australia
Telstra
Holly Raiche

(continued next page)

Table A.4 (continued)

1 February 2017 – Sydney

Optus
BAL Consulting
National Farmers' Federation
Vodafone Hutchison Australia
Australian Communications Consumer Action Network
NSW Farmers' Association
Malcolm Moore

2 February 2017 – Cairns

Isolated Children's Parents' Association Qld
TeleBiz
Cape York Digital Network
Bruman Rigging and Recovery
Telstra

7 February 2017 – Melbourne

Mark Gregory
Victorian Farmers Federation
Competitive Carriers Coalition and Macquarie Telecom
Stop Smart Meters Australia
George Gordon

8 February 2017 – Melbourne

Rose-Marie Newton
AgForce
Better Internet for Rural, Regional & Remote Australia
Isolated Children's Parents' Association (NSW)
Coutts Communications
Indigenous Remote Communications Association and Desert Knowledge Australia
South Australian Council of Social Service
Kylie Camp
City of Launceston
Pastoralists' Association of West Darling

9 February 2017 – Port Augusta

Regional Development Australia Far North
Flinders Ranges Council
Isolated Children's Parents' Association
Marree Hotel
Outback Communities Authority
Aaron Stuart
Rawnsley Park Station
Barry and Christine Wakelin
School of the Air

(continued next page)

Table A.4 (continued)

14 February 2017 – Perth

Bruce Bebbington
Mid West Development Commission
Shire of Cuballing
Regional Development Australia Wheatbelt
The Hon. Martin Aldridge MCL
Andrew Mangano
Shire of Coorow
WA Department of Regional Development
Isolated Children's Parents' Association WA
Telstra
Shire of Westonia

B The National Broadband Network

The National Broadband Network (NBN) is a high-speed broadband network that, when complete, will be capable of supplying wholesale broadband internet access to all premises across Australia. The NBN operates on the following bases:

- *open access* — access to the network is provided to all access seekers on a non-discriminatory basis
- *wholesale-only* — NBN Co Limited (nbn) does not supply retail services to end users.

In April 2009, the Australian Government established nbn, a government business enterprise, to build and operate the NBN. Deployment commenced in 2010 and completion is expected in 2020, with around 4.5 million premises declared ‘ready for service’ at 30 March 2017. The Government’s expectation is that the network will be able to:

... provide peak wholesale download data rates (and proportionate upload rates) of at least 25 megabits per second to all premises, and at least 50 megabits per second to 90 per cent of fixed line premises (Fifield and Cormann 2016b, p. 1)

This appendix details the physical and business structure of the NBN and associated rollout and transitional arrangements.

Since the commencement of the rollout, the design of the NBN has evolved due to changes to policy, technology, costs and forecast take-up rates. This appendix focuses on the current network design.

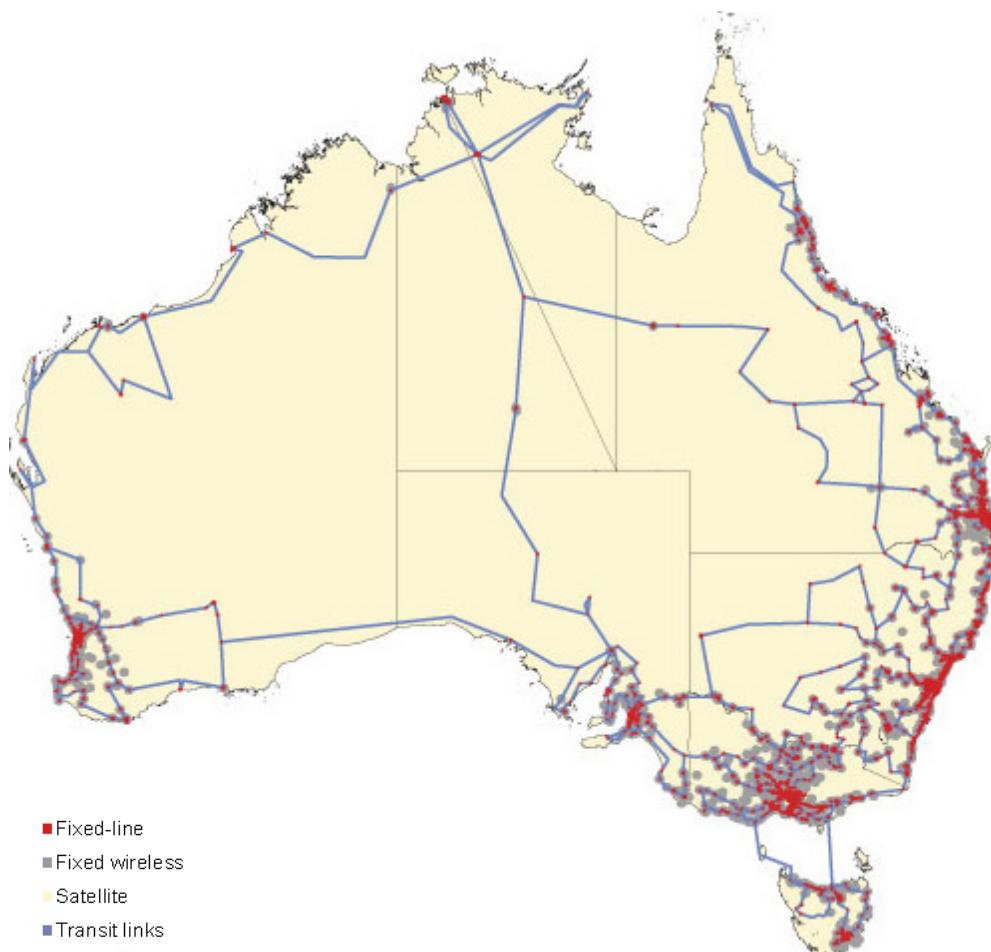
B.1 Structure of the National Broadband Network

nbn’s core product, supplied to access seekers, is an ‘Ethernet bitstream service’ — a service which carries traffic between a ‘user network interface’ (a premises) and a point of interconnect (POI) (nbn 2016n).¹¹⁶ There are 121 POIs located in Telstra exchanges and nbn facilities around Australia (figure B.1), with each connected to premises in the surrounding area.¹¹⁷ To allow the supply of retail broadband services, access seekers connect their core networks (typically located in capital cities) to each POI they wish to reach. They may then provide their own retail services as a retail service provider (RSP) or resell access (such as Optus’ ‘Residential Broadband over NBN’ product).

¹¹⁶ nbn also supplies two other services, a ‘facilities access service’ and an ‘nbn platform interfacing service’ which allow retail service providers to connect to the NBN.

¹¹⁷ All nbn satellite services are supplied from a single POI located in Sydney.

Figure B.1 The three NBN footprints



Source: Australian Government (2011).

The NBN is divided into three footprints — fixed-line, fixed wireless and satellite (figure B.1; table B.1). The fixed-line footprint (92 per cent of premises) is composed of a ‘multi-technology mix’, comprising fibre to the premises (FTTP), fibre to the node (FTTN), fibre to the building (FTTB), fibre to the curb (FTTC) and hybrid fibre coaxial (HFC). A single access technology is used in the fixed wireless and satellite footprints. The three footprints are not contiguously demarcated, with some premises in regional and remote areas served by fixed-line technologies and some fringe metropolitan areas served by fixed wireless and satellite technologies. For example, there are areas where some premises will be served by FTTP and others by satellite (nbn 2014b).

Table B.1 NBN technology mix

Forecasts, at completion of network

<i>Footprint</i>	<i>Technology</i>	<i>Proportion of premises covered</i>	<i>Premises covered</i>
		%	million
Fixed-line	FTTP	17–21	2.0–5.5
	FTTN/B/C	43–54	5.1–6.5
	HFC	21–27	2.5–3.2
Fixed wireless	Fixed wireless	5	0.6
Satellite	Satellite	3	0.4
Total		100	11.9

Sources: nbn (2015a, 2016b).

Subject to meeting network performance requirements, technology choice is determined on an area-by-area basis, with the aim to minimise peak funding, optimise economic returns and enhance nbn's viability (Turnbull and Cormann 2014). Factors such as geography, population density and the location and condition of existing networks determine the most appropriate technology choice. This is especially the case within the fixed-line footprint, where nbn has purchased existing network assets for reconditioning and upgrade. nbn forecasts the cost of deployment per premises to vary by over three-fold across technologies, with FTTP greenfields the least expensive and satellite the most expensive (figure B.2).¹¹⁸

Fixed line multi-technology mix

Covering 92 per cent of premises, the fixed-line footprint comprises the bulk of the NBN, and will also deliver the fastest connection speeds.

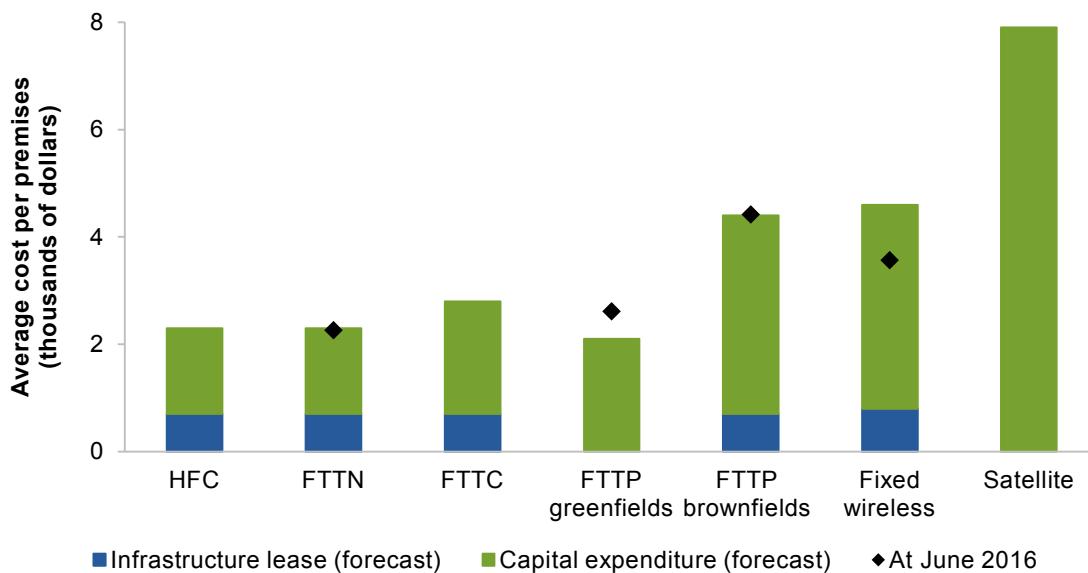
The fixed-line networks are an upgrade of existing network assets. Under commercial agreements with Optus and Telstra, the ownership of Optus' and Telstra's HFC networks and Telstra's copper network is progressively transferring to nbn as NBN infrastructure is rolled out (section B.2).¹¹⁹ Accordingly, Telstra is using NBN infrastructure to deliver on its obligations under the telecommunications universal service obligation (TUSO) within the NBN fixed-line footprint.

