Regional Telecommunications Review 2018

Submission by the Australian Communications Consumer Action Network

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About ACCAN

The Australian Communications Consumer Action Network (ACCAN) is the peak body that represents all consumers on communications issues including telecommunications, broadband and emerging new services. ACCAN provides a strong unified voice to industry and government as consumers work towards availability, accessibility and affordability of communications services for all Australians.

Consumers need ACCAN to promote better consumer protection outcomes ensuring speedy responses to complaints and issues. ACCAN aims to empower consumers so that they are well informed and can make good choices about products and services. As a peak body, ACCAN will represent the views of its broad and diverse membership base to policy makers, government and industry to get better outcomes for all communications consumers.

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Executive Summary and Recommendations

Australian Communications Consumer Action Network (ACCAN) would like to thank the Regional Telecommunications Independent Review Committee (RTIRC) for the opportunity to submit to its review. The Regional Telecommunications Review is the foremost forum for examining geographic equity in telecommunications services and consequently provides a unique opportunity to contribute to the development of policy to support regional telecommunications services and regional communities.

Communications are an essential service for consumers and play an increasing and important role in accessing private and public services. Access to communication services ensures that individuals can remain socially connected, engage with health and emergency services as well as educational and employment opportunities (PC 2017, p. 29; Graham 1999).

Telecommunications in regional and remote Australia have received significant attention and investment in recent years, a reflection of the considerable benefits that greater digital inclusion may bring to regional consumers, communities and economies. However, despite this, considerable challenges remain in infrastructure, affordability and digital literacy.

There is a need for ongoing policy development to bridge the digital divide and achieve digital inclusion for all Australians, irrespective of where they live and work. For regional and remote Australia, this means an ongoing commitment to existing policies such as the universal service obligation and uniform pricing, as well as a renewed commitment to further funding for investments in infrastructure that reflect community needs and aspirations (in mobile blackspots, public wifi and mobile extenders); targeted financial support for individuals facing affordability challenges; and digital literacy programs that reflect the realities of living in remote areas.

Addressing the challenges faced in regional and remote communities requires targeted policy action, and for some communities an additional level of commitment is required. To this end ACCAN calls on government to address the acute digital divide experienced by Indigenous Australians through an Indigenous Telecommunications Strategy that takes a comprehensive approach to the challenges that exist in remote infrastructure, affordability and digital literacy.

Government must make an ongoing commitment to ensuring that consumers in regional and remote Australia can continue to access the services that they need. However many regional and remote consumers are currently facing considerable uncertainty concerning the future provision of services that they rely on, and we call upon the government to provide clear guidance concerning the continuation of ADSL services.

Although action by government can directly address many of the challenges faced in regional and remote Australia, government can also enable better outcomes through targeted measures to support competition in regional and remote telecommunications markets. Consumer outcomes in regional and remote Australia are typically poorer than those achieved in metropolitan centres, as a result of insufficient consumer service guarantees at a wholesale and retail level for fixed services, as well as poor provision of information concerning mobile services.

The lack of consumer standards and information has meant that providers have historically had little incentive to provide service offerings that meet the needs of consumers and been subject to limited transparency concerning the quality of the service that they offer. As part of our submission we have made several recommendations to maintain and improve competition, through spectrum sharing arrangements for wireless internet providers and greater disclosure concerning mobile coverage and data throughput.

Where consumers are informed about the quality of networks and services on offer they will switch to the best available. In regional mobile communications, this creates strong incentives for providers to invest and provide the best possible service, in the knowledge that if they don't they risk losing the market, not just part of their market share.

The needs and concerns of regional and remote consumers are diverse, and as a consequence our submission touches upon a broad variety of issues, in summary ACCAN's submission argues:

- For a continuing program of investment in regional and remote mobile infrastructure, public wifi services and mobile signal extenders;
- For the introduction of consumer protections through reliability standards and service guarantees for voice and data services;
- There is a need for the provision of targeted consumer information concerning the options that consumers have to legally extend mobile signals;
- For the provision of detailed information concerning mobile service coverage and average performance to better inform consumer decisions and enhance competition;
- That Sky Muster services only be provided only where a consumer has a genuine need for the service and there are no alternative service options;
- That government should develop an ADSL Future Service Strategy outlining how consumers remaining on the ADSL network will continue to receive services into the future;
- For the extension of the Broadband Performance Monitoring Program across all NBN technologies;
- That the ACMA and the ACCC examine options for arrangements to promote the sharing of spectrum in regional Australia to ensure that wireless service providers can continue to bring competition to regional broadband markets.
- That government adopt a universal service obligation that is technologically neutral and provides access to both voice and data.

Recommendation 1

That the government commit to the ongoing funding of broadband services in regional, rural and remote Australia and commit to a long-term funding policy.

Recommendation 2

That the government commit to reviewing existing affordability policies including the Centrelink Telephone Allowance to provide greater support to low