118 These costs are only representative in areas where the technology has been, or will be, chosen for deployment. For example, nbn is only using HFC in areas with existing HFC networks, so these costs represent the cost of upgrading the existing HFC network rather than the cost of laying a new HFC network.

119 In September 2016, nbn (2016i) announced that it would not be using Optus' HFC network.

Figure B.2 NBN technologies — construction costs per premises^{a,b}

Forecast cost at network completion and cost as at June 2016



^a Current figures for HFC, FTTC and satellite are not available because at June 2016 no HFC or FTTC premises were ready for service and deployment of the *Sky Muster* satellite service was not complete.

^b Total FTTC figure based on trial estimates and infrastructure lease contribution assumed to be in line with other fixed-line technologies.

Sources: nbn (2015a, 2016b, 2017g).

Fibre to the x

FTTP, FTTN, FTTC and FTTB (collectively known as FTTx) networks involve, to varying degrees, replacing the existing copper network with fibre.

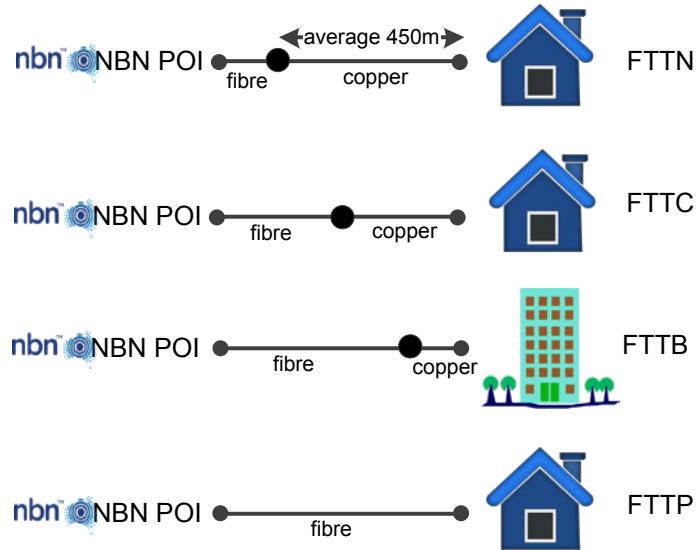
For a FTTP connection (sometimes just known as a ‘fibre’ connection), all copper is replaced so that the premises and the POI are connected entirely by fibre. In brownfields areas, this technology is the most expensive to implement because it involves significant civil works, while greenfields installations cost around half as much (figure B.2).

All other FTTx networks involve retaining a portion of the existing copper lines. For FTTN, fibre connects the POI to a node (street cabinet or micro-node), beyond which the existing copper network connects the node to the premises (figure B.3). FTTC, which nbn (2016i) officially added to the multi-technology mix in September 2016, takes the fibre further — to the individual junction box in the street outside each premises (Simpson 2016).

FTTB is used when connecting a multi-dwelling building, such as an apartment block. A fibre connection is provided to the building communications room, after which existing technology (typically copper) is used to connect each dwelling. In effect, FTTB is a FTTN connection with the node located in the building.

Figure B.3 Fibre to the x networks

A stylised depiction



The data speed achievable over FTTx technologies decreases with the amount of copper present in the network, with copper-free FTTP networks providing the fastest potential speeds.¹²⁰ Two factors apply here. First, shorter copper runs allow the use of faster data transmission technologies. At present, nbn is using ‘Very-high-bit-rate Digital Subscriber Line 2’ (VDSL2) technology over all copper runs. However, nbn is running trials of G.fast and XG.FAST technologies, which have been shown to deliver faster speeds over progressively shorter copper runs. G.fast delivered speeds in excess of 600 Mbps over a 100m copper run (Wilton 2016a), while XG.FAST delivered 8 Gbps over a 30m run (Wilton 2016b). Second, the speed that can be achieved falls as the length of the copper run increases regardless of the technology used.

NBN services are sold by wholesale speed tier (table B.3), although the maximum available speed is dictated by the limits of the network technology. FTTP is offered in seven speed tiers of up to 1000/400 Mbps, while nbn (2016f) claims that around 90 per cent of FTTN users can receive speeds of up to 50 Mbps download and the ‘majority’ can receive 100 Mbps download. The faster FTTN and FTTB speed tiers do not guarantee a wholesale peak speed as the length and condition of the copper line supplying the final connection to the premises may place limitations on the achievable speed. nbn has not yet indicated what speeds will be available to premises receiving a FTTC service.

¹²⁰ nbn offers FTTP at speeds of up to 1000/400 Mbps, but faster speeds are possible over fibre.

Hybrid fibre coaxial

To deliver HFC services, nbn is upgrading Telstra's existing HFC network, originally deployed in the early 1990s to supply cable television but upgraded to supply broadband in 1996 (and again in 2009) (Vertigan Panel 2014). Prior to the NBN infrastructure rollout, Telstra's network was capable of serving approximately 2.5 million premises in Sydney, Brisbane, the Gold Coast, Adelaide and Perth.

As part of the HFC rollout, nbn will upgrade the network again with Data Over Cable Service Interface Specification (DOCSIS) 3.1 technology. This will allow the supply of wholesale speeds in five tiers of up to 100/40 Mbps.

Fixed wireless

nbn's fixed wireless footprint will encompass around 5 per cent of premises (nbn 2016e). Fixed wireless networks use the same cellular technology as mobile networks, but can deliver a more consistent service as the number of users within a cell does not vary (nbn 2015b), and antennas can be optimally positioned. Microwave hops are used to transmit aggregated data from base stations to 'hub sites', after which fibre links carry the traffic to the POI.

To enable the operation of its wireless access networks, nbn holds a combination of spectrum licenced and apparatus licenced (chapter 2, box 2.7) spectrum rights. nbn's spectrum licences include up to 98MHz in the 2.3GHz band and 100MHz in the 3.4GHz band (nbn 2014b), and it was issued apparatus licences for spectrum in the 3.5GHz band at the direction of the Minister for Communications under the *Radiocommunications Act 1992* (Cth) to fill the spectrum 'gaps' identified in the 2014 *Fixed Wireless and Satellite Review*.

Where possible, nbn fixed wireless uses existing mobile infrastructure (nbn 2015b) and all access networks use 4G wireless technology (in line with the current generation of mobile infrastructure). Fixed wireless is offered at three speed tiers, reaching up to 25–50/5–20 Mbps (table B.3). nbn has indicated that it intends to make a 100/40 Mbps speed tier available from early 2018 (Colley 2017).

Satellite

nbn offers satellite broadband to the remaining three per cent of Australian premises not covered by the fixed-line or fixed wireless footprints. The satellite service features interim and long-term measures.

- Interim services have been offered through nbn's Interim Satellite Service and Satellite Support Scheme (often known as the ISS and NSS, respectively). The Interim Satellite Service (supplied by Optus and IPSTAR satellites) reached capacity in June 2013 after 44 000 services had been supplied (BCR 2016a). This prompted the commencement of

the Satellite Support Scheme (supplied by IPSTAR) in July 2014 to provide a further 9000 premises with an interim connection (nbn 2014c). Interim services were reserved for users who could not access a commercial broadband service or another subsidised satellite broadband service (supplied under the Interim Satellite Service or the Australian Broadband Guarantee, which was in operation from 2007 to 2011). The ISS was decommissioned in February 2017.

- nbn's Long Term Satellite Service (known hereafter as the *Sky Muster* satellite service) commenced in 2016 following the launch of the *Sky Muster* satellite in October 2015. A second satellite, *Sky Muster II*, was launched in October 2016. Collectively, these satellites provide capacity of 135 Gbps (107 Gbps for downloads and 28 Gbps for uploads), and speeds of up to 25/5 Mbps. Although the *Sky Muster* satellite service provides coverage to all of Australia, only users outside of the fixed-line and fixed wireless footprints are permitted to receive the service.

Fair use policy

Sky Muster satellite customers face nbn-mandated usage caps to prevent the congestion of the service — known as the fair use policy (table B.2). Each service features a rolling 150 gigabyte (GB) per month cap (at the wholesale level), with further and variable caps on download volumes during peak times depending on the class of service purchased.¹²¹ Caps also apply to the *average* upload and download volumes for each RSP's customers, which further limit data allowances. These caps also vary with the class of service purchased. Premises are limited to one service, with the exception of those with eligible distance education students that are entitled to purchase a second service with a 50 GB per student monthly download limit, up to a maximum of 150 GB per household.

Table B.2 The *Sky Muster* fair use policy

Data caps and additional charges applying to *Sky Muster* services

Additional monthly charge ^a	Maximum average download volume per end user during peak periods ^b	Maximum average upload volume per end user during peak periods ^b	Peak period end user data cap ^c	Total end user data cap ^c
\$	GB	GB	GB	GB
0	30	5	75	150
18	35	6	100	150
40	40	7	150	150

^a In excess of standard nbn wholesale charges. ^b Calculated weekly based on data transfers over the preceding four week period and for each end user in the relevant service class. ^c Includes both upload and download usage.

Sources: nbn (2016d, 2016l).

121 The lowest service class is priced in line with the network-wide price caps for nbn services.

Wholesale pricing

nbn currently operates with a capped wholesale price model, with the caps set uniformly across all of its networks. Wholesale access to the NBN infrastructure involves three charges: the Access Virtual Circuit and User Network Interface (AVC) charge, the Connectivity Virtual Circuit (CVC) charge and the Network to Network Interface (NNI) charge.

Access Virtual Circuit and User Network Interface charge

Levied on a per-end user basis, the AVC charge is a monthly access charge. The charge increases with the chosen speed tier (table B.3), and includes a 0.15 Mbps symmetrical prioritised channel which can be used for supplying a managed VoIP service. For premises served by FTTB, FTTN and fixed wireless, the charge may only guarantee a peak wholesale speed in a range due to the variable nature of the connection offered by these technologies.

Table B.3 Activity Virtual Circuit and User Network Interface charges
Monthly rates

Peak wholesale speed	Availability	Charge
Mbps		\$
12/1	FTTP, FTTN, FTTB, HFC, fixed wireless, satellite	24
25/5	FTTP, FTTN, FTTB, HFC, fixed wireless, satellite	27
25/5-10	FTTB, FTTN	30
25/10	FTTP, HFC	30
25-50/5-20	FTTB, FTTN, fixed wireless	34
50/20	FTTP, HFC	34
25-100/5-40	FTTB, FTTN	38
100/40	FTTP, HFC	38
250/100	FTTP	70
500/200	FTTP	100
1 000/400	FTTP	150

Source: nbn (2016l).

Connectivity Virtual Circuit charge

The CVC charge is an aggregate bandwidth consumption charge. Effectively, in paying the CVC charge RSPs are purchasing the right to transmit over NBN infrastructure a specified quantity of data per second over a monthly period. This bandwidth is then allocated between end users at the RSP's discretion, and, hence, a degree of product differentiation can be generated at this level.

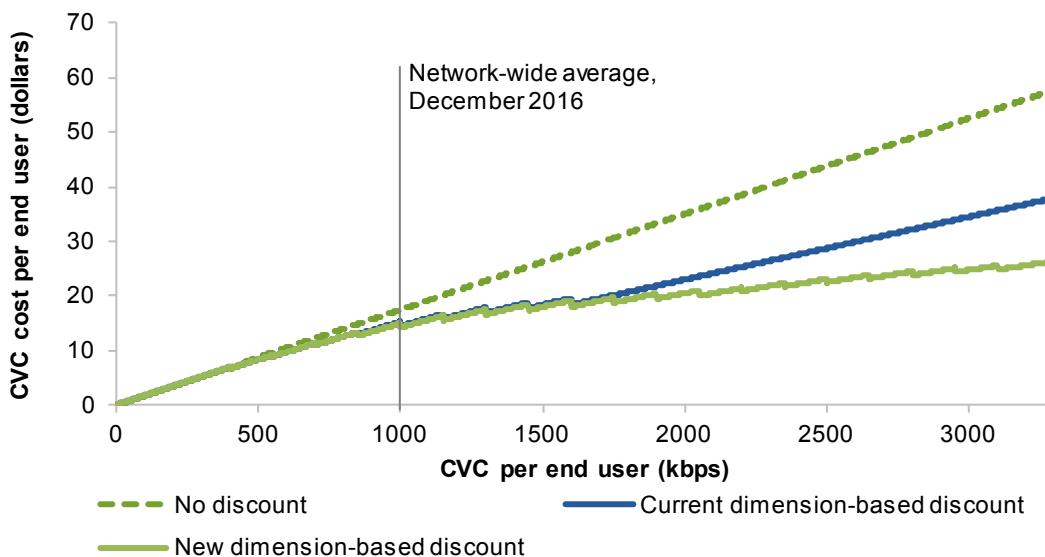
Larger RSPs will typically have to purchase fewer CVCs per customer to generate an equivalent quality of service because of the ability to smooth demand over having a larger pool of consumers (ACCC, pers. comm., 9 September 2016).

Dimension-based discount

In June 2016, nbn introduced a ‘dimension-based discount’ scheme which grants a discount to the unit price of CVC as the network-wide quantity of CVC purchased per end user grows. This led to the provision of an immediate \$1.75 per Mbps discount on the introduction of the scheme. nbn (2017f) is expected to launch a new dimension-based discount scheme in June 2017, with increased discounts on offer — although the difference only becomes significant at bandwidth consumption levels around double the current network-wide average (figure B.4). Importantly, the new model will calculate CVC per end user individually for each RSP, which should encourage RSPs to provision more CVC per end user. The scheme does not apply to *Sky Muster* satellite services.

Figure B.4 The dimension-based discount

Impact on total CVC cost per end user



Sources: nbn (2016c, 2017b).

Network to Network Interface charge

The NNI charge is levied for each POI reached by an RSP, and covers interconnection costs. The charge is small as a proportion of other wholesale costs — for example, modelling by Tsang (2016c) assumes a monthly per end user NNI cost of \$0.20.

These three charges generated an average revenue per end user of \$43 for nbn during 2015-16 (box B.1).

Box B.1 Costs of supplying a retail service over the NBN

NBN wholesale charges

- During 2015-16, the proportion of users on each speed tier was approximately: 33 per cent 12/1 Mbps, 45 per cent 25/5 Mbps, 6 per cent 50/20 Mbps, and 16 per cent 100/40 Mbps. Weighting these tiers by their charge (table B.2) yields an average monthly AVC charge of approximately **\$28 per end user** (Tsang 2016c).
- During the same period, Tsang (2016c) estimates that an average of 0.835 kbps of CVC was provisioned per end user, at a monthly cost of around **\$15 per end user**.
- Combining these two figures yields nbn's **average revenue per end user of \$43**. This is the average NBN wholesale charge for that period.

Transmission charges

- For RSPs that own transmission infrastructure, these costs are not explicit and are likely to be variable.
- For RSPs that purchase wholesale transmissions, the ACCC's regulated domestic transmission capacity service prices can be used to approximate transmission costs. Analysis by Ockerby and Wongsosaputro for nbn (sub. 47, attachment) used this methodology and found that monthly prices would range between **\$0.13 and \$0.71 per end user** under different assumptions.

Funding

nbn is currently funded through Australian Government equity up to a limit of \$29.5 billion. After this, it will receive a loan of \$19.5 billion from the Australian Government, with the expectation that this loan will be re-financed on external markets in 2020-21 (Fifield and Cormann 2016a). The company is set to receive its final \$9.2 billion tranche of equity during 2016-17, and plans to begin issuing debt during 2017-18 (table B.4). Peak funding is expected to be reached early in the 2021-22 financial year, and nbn (2016b) forecasts it will be in the range of \$46 billion to \$54 billion, with \$49 billion as the base case. nbn's weighted average cost of capital is the risk-free rate (10 year Australian Government Bond spot rate) plus 350 basis points (BCR 2016a).

nbn currently operates with a uniform wholesale price model,¹²² where profits from commercial services (primarily fixed-line) cross-subsidise the provision of non-commercial services (primarily fixed wireless and satellite) (BCR 2016a). In its response to the 2014 Vertigan Review, the Australian Government (2014) indicated it

¹²² The BCR (2016a) found that while localised cost differences may render some fixed-line services non-commercial, the fixed-line footprint taken collectively is commercial whereas the fixed wireless and satellite footprints are non-commercial.

would grant nbn the flexibility to adjust prices on a non-uniform basis subject to existing price caps. The Government has also proposed an industry levy (known as the Regional Broadband Scheme) to fund nbn's non-commercial services, and to this end has released draft legislation for comment. The proposed Regional Broadband Scheme is discussed in chapter 8.

Table B.4 nbn funding forecasts
nbn estimates, 2016-17 to 2019-20

<i>Financial year</i>	<i>Equity funding</i>	<i>Debt funding</i>	<i>Cumulative total funding</i>
	\$ billions	\$ billions	\$ billions
2015-16 and previously ^a	20.3	0	20.3
2016-17	9.2	0	29.5
2017-18	0	10.0	39.5
2018-19	0	6.6	46.1
2019-20	0	2.5	48.6
Peak (expected 2021-22)	0	0.4	49.0

^a Actual figure.

Source: nbn (2016b).

Risks and economic viability

Short-term risks to nbn's commercial viability have been mitigated by the recent decision of the Australian Government to offer a commercial loan to nbn.

In the longer term, risks to economic viability centre on competitive pressures exerted by substitutable services. The proposed Regional Broadband Scheme should shield nbn from inefficient¹²³ fixed-line infrastructure competition in commercial areas, but competition from mobile and rival fixed wireless providers is likely to intensify in coming years. In particular, the introduction of 5G technology (expected around 2020) will bring the technical capabilities of wireless technologies closer to fixed-line technologies.

nbn's (2010) long-term estimate is that around 15.6 per cent of households will be mobile-only by 2020 (up from around 8 per cent in 2010). Critiquing this estimate, de Ridder (2015b) said:

I took a bet in January 2011 with two local experts that 20% would be breached by 2020. I think I shall be collecting soon! The BCR tells me that the ABS figure is now 15.9%. On ACMA data it is higher with the BCR stating ... in its latest paper that 'the 21 per cent of

¹²³ Under an unsubsidised uniform wholesale price model, infrastructure providers with higher costs than nbn may be able to undercut its prices in commercial areas because they lack an obligation to supply non-commercial services. Competition of this type is inefficient (Vertigan Panel 2014).

households that do not have a fixed line service would not contribute to the funding of non-commercial services'. (p. 1)

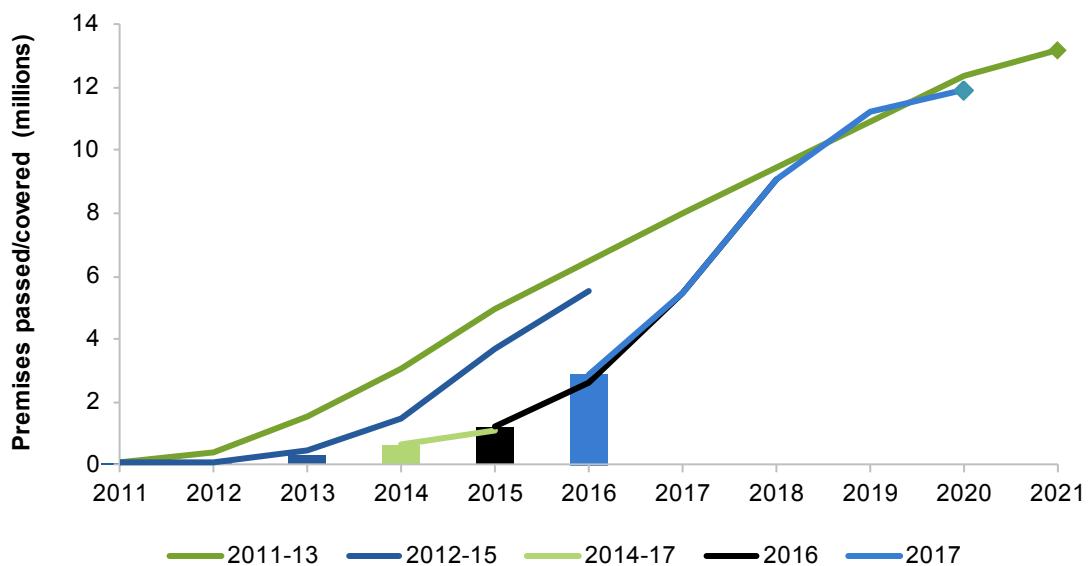
The forecast internal rate of return sits at 3.2–3.7 per cent, having fallen from 7 per cent at the commencement of the project (nbn 2010, 2016b).¹²⁴

Overall, continued technological innovation will provide increased competitive pressure on nbn. This will need to be considered in designing funding arrangements for nbn's non-commercial services (chapter 8) and in the planned forthcoming Productivity Commission review of the NBN (chaper 7, box 7.5 and recommendation 7.4).

B.2 Rollout and transition arrangements

Early on, the rollout of the NBN infrastructure was hampered by delays and ran significantly behind schedule (figure B.5). However, since 2014, rollout plans (while less ambitious) have been exceeded — although more rapid deployment targets loom in coming years.

Figure B.5 Recent rollout targets are being met, but more rapid deployment is required in coming years^{a,b}
nbn Corporate Plan rollout targets (lines) and actual premises passed/covered (bars)



^a 2011–13 forecast revised downward to reflect updated interim satellite service accounting methodology.
^b Markers indicate forecast rollout completion.

Sources: Productivity Commission estimates based on nbn (2010, 2012, 2014a, 2015a, 2016b).

¹²⁴ The 2011–13 Corporate Plan forecast an internal rate of return of 7 per cent over the then planned deployment period of 2010–11 to 2020–21. The 2017 Corporate Plan forecast an internal rate of return of 3.2–3.7 per cent, but did not specify the time horizon over which the forecast was made.

The fixed-line footprint underwent significant redesign following the election of a new Government in 2013, transitioning away from an all-FTTP model toward the multi-technology mix. While this timing coincides with nbn's improvement in meeting targets, this has been due in large part to progress in the delivery of technologies in prospect prior to the redesign — FTTP, fixed wireless and satellite (table B.5). Continued meeting of targets will require the delivery of FTTN/B/C and HFC services on a large scale. In principle, the use of FTTN/B/C and HFC services should allow a more rapid rollout as nbn does not need to replace as much infrastructure in the fixed-line footprint. However, there will be remediation required in some areas due to the degradation of copper lines.

Regarding the rollout of the NBN, the current shareholder Statement of Expectations (Fifield and Cormann 2016b) states:

When planning the rollout, nbn should prioritise locations that are poorly served, to the extent commercially and operationally feasible. During the rollout, nbn should be guided by the following goals: service quality and continuity for consumers; certainty for retail service providers and construction partners; and achievement of rollout objectives as cost-effectively and seamlessly as possible. nbn should apply the Government's new developments policy. (p. 1)

Table B.5 The NBN rollout to date

As at 31 December 2016 unless otherwise indicated

Technology	Premises 'ready for service'	Expected proportion of premises ready for service at network completion (approx.)
	No.	%
FTTP brownfields ^a	1 118 775	93
FTTP greenfields ^b	333 621	42
FTTN/B	1 334 824	22
FTTC	0	0
HFC	158 938	6
Fixed wireless	468 930	78
Satellite	409 377	100
Total	3 824 465	32
Fixed-line (30 March 2017)	3 627 993	33
Fixed wireless (30 March 2017)	489 763	82
Satellite (30 March 2017)	413 544	100
Total (30 March 2017)	4 531 300	38%

^a FTTP brownfields calculated as total FTTP premises ready for service less total greenfields installations.

^b All greenfields installations assumed to be FTTP.

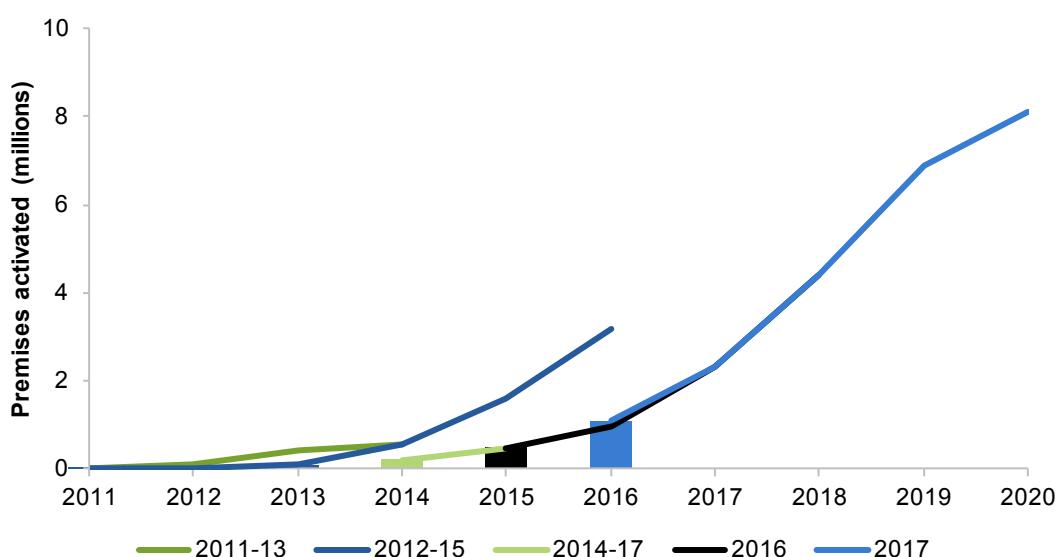
Sources: Productivity Commission estimates based on nbn (2016b, 2017c, 2017d).

Take-up of nbn services

nbn (2016b, p. 39) forecasts the aggregate take-up of nbn services to be 73–75 per cent ‘beyond’ the completion of the network in 2020. However, this figure masks cross-technology differences. Take-up rates are forecast to be significantly lower in the fixed wireless and satellite footprints, at 40–55 per cent and 50–65 per cent respectively (nbn 2014b).

At an aggregate level, the actual take-up of nbn services has matched forecasts since around 2014 (figure B.6).

Figure B.6 Take-up rates have followed forecasts in recent years
nbn Corporate Plan targets (lines) and actual premises activated (bars).



Sources: nbn (2010, 2012, 2014a, 2015a, 2016b).

Migration within the fixed-line footprint

The Department of Communications and the Arts’ (2016g) Migration Assurance Policy Framework governs the migration process within the fixed-line footprint. Once an area is declared ‘ready for service’, consumers accessing services delivered over the existing copper access network have 18 months to migrate to the NBN before the copper network is decommissioned.¹²⁵ During this migration period, responsibilities are shared between nbn, Telstra RSPs and end users. At the wholesale level, nbn is responsible for notifying end users of the declaration and the need to migrate from the copper network, and Telstra must

125 The fixed-line NBN is rolled out in parallel with the existing copper access network to allow a migration period.

maintain the existing copper connection until migration has taken place and is not permitted to connect new copper services. RSPs (including Telstra) supplying copper services are responsible for informing end users of the impact of the migration on their existing service and of available alternative products. The RSP selected to supply an NBN service is responsible for arranging any installation or wiring upgrades or arranging this with a third-party provider. Finally, end users are responsible for ordering a service with their preferred RSP as early in the migration process as possible.

Outside the fixed-line footprint

For Australians residing outside of the fixed-line footprint, existing services are not decommissioned as part of the NBN rollout. Premises may qualify for the copper continuity obligation, such that the copper connection must be maintained (until 2032) unless agreed otherwise. Otherwise, Telstra is obliged under the TUSO to supply a *standard telephone service* over non-NBN infrastructure on request.

Transfer of Telstra and Optus' networks to nbn

Under commercial agreements, ownership of Telstra's copper and HFC and Optus' HFC networks will progressively transfer to nbn.¹²⁶ The transfer occurs on a region-by-region basis as the network is rolled out. After nbn has determined the technology for use in a particular region, it triggers the transfer of the relevant copper or HFC assets and associated infrastructure — meaning that nbn will own those assets by the time of the 'ready for service' declaration. Meanwhile, Telstra will continue to own some required infrastructure such as dark (unused) fibre, exchange rack space, ducts and pits, with access leased for an average of 30 years (Telstra 2014b).

New developments policy

The Australian Government's (2015) Telecommunications Infrastructure in New Developments policy (specifically referenced in the current shareholder Statement of Expectations) details arrangements for the connection of new premises to the NBN or alternative local network.

Competition for the provision of high-speed broadband infrastructure is encouraged in new developments, with developers given the choice over whether to contract nbn or an alternative provider to install infrastructure. If nbn is chosen, developers pay a fixed per-premises cost, a contribution to the costs associated with connecting to nbn's transit network and any pit and pipe costs.

¹²⁶ Although nbn (2016i) announced in September 2016 that it would not be using Optus' HFC network as part of the nbn rollout, ownership of the network will still transfer to nbn.

In the event that a developer is not able to source a broadband infrastructure provider through a competitive process, infrastructure provider of last resort obligations fall on either nbn or Telstra (which can also levy charges for infrastructure). nbn is the infrastructure provider of last resort for fixed broadband and voice infrastructure in:

- new developments, irrespective of size or type, in those areas of its fixed-line footprint declared ‘ready for service’
- new developments of 100 or more lots/premises in those parts of its fixed-line footprint not yet declared ‘ready for service’
- new developments in its fixed-line footprint where nbn has publicly identified an area as a fixed-line rollout region — on the basis rollout regions are announced 12 months prior to the ready for service date.

As part of its obligations under the TUSO, Telstra is the infrastructure provider of last resort for the provision of voice services in:

- new developments that received planning approval before 1 January 2011, but not in developments that are now being serviced by nbn or were ‘landbanked’ (developments approved before 1 January 2011 but not proceeded by that date)
- new developments, whether broadacre or infill, of fewer than 100 lots/premises in the NBN fixed-line footprint not yet declared ‘ready for service’
- new developments in the NBN fixed wireless and satellite footprints.

Statutory Infrastructure Provider regime

Recently, the Australian Government has proposed a statutory infrastructure provider (SIP) regime. The regime, for which the Government (DoCA 2016d) has released draft legislation for comment, would require nbn (and in some circumstances other carriers) to connect infrastructure and supply wholesale services on reasonable request from a retail service provider. This will ensure that all premises will be guaranteed an infrastructure connection and retail service providers will have access to wholesale services supplied on that infrastructure. Other than the current Statement of Expectations which requires nbn to roll out the NBN, there is currently no legal obligation requiring nbn to connect any premises to its network.

The draft legislation provides that during the NBN rollout, nbn will have SIP obligations in all areas where it is supplying wholesale services. After the NBN rollout is completed, nbn will be the default SIP for all of Australia. Other carriers can also become a SIP where appropriate, for example where a carrier is the sole provider of infrastructure in a new development.

C Approaches to universal telecommunications services in the OECD

This appendix outlines approaches to universal telecommunications service¹²⁷ policies in different nations with a particular focus on those adopted by the Organisation for Economic Co-operation and Development (OECD) countries.

The governments of all OECD countries have policy objectives geared towards the provision of telecommunications services on a universal basis.¹²⁸ These objectives are reflected in their legal and regulatory frameworks, national plans or other policy documents. The pursuit of these objectives through such diverse instruments reflects, to some extent, differences in the objectives themselves, but also differences in their respective markets and broader policy settings.

Most countries have longstanding universal service policies focused on voice-based telecommunications services. These policies generally address the *availability*, *accessibility* and *affordability* of such services. However, for broadband services, most OECD countries tend to focus their efforts largely on ensuring universal availability. To the extent that some countries include broadband within a universal service obligation (USO) policy, they also enable broadband to be affordable — generally through uniform pricing.

Comparisons across countries at a comparable stage of development can provide insights into policy design and its relative effectiveness. Nonetheless, country-specific factors can limit their usefulness. For example, Australia has a large landmass and a relatively small and highly urbanised population, leaving large areas sparsely populated. These characteristics present particular challenges to universal service provision that do not necessarily apply to smaller and more densely populated countries. As such, approaches adopted in such countries may not be directly transferable to the Australian context.

Section C.1 of this appendix outlines the main objectives of universal telecommunications service policies across different OECD countries. Section C.2 discusses the scope of these policies in different countries and how they have changed in recent years. Section C.3

127 As explained in chapter 1, this appendix uses the term ‘universal service’ to encompass both ‘universal service’ and ‘universal access’ concepts, unless otherwise noted.

128 Two OECD countries (Mexico and Chile) have objectives to provide at least ‘universal access’ (that is, availability on a shared basis). All others have objectives to provide universal service.

outlines the various arrangements used in OECD countries to deliver universal telecommunications services, separately for voice and broadband. Section C.4 concludes with an overview of funding arrangements mainly focused on improving the availability of universal services.

C.1 Objectives of universal service policies

The objectives of universal service policies in different OECD countries are commonly based on economic and social policy rationales (box C.1). While these rationales are not always explicit, some countries (for example, Finland and France) have explicitly legislated universal service as a ‘right’ (AHRC 2013).

A common goal of universal service policies in many countries is to guarantee the availability of basic telecommunications services to all residents at an affordable price (box C.2).

C.2 The scope of universal service policies

Services covered in the scope of a universal voice service in OECD countries typically include: residential telephone services, access to a comprehensive telephone directory, a directory assistance service, access to free emergency calls, and special services for people with disability. In the 22 European Union (EU) member states¹²⁹ of the OECD, for example, the universal provision of a minimum set of telephone services (of specified quality) is a requirement of the EU Universal Service Directive 2002 (amended in 2009) (European Commission 2016d). This could be provided by market drivers — which the Directive considers to be the main mechanism — or through regulatory interventions such as universal service obligations in cases of market failures (Batura 2016).

However, the inclusion of payphones in the scope of universal services has dwindled over time and many countries are expanding the scope of universal services to include broadband.

129 In 2016, the 22 OECD countries that are members of the EU were: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the UK.

Box C.1 **Rationales for universal service policies in selected OECD countries, 2016**

Canada

In establishing its universal service objective, the Canadian Radio-television and Telecommunications Commission (2016c) said:

Modern telecommunications services are fundamental to Canada's future economic prosperity, global competitiveness, social development, and democratic discourse. In particular, fixed and mobile wireless broadband Internet access services are catalysts for innovation and underpin a vibrant, creative, interactive world that connects Canadians across vast distances and with the rest of the world.

Canadians are using these services to find jobs, manage their investments, conduct business, further their education, keep informed on matters of public concern, consult with health care professionals, and interact with all levels of government. In general, fixed and mobile wireless broadband Internet access services improve the quality of life for Canadians and empower them as citizens, creators, and consumers. (p. 1)

European Union (applicable to 22 OECD countries)

European Union Directive 2009/140/EC, which is applicable to 22 OECD countries, stated:

... the Internet is essential for education and for the practical exercise of freedom of expression and access to information. (Garcia Calvo 2012, p. 57)

United States

The US' National Broadband Plan stated:

... broadband is a foundation for economic growth, job creation, global competitiveness and a better way of life. (FCC 2010, p. xi)

United Kingdom

The telecommunications regulator in the United Kingdom, Ofcom, in its 2005 *Review of the Universal Service Obligation* stated:

... there are both social equity and economic grounds for [a universal service obligation]. It provides services to help vulnerable customers and those in remote and rural areas, whom the market might not otherwise choose to serve, allowing them to take their full part in the economy and society. In addition, all citizens benefit by having a larger telephone network; they can contact and be contacted by more people. Cheap communication also enhances economic growth. (Ofcom 2006, p. 5)

Box C.2 **Objectives of universal service policies in selected OECD countries, 2016**

Australia

In Australia the universal service obligation is the obligation placed on the universal service provider (Telstra) to ensure that standard telephone services, payphones and prescribed carriage services are reasonably accessible to all people in Australia on an equitable basis, wherever they reside or carry on business (ACMA 2016n).

Canada

The CRTC (2016c) recently established the following universal service objective:

Canadians, in urban areas as well as in rural and remote areas, have access to voice services and broadband Internet access, on both fixed and mobile wireless networks. (p. 2)

The goals underpinning the CRTC's universal service framework are:

- Canadians in urban, rural, and remote areas can access affordable, high-quality telecommunications services;
- telecommunications companies continue to invest in and various levels of government continue to fund robust infrastructure that can be upgraded in the future and that is capable of providing high-quality telecommunications services to Canadians across the country;
- Canadians can access innovative service offerings that enhance social and economic development; and
- Canadians can make informed decisions about their telecommunications services. (CRTC 2016c, pp. 1–2)

European Union (applicable to 22 OECD countries)

The EU defined universal services as:

... a minimum set of services of specified quality which is available to all users regardless of their geographical location and, in the light of specific national conditions, at an affordable price. (Garcia Calvo 2012, p. 11)

South Korea

According to the South Korean Telecommunications Business Act, universal service is:

... the basic telecommunications service that any user may receive at an appropriate charge anytime and anywhere within [South] Korea. (Garcia Calvo 2012, p. 62)

Switzerland

The Swiss Constitution (article 92) states that:

The Confederation shall ensure the adequate, universal, and reasonably priced provision of postal and telecommunications services in all regions of the country. (Jaag, Maegli and Morel 2016, p. 232)

United States

The main objective of the Universal Service Fund in the United States is to promote the availability of quality telecommunications services at just, reasonable and affordable rates for all consumers (FCC 2016b).

Public payphones have dwindled in importance

The demand for public payphone services across the world has declined considerably in recent years (CRTC 2015a). This tendency is strongly evident in many OECD countries. For example, the European Commission (2014) reported that in France 80 per cent of payphones were not being used and that 95 per cent of them were loss-making.

The provision of payphone services has also decreased in importance in the scope of universal service policies across the OECD. As at 2014, in 18 of 35 OECD countries, there were no universal service obligations in place to support payphone services. These countries were Belgium, Canada, Chile, Denmark, Estonia, Finland, France, Germany, Israel, Latvia, Luxemburg, Mexico, Netherlands, New Zealand, Poland, South Korea, Sweden, and the United States.

... while universal broadband services have become more prominent

As modern telecommunications services not only include telephone services but also data services, and in view of the economic and social benefits of access to the internet (chapter 5), many developed nations have either widened or are seeking to widen the scope of their universal service objectives to include broadband. In particular, many OECD countries have a national broadband plan designed to provide high-speed broadband services nationally (OECD 2011). The OECD (2015) also noted that these plans increasingly form a key pillar in many countries' digital economy strategies.

The scope of universal services is regularly reviewed

Given the dynamic nature of the telecommunications sector, many governments regularly review the scope of their universal service policies. For example, the European Commission is required to regularly review the list of minimum telecommunications services that the EU member states should provide universally. In these reviews, the European Commission applies two tests:

- first, whether a particular service is a ‘necessary’ service
- second, whether the service is likely to be delivered by competitive market forces, in which case the service is not included within the scope of universal service policies.

This is not to say that member states cannot include additional services within the scope of the universal service policies if they so wish (Batura 2016).

In 2006 and 2008, the European Commission reviewed the scope of the EU universal services policy and decided not to add broadband internet or mobile telephony to the list of universal services (infoDev and ITU 2016). The European Commission determined that access to broadband was not an ‘essential’ service in Europe. While mobile phone services were recognised as essential for social inclusion, the European Commission concluded that market forces were sufficient to deliver these services universally across Europe.

Table C.1 National broadband plans in selected OECD countries
2016

<i>Country</i>	<i>National broadband plan</i>
Australia	Australia's National Broadband Network aims to provide peak wholesale download data rates (and proportionate upload rates) of at least 25 megabits per second (Mbps) to all premises, and at least 50 Mbps to 90 per cent of fixed-line premises, as soon as possible.
Canada	National target to provide 90 per cent of Canadian houses and small business at least 50 Mbps download and 10 Mbps upload for fixed broadband internet access services by 2021 (with the remaining 10 per cent by around 2026–31).
EU (which includes 22 OECD members)	The European Commission's Digital Agenda for Europe aims to provide all European households with access to connectivity offering at least 100 Mbps by 2025.
New Zealand	The national broadband strategy aims to provide 99 per cent of New Zealanders access to broadband at peak speeds of at least 50 Mbps and the remaining one per cent with access at least 10 Mbps by 2025.
United Kingdom	National target to provide 10 Mbps to all UK residents by 2020.
United States	The national broadband strategy aims to provide an actual download speed of 25 Mbps broadband to all Americans by 2020.

Sources: Bauer et al. (2015); CRTC (2016a, 2016c); EC (2016a, 2016b); FCC (FCC 2010, 2015); Fifield and Cormann (2016b); New Zealand MBIE (2016b); nbn (sub. 47).

C.3 Delivery of universal services

OECD governments have taken various approaches in pursuing their universal service objectives. For example, among the 22 EU member countries in the OECD, Batura (2016) noted that the EU's universal services directive considers market forces to be the primary mechanism except in cases of market failure, where regulatory mechanisms are in place.

All OECD countries have moved away from state-owned telecommunications monopolies to a combination of different approaches including:

- imposing USOs on one or more service providers
- allowing competitive market forces to deliver universal services
- establishing universal service funds to disburse subsidies to targeted universal service programs
- using open access networks
- implementing small-scale and targeted universal service programs.

Imposing USOs on service providers

USOs are common for the delivery of voice services

Following the liberalisation of their telecommunications sectors, many OECD governments imposed service obligations on incumbent carriers to meet all reasonable requests for a voice service to ensure that these were available even in non-commercial conditions, typically (but not always) at a reasonable price and a given quality. In 2014, nearly 70 per cent of OECD countries had USOs in place (table C.2). These obligations mainly covered availability but often included uniform national prices and a variety of accessibility obligations.

There has been a gradual shift to contestable models

Over time, USOs have evolved somewhat from the traditional model of *administrative* USOs. These types of USOs were imposed primarily on incumbent (typically former state-owned) carriers without inviting expressions of interest from other service providers.

While this approach remains the most common across the OECD, some countries have shifted to *contestable* USO models (table C.2). As competition in telecommunications markets has strengthened over time, a number of countries (mainly in the EU) have chosen to designate universal service providers through competitive tenders. In 2014, at least three OECD countries had contestable USOs in place — Austria, Hungary, and Portugal.

In general, a competition-based designation applies to a specified time period. The lowest bidder for universal service subsidies is usually designated as the universal service provider. If there are no bidders, the incumbent carrier or the carrier with the largest market share is often designated as the universal service provider for a specified period.

Geographically segmented USOs are also used in the OECD. These USOs are applicable only to a specific geographical area and can be contestable or administrative. This type of USO allows for the gradual phase-out of obligations as the market matures. This approach has been adopted in Canada (box C.3).

USOs are moving to technologically neutral solutions

In the past, regulators have typically required that the telephone service obligation be met as a fixed-line service. More recently, however, governments have increasingly supported technologically neutral approaches to USOs. For example, in the EU, the directives related to the telecommunications sector encourage member countries to formulate technologically neutral regulations (Garcia Calvo 2012). Finland and Norway are examples of OECD countries that currently have technologically neutral USOs in place (Garcia Calvo 2012). However, in some countries (for instance, Canada) the basic voice service obligations still generally applies to a fixed-line service.

Table C.2 Main approaches used by OECD countries to achieve universal telecommunications services
2014

Country	<i>Approach</i>	
	<i>Telephone service^a</i>	<i>Broadband service^b</i>
Australia	Administrative universal service obligation (USO)	A publicly-funded national broadband network and price controls
Austria	Contestable USO	Market forces and targeted public funding for infrastructure projects
Belgium	Market forces	Market forces
Canada	Administrative USO	Market forces and targeted public funding for infrastructure projects
Chile	Universal services fund (USF)	Market forces and targeted public funding for infrastructure projects
Czech Republic	Market forces	Market forces and targeted public funding for infrastructure projects
Denmark	Contestable USO	Market forces
Estonia	Market forces	Market forces and a public funded middle-mile broadband network
Finland	Administrative USO	Administrative USO
France	Administrative USO	Market forces and targeted public funding for infrastructure projects
Germany	Market forces	Market forces
Greece	Administrative USO	Market forces
Hungary	Contestable USO	Market forces and targeted public funding for infrastructure projects
Iceland	Administrative USO	Market forces
Ireland	Administrative USO	Market forces and targeted public funding for infrastructure projects
Israel	Administrative USO	Administrative USO
Italy	Administrative USO	Market forces and targeted public funding for infrastructure projects
Japan	Administrative USO	Subsidised funding for a national broadband network
Latvia	Administrative USO	Administrative USO
Luxemburg	Market forces	Subsidised funding for a national broadband network
Mexico	USF	Universal access of broadband is aimed to guarantee through a national broadband network
Netherlands	Administrative USO	Market forces
New Zealand	Administrative USO	Public-private partnership for two national broadband networks
Norway	Administrative USO	Market forces

(continued on next page)

Table C.2 (continued)

Country	<i>Approaches</i>	
	<i>Telephone service^a</i>	<i>Broadband service^b</i>
Poland	Market forces	Market forces and targeted public funding for infrastructure projects
Portugal	Contestable USO	Market forces and targeted public funding for infrastructure projects
Slovak Republic	Market forces	Market forces and targeted public funding for infrastructure projects
Slovenia ^c	Administrative USO	Market forces and targeted public funding for infrastructure projects
South Korea	Administrative USO	Market forces
Spain	Administrative USO	Administrative USO
Sweden	Market forces	Market forces and targeted public funding for infrastructure projects
Switzerland	Administrative USO	Administrative USO
Turkey	Administrative USO	Administrative USO
United Kingdom ^c	Administrative USO	Market forces and targeted public funding for infrastructure projects
United States	USF	Market forces and targeted public funding for infrastructure projects

^a An administrative USO is typically imposed on an incumbent carrier(s) without inviting expressions of interest from other service providers. A contestable USO is where a designated service provider is chosen by competitive tender. ^b In most OECD countries, a universal service objective for broadband is largely focused on ensuring ‘availability’, mainly through extending broadband services to non-commercial areas.

^c The United Kingdom and Slovenia are planning to include broadband within the scope of their USO.

Sources: European Commission (2015, 2016b); nbn (sub. 47).

Box C.3 **Universal voice and broadband service provision in Canada** 2016

In Canada, universal voice and broadband service objectives are achieved through a combination of universal service obligations (USOs) and competitive market forces.

Geographically segmented USOs

USOs apply only to geographical areas where competition is deemed insufficient to provide universal services. These areas are identified and regulated by the Canadian Radio-television and Telecommunications Commission (CRTC), which is Canada's telecommunications regulator. In regulated areas, the CRTC has stipulated a maximum price for voice services.

Elements that are within the scope of these USOs include residential telephone services, dial-up Internet services, operator or directory assistance services, access to emergency services, voice message relay services, and a print copy of the current local telephone directory.

USOs are imposed on incumbent local exchange carriers (ILECs), which were the monopoly providers of telephone services in their respective geographical areas prior to the 1990s.

Subsidies are provided for meeting the USOs, but only to those ILECs that incur losses when meeting the obligations. The CRTC has defined some geographical areas in Canada as high-cost serving areas (HCSAs), which are primarily located in rural and remote areas. ILECs that meet the USOs in HCSAs are given a subsidy to close the gap between the stipulated rate and the associated costs of providing that service. Having determined that very few gaps in universal voice service remain and that its regulatory focus should move away from telephony towards internet, the CRTC recently decided to phase out most of these local voice service subsidies and establish a new funding mechanism for broadband internet services.

Subsidies are entirely funded through an industry levy. All telecommunications service providers who generate more than CAN\$10 million of annual revenue are required to contribute. In future, contribution-eligible revenues will be expanded to include both retail internet access and SMS service revenues.

Payphone services

Payphone services are not within the scope of the voice USOs. However, the CRTC recognises that payphones are still important to Canadians. In 2015, the CRTC proposed that all ILECs be required to notify communities affected before removing the last public telephone from a particular location.

Competitive market forces

In 2006, the Canadian Government decided to rely on market forces to the maximum extent feasible for the provision of universal services. Accordingly, the Government reduced the number of regulated areas and HCSAs considerably. This resulted in a reduction of the total subsidy provided for meeting basic telephone service obligations from CAN\$920 million in 2001 to CAN\$100 million in 2016. The CRTC has proposed that increases in funding (to reduce the size of the connectivity gap) would be gradual (by CAN\$25 million annually from 2017) and capped (at CAN\$200 million). In particular, the new funding mechanism for broadband internet services will be managed by a third party administrator and competitive tender processes will be used to distribute funds to successful applicants.

Sources: CRTC (2011, 2015b, 2016b); Garcia Calvo (2012).

... but USOs are not as common for broadband services

However, broadband USOs are not common in the OECD. In 2014, only 8 of 35 OECD countries had included or planned to include broadband service within their existing USOs (table C.2). In most of those countries, a minimum broadband speed was also stipulated. For example, in Spain the minimum speed was set at 1 megabits per second (Mbps); in Finland at 2 Mbps; in Switzerland at 600 kilobits per second (kbps); and in Turkey at 512 kbps (Garcia Calvo 2012). In the United Kingdom, the intention is to set the minimum speed at 10 Mbps once their proposed USO comes into effect (expected in 2020) (UK Department for Culture, Media & Sport 2016b).

An increasing reliance on market forces

Many OECD countries increasingly rely on market forces to meet their universal service objectives. In 2014, eight OECD countries relied entirely on market forces to deliver universal voice services (table C.2). However, the national telecommunications regulators of these countries constantly monitor market developments and are empowered to take corrective actions (such as imposing USOs) when markets do not bring about sufficient universal service provision.

Germany is one example of an OECD country that relies entirely on competitive market forces to achieve its universal service objectives. According to the national telecommunications regulator in Germany, the incumbent is well positioned to provide universal services in that country. However, if it decides not to provide universal services, the regulator must be notified at least one year in advance. In such circumstances, there are legal provisions to take regulatory actions (and provide subsidies) to ensure universal service provision. Belgium, the Czech Republic, Estonia, Luxemburg, Poland, Slovak Republic and Sweden are other OECD countries that rely entirely on market forces to achieve universal services for voice-based telecommunications.¹³⁰

Most OECD countries also rely on competitive market forces to deliver their broadband universal service objectives. Currently, most OECD countries rely on competitive market forces together with targeted subsidies aimed to address the gaps that markets are unable (or slow) to fill, as the main mechanism for achieving universality in the provision of broadband services. For example, in 2011, Canada decided not to include broadband within the scope of its existing voice-based USOs as that would have increased the subsidy requirement substantially. Instead, universal broadband goals in Canada are expected to be achieved through a combination of market forces, targeted funding, and public-private partnerships at all levels of government (box C.3).

¹³⁰ In the Czech Republic and the Slovak Republic, certain other services (such as payphones and services for people with disability) are guaranteed through USOs.

Universal service funds are used in some countries

Universal service funds — a system for allocating subsidies to different universal service programs (usually through competitive tendering) — are now used in some OECD countries to improve the availability (and in some cases the accessibility and affordability) of telephone services. The Universal Service Fund in the United States, which provides subsidies for various universal service programs targeting availability, accessibility and affordability, was one of the first of its kind (box C.4). In 2016, Canada also announced the establishment of such a fund to fill gaps in universal broadband services (CRTC 2016c). Chile and Mexico also have universal service funds, but they target ‘universal access’ (that is, availability on a shared basis).

Most OECD countries use a targeted subsidy approach to extend the reach of broadband services even though most of them have not explicitly established universal service funds for this purpose. For example, most of the 22 EU member states of the OECD have made public funds available to disburse subsidies and/or subsidised loans, on a competitive basis, for programs that fill fibre-based infrastructure gaps (table C.2).

Open access arrangements can promote universal service objectives

Many OECD countries use open access arrangements to promote the availability and affordability of telecommunications services. Open access refers to wholesale access to network infrastructure or services provided on ‘fair and reasonable’ terms (OECD 2013, p. 5). In telecommunications, these arrangements can apply to many types of infrastructure networks, including traditional copper, fibre, and wireless networks.

On the one hand, such arrangements can help achieve universal service objectives by stimulating competition in retail markets, which in turn can enhance the availability and affordability of telecommunications services. On the other hand, open access arrangements might also undermine universal service provision by dampening incentives to invest in commercially marginal areas.

Open access obligations on copper networks (on the ‘last-mile’ connection) are common in many OECD countries through the mandatory provision of local loop unbundling (which allows retail level competition over legacy copper wire). However, some OECD countries do not mandate local loop unbundling. These include South Korea, Mexico, Chile, Israel, and the United States (OECD 2013).

Box C.4 The Universal Service Fund in the United States

In the United States, the Universal Service Fund is the primary source of finance for universal service arrangements. The main objective of the Universal Service Fund is to promote the availability of quality telecommunications services at 'just, reasonable and affordable' rates for all consumers.

Scope

The Universal Service Fund aims to ensure:

- universal availability of voice and broadband to homes and businesses
- the availability of mobile voice and mobile broadband where Americans live, work or travel.

Implementation

The Universal Service Fund aims to achieve its objectives through the following four programs.

High-Cost Support (now known as the Connect America Fund)

This program provides support to certain qualifying telephone companies that serve high-cost areas. In turn it helps ensure the residents of these regions have access to a reasonably comparable service at rates reasonably comparable to urban areas. This program also supports extensions to broadband and mobile communications infrastructure in areas that lack these services. Funds for infrastructure projects are distributed through a competitive bidding process.

Low-Income Support (also called the Lifeline program)

This program assists low-income customers by helping to pay for monthly telephone charges. It also supports initiatives to expand phone service for residents of Tribal lands.

Schools and Libraries Support (also known as the E-Rate)

This program provides telecommunications services to eligible schools and libraries.

Rural Health Care Support

This program allows rural health care providers to pay rates for telecommunications services similar to those of their urban counterparts, making telehealth services affordable.

Financing

The Universal Service Fund is financed by contributions from a range of telecommunications service providers including telecommunications carriers (wireline, wireless and satellite), interconnected voice over internet protocol providers, and cable companies that provide voice services. The level of contribution is based on respective interstate and international end-user revenues.

Governance

The Universal Service Fund is administered by the Universal Service Administrative Company, which is an independent, not-for-profit corporation. The annual monitoring report of the Federal Communications Commission — the telecommunications regulator of the United States — tracks contributions and disbursements.

Source: FCC (2016c).

Open access fibre-based networks are becoming more common in OECD countries. Once it is rolled out, Australia's National Broadband Network (NBN) infrastructure will be one of the most extensive open access fibre-based¹³¹ networks in the world. New Zealand's fibre network is another nationwide open access network. In many other OECD countries, at least some parts of the fibre footprint are open access networks. For example, in the Canadian province of Alberta, an open access network is used to provide high-speed broadband services across that province — especially in its sparsely populated rural areas. A public-private partnership arrangement underpins this network. The Alberta Government owns a fibre network, Alberta SuperNet, which spans across Alberta province. Axia, a private company, has a ten-year renewable contract with the Alberta Government to provide wholesale services to interested retail service providers at prices that are benchmarked against metropolitan wholesale rates (Axia NetMedia Corporation 2007). Retail service providers deliver broadband services in a competitive environment. Axia, as the operator of Alberta SuperNet, is not allowed to provide retail services. Other examples of partial open access regimes for fibre networks are also evident in countries such as Denmark, Spain and Sweden.

Open access arrangements also apply to wireless networks in many OECD countries including Australia, France and Japan. In these countries, mobile carrier licenses are generally restricted to a small number of carriers due mainly to the scarcity of spectrum. However, commercially negotiated open access arrangements allow many retail service providers to operate off these networks (OECD 2013). The Australian Competition and Consumer Commission is examining other countries' experiences with inter-carrier mobile roaming in their inquiry on domestic mobile roaming regulations (ACCC 2016e).

Small-scale community-based programs

Across a wide range of countries, small-scale programs initiated by cooperatives, local governments, educational institutions, private entrepreneurs, and non-government and community-based organisations provide telecommunications services in areas that are unserved or under-served by commercial service providers. Rural telecommunications service provision by cooperative societies in some parts of the United States and by community-based organisations in some parts of Australia are examples of such programs.

C.4 Funding arrangements

While much of the material in this appendix covers the availability, accessibility and affordability elements of universal service provision, this section largely focuses on how the availability element of a universal service objective is funded.

¹³¹ NBN's fixed line footprint (which comprises 92 per cent of Australian premises) will made up a mix of fibre-based technologies: fibre to the premises, fibre to the node, fibre to the building, fibre to the curb and hybrid fibre coaxial cable (appendix B).

The pursuit of a universal service availability objective often entails the mandated provision of services in areas that are assessed as non-commercial. There is a diverse range of approaches used in OECD countries to address the funding of such services.

Most OECD countries have ‘defined’ a universal service funding approach within their legislative framework. The most commonly ‘defined’ approach is funding through an industry levy (nearly half of all OECD countries). Other commonly ‘defined’ approaches are funding entirely by general government revenue (budget funded) and a mix of an industry levy and general government revenue. However, not all countries implement their ‘defined’ approaches (table C.3).

In practice, there appears to be no clear relationship between the type of program funded and the funding method used. The diversity in the choice of funding approaches may reflect different factors, including the required funding amount, a country’s fiscal and macroeconomic situation, its political leanings, historical precedent and so on.

Many OECD countries provide no compensation

In 2015, nearly half of the OECD countries did not provide recurrent subsidies for universal service provision (table C.3). In countries such as Ireland, Norway and the United Kingdom, the obliged universal service providers are not compensated because it is deemed that they do not incur an unfair burden in fulfilling these obligations. For example, in the United Kingdom, where Ofcom assessed the net costs of the USO in 2005, it deemed that the costs of universal provision of telephone services and payphones were not substantially higher than the associated benefits (ubiquity benefit, life-cycle effects, brand enhancement, corporate reputation and advertising on public payphones) (Garcia Calvo 2012). On this basis, Ofcom determined that the universal service providers did not incur an unfair burden in fulfilling their obligations and, hence, did not require a subsidy.

... and many rely solely on industry funding

Of the OECD countries that provided subsidies in 2015, the majority (almost two-thirds) used industry levies to fully fund universal service provision. This was the case in 11 OECD countries: Canada (although this arrangement is being phased out (box C.3)), France, Iceland, Japan, Netherlands, New Zealand, Portugal, Slovenia, South Korea, Spain, and the United States. In some of these countries, industry levies were directed to a universal service fund from which subsidies were subsequently disbursed. In others, the levies were disbursed directly to the relevant universal service providers.

Table C.3 Universal service funding approaches in the OECD
Approaches to recurrent funding primarily targeted at availability, 2015

Country	<i>Funding approach</i>	
	<i>The 'defined' approach^a</i>	<i>The approach implemented</i>
Australia	Budget contribution and industry levy	Budget contribution and industry levy
Austria	Private agreement between the universal service provider and the largest 10 other providers	Private agreement between the universal service provider and the largest 10 other providers
Belgium	Industry levy	No funding
Canada	Industry levy	Industry levy
Chile	Budget funded	Budget funded
Czech Republic	Budget funded	Budget funded
Denmark	Budget contribution and industry levy	Budget contribution and industry levy
Estonia	Not defined	No funding
Finland	Budget funded	No funding
France	Industry levy	Industry levy
Germany	Not defined	No funding
Greece	Industry levy	No funding
Hungary	Industry levy	No funding
Iceland	Industry levy	Industry levy
Ireland	Not defined	No funding
Israel	Not defined	No funding
Italy	Industry levy	No funding
Japan	Industry levy	Industry levy
Latvia	Budget funded	Budget funded
Luxemburg	Not defined	No funding
Mexico	Budget funded	Budget funded
Netherlands	Industry levy	Industry levy
New Zealand	Industry levy	Industry levy
Norway	Not defined	No funding
Poland	Industry levy	No funding
Portugal	Industry levy	Industry levy
Slovak Republic	Industry levy	No funding
Slovenia	Industry levy	Industry levy
South Korea	Industry levy	Industry levy
Spain	Industry levy	Industry levy
Sweden	Not defined	No funding
Switzerland	Not defined	No funding
Turkey	Budget contribution and industry levy	No funding
United Kingdom	Not defined	No funding
United States	Industry levy	Industry levy

^a The 'defined' approach is one that is specified in legislation.

Sources: European Commission (2016c); ITU (2016).

New Zealand provides another example of where subsidies for the provision of universal voice services are entirely funded by an industry levy. Every year, the Commerce Commission (the regulatory authority in New Zealand) estimates the subsidy amount to be distributed to universal service providers and accordingly determines the amount to be collected via the levy. The funds collected are paid directly to universal service providers (Commerce Commission New Zealand 2016).

... or a mix of industry- and government-funded subsidies

In some OECD countries, such as Australia and Denmark, subsidies for universal service provision are funded by a combination of industry levies and appropriations from the national budget.

Some rely entirely on government to fund universal services

In some countries, subsidies for universal service provision are entirely funded from the national budget. In four OECD countries — Chile, the Czech Republic (payphones only), Latvia and Mexico — universal service subsidies, albeit small, are entirely funded by general government revenue.

D Affordability and the NBN

Most users of fixed telecommunications services are expected to migrate to National Broadband Network (NBN) infrastructure as it is rolled out across Australia. This appendix assesses the relative affordability of broadband and voice services currently available over the NBN, with a particular focus on users of voice services over NBN Co Limited's (nbn) fixed-line network and low-income users.

SACOSS and ACCAN (subs. DR85; DR124) along with other participants (such as RDA Northern Territory, sub. DR115 and Wamboin Communications Action Group, sub. DR151) were critical of the Commission's analysis of these services in the draft report. Their main criticisms were that the analysis did not: cover *baseline* broadband or voice services; factor in the relative quality of different services (particularly for voice services over *Sky Muster*) in its comparisons of plans; account for differences between the minimum data allowances offered in nbn and legacy plans; and did not consider the growing demand for higher data speeds and allowances.

In the light of some of these criticisms, particularly in ensuring like-for-like comparisons, the Commission has reviewed its analysis and findings.

Section D.1 describes the methodology and sources of data used in this analysis. Section D.2 presents the results.

D.1 Methodology and sources of data

Assessing the relative affordability of telecommunications services over the NBN was undertaken in two steps.

- The first step was to identify basic fixed broadband and voice packages available from retail service providers (RSPs) in the market through desktop research.
- The second step was to compare the relative affordability of these packages. The primary measure of relative affordability used was the price of the package. If the price of NBN packages was lower than that of other basic fixed broadband and voice packages, then that indicates an improvement in affordability for users migrating to the NBN. The share of disposable income spent on packages was also considered as a measure of affordability.

Data for this analysis were collected from multiple sources.

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- Prices and service inclusions of various broadband packages were collected from www.whistleout.com.au, which compares broadband packages offered by 38 service providers.
 - Information on basic voice services offered by Telstra was collected from Telstra's website (www.telstra.com.au).
 - Information on packages offered by RSPs over nbn's *Sky Muster* service was collected from their respective websites.
 - Data on disposable household income were collected from the Australian Bureau of Statistics.

The analysis is subject to a number of simplifying assumptions and qualifications.

First, the analysis does not focus on the affordability of a service that necessarily meets a *baseline* standard, but on packages that offer the cheapest comparable service.

Second, the analysis does not take account of the quality of the voice call over different NBN technologies. Some users, such as those migrating from a fixed *standard telephone service* to nbn's *Sky Muster* service, may experience a lower quality of voice service compared with other users (chapter 6).

Third, the analysis does not examine the affordability of mobile services or a consumer's use of multiple telecommunications services. Use of mobile services has become widespread and these consumers have enjoyed falling prices and improved product offerings (ACCC 2017; chapters 2 and 6). Consumers are also increasingly making use of a mix of telecommunications services to minimise expenditure on telecommunications or to meet their specific needs. This includes Over-the-Top voice over internet protocol (VoIP) services such as Skype and WhatsApp, which offer free calls and messaging (chapter 2). Using a combination of telecommunications services can be cheaper than a single service and further price discounts can apply where providers 'bundle' these services.

Finally, the analysis assumes that the caller and recipient of the call are with different RSPs. If they are with the same RSP, charges for a call between them may be lower or even free.

D.2 Results

The price of basic fixed broadband packages over NBN and ADSL

Asymmetric digital subscriber line 2+ (ADSL2+) technology provides the fastest broadband speeds for most Australian premises that are not yet connected to NBN

infrastructure.¹³² ADSL2+ has peak theoretical download rates of up to 24 megabits per second (Mbps), although rates may be much slower in practice. NBN infrastructure is capable of providing much faster broadband. Retail connections are sold in speed tiers, with peak download speeds ranging from 12 Mbps to 1000 Mbps, although higher speeds are not available in some areas.

Prices for basic broadband packages are similar for ADSL2+ and NBN products, although NBN products are slightly more expensive in non-metro areas (table D.1). Account also needs to be taken of the lower quality of service likely to be available over nbn's satellite network, including the data caps imposed.

Table D.1 Basic broadband packages in Australia^a
March 2017

Technology	Provider	Monthly data allowance	Peak speed	Monthly price
			(download)	
Metro areas				
ADSL2+ ^b	Spin Tel	40	Up to 24	39.95
NBN (Tier 1)	teleron	50	12	40.00
NBN (Tier 2)	teleron	50	25	49.00
Non-metro areas				
ADSL2+ ^b	Spin Tel	40	Up to 24	39.95
NBN (Tier 1)	southern phone	50	12	45.00
NBN (Tier 2)	southern phone	50	25	55.00
NBN (Satellite, Tier 1) ^c	iiNet	60	12	39.99

^a Broadband prices and what is included in the service package are changing rapidly. Prices exclude any upfront costs. Some services may not be available in all areas and pricing may vary depending on the exchange to which a customer is attached. ^b Monthly prices of ADSL2+ packages include home phone line rental. Actual peak speeds depend on the length of the copper run from the exchange to the premises, and may be much less than 24 Mbps download. ADSL2+ is not available in areas where NBN fixed-line services are available. ^c The NBN Satellite package listed includes a 20GB peak and 40GB off-peak monthly data allowance.

Source: WhistleOut (2017).

132 Across Australia, around 91 per cent of premises were capable of receiving asymmetric digital subscriber line (ADSL) or digital subscriber line (DSL) broadband services and 24 per cent of premises were capable of receiving hybrid fibre coaxial (HFC) services in 2013 (DoC 2013). However, due to significant overlaps, the combined coverage of these networks was around 94 per cent of premises. Because the majority of consumers receiving HFC broadband can also receive ADSL/DSL broadband, and DSL broadband is generally available for a lower price than HFC broadband, this appendix does not consider the affordability of HFC broadband packages.

The price of voice-only services for customers migrating to nbn's fixed-line and fixed wireless services

Following the rollout of NBN infrastructure, premises in the fixed-line and fixed wireless footprints will be able to access a fixed voice-only service.

The price of fixed voice-only services is unlikely to change for most customers seeking this service over NBN infrastructure. Both Telstra and Optus do not distinguish customers on their existing networks from customers on NBN fixed networks.

- Telstra's *standard telephone service* under the telecommunications universal service obligation is currently available across Australia for around \$26 per month (plus call charges) and is also available to customers on NBN fixed-line services.
- Optus' home phone plans — currently starting from \$22 per month (plus call charges) are available to customers of Optus' hybrid fibre coaxial (HFC) networks and portions of the copper access network, as well as to customers on NBN fixed-line and fixed wireless services (table D.2).

Table D.2 The prices of Telstra and Optus home phone packages^a

	<i>Monthly rental</i>	<i>Local calls^b</i>	<i>Standard national calls^c</i>	<i>Calls to standard Australian mobiles</i>
Telstra Home Phone Basic ^d	\$25.95	\$0.30 per call	\$0.25 per minute plus \$0.55 call connection fee	\$0.36 per minute plus \$0.55 call connection fee
Telstra Home Phone National ^d	\$50.00	Included	Included	\$0.30 per minute plus \$0.55 call connection fee
Optus Phone Plan ^e	\$22.00	\$0.30 per call	\$0.20 per minute plus \$0.45 call connection fee	\$0.20 per minute plus \$0.45 call connection fee

^a Prices exclude any upfront costs. ^b Local calls are calls made within a local area. ^c Standard national calls are long-distance calls to fixed-line numbers within Australia. ^d Telstra home phone packages are available over the NBN fixed-line network and the copper access network within the NBN fixed wireless and NBN satellite footprints. They are not available over nbn's fixed wireless or *Sky Muster* services. ^e Optus home phone packages are available over Optus' HFC network, the NBN and the copper access network.

Source: Online prices as advertised by each listed service provider, March 2017.

The price of obtaining voice services over nbn's *Sky Muster* service

Voice-only packages are not available over nbn's *Sky Muster* service (nor are the Customer Service Guarantee or Priority Assistance available). Customers wanting a voice service need to purchase a bundled broadband and managed VoIP service, but not all RSPs offer this service. The monthly rental associated with obtaining a VoIP package over nbn's *Sky Muster* service can vary from \$35 to \$45 per month (excluding upfront costs), although the

per call charge can be lower than fixed voice-only services (table D.3). However, fixed voice-only and managed VoIP over *Sky Muster* services are not strictly comparable and any price differences need to take account the lower quality of voice calls over satellite services.

Table D.3 The price of obtaining VoIP services over nbn's *Sky Muster* service^a

	<i>Monthly price^b</i>	<i>Local calls^c</i>	<i>Standard national calls^d</i>	<i>Calls to standard Australian mobiles</i>
SkyMesh	\$34.95	\$0.10 per call	\$0.10 per call	\$0.30 per minute
Clear Networks	\$37.90	\$0.13 per call	\$0.13 per call	\$0.27 per minute
Activ8me	\$39.95	\$0.11 per call	\$0.17 per call	\$0.25 per minute plus \$0.38 call connection fee
ANT Communications	\$42.90	Included	Included	\$0.26 per minute
IPSTAR	\$44.95	\$0.10 per call	\$0.10 per call	\$0.27 per minute
Harbour ISP	\$45.00	Included	Included	\$0.27 per minute

^a Comparison is limited to monthly prices and a selected set of call charges. Different RSPs may offer additional services to those listed in the table. Prices of the lowest cost packages were taken into account in the comparison. ^b Monthly prices of VoIP packages include the monthly prices of the cheapest broadband package by the same provider. All prices exclude any upfront costs. ^c Local calls are calls made within a local area. ^d Standard national calls are long-distance calls to fixed-line numbers within Australia.

Source: Online prices as advertised by each listed service provider, March 2017.

What about the affordability of services for low-income consumers?

Voice services

Table D.4 sets out some affordability estimates assuming stylised circumstances facing households in the lowest income quintile that use either fixed-line voice or satellite voice services (scenarios 1 to 3). These scenarios represent only limited use of a home phone for standard national calls and/or for emergency calls and incoming calls. In all scenarios, low-income households spend on average less than 3 per cent of their disposable household income on a voice service.

- For a low-income household obtaining a Telstra Home Phone package over a fixed-line NBN or copper service, the affordability of such a service depends on how much it uses the service and can range from 1.5 to 2.8 per cent of disposable household income. However, the share of disposable income can be higher if households do not select a package that best suits their needs.
- For a low-income household that obtains the cheapest available VoIP package over nbn's *Sky Muster* (which includes a basic broadband package), spending can range from 2.0 to 2.4 per cent of disposable household income. However, users of *Sky Muster*

may experience a less reliable and lower quality voice service compared with users of a *standard telephone service*.

Table D.4 Stylised examples of affordability of voice services for low-income households^a

Telecommunications voice option	Average share of disposable household income spent on a voice service ^b		
	Scenario 1: One 2-minute standard national call per day	Scenario 2: Five 2-minute standard national calls per day	Scenario 3: Emergency calls and incoming calls only
	%	%	%
Telstra home phone ^c	2.8	2.8	1.5
NBN satellite ^d	2.2	2.4	2.0

^a Low-income households are defined as households in the lowest ‘equivalised’ disposable household income quintile. An equivalising factor adjusts for households of different size and composition. ^b Mean monthly equivalised disposable household income (adjusted) for the lowest income quintile in 2013-14 was \$1764. ^c Telstra home phone prices for scenarios 1 and 2 are based on Home Phone National package and scenario 3 is based on Home Phone Basic package. ^d NBN satellite voice prices for scenarios 1 and 3 are based on NBN- SA- 5- 5 and SkyMesh voice packages offered by SkyMesh and scenario 2 is based on ANT Communications. All prices exclude any upfront costs.

Sources: Productivity Commission estimates based on ABS (*Household Income and Wealth, Australia, 2013-14*, Cat. no. 6523.0) and online prices advertised (as at March 2017) by ANT Communications, SkyMesh and Telstra.

Basic broadband services

Basic broadband packages represent a small share of disposable household income for most low-income households. The basic broadband packages for premises listed in table D.1 (both ADSL2+ and NBN products) can range from 2.3 to 3.1 per cent of disposable household income for the lowest income quintile. It should be noted that these calculations exclude any upfront costs to connect to a broadband service. Disposable income among low-income households can also vary, as can households’ preferences for broadband usage. Households may not necessarily purchase a basic broadband package, with more premium packages involving a greater share of household income.

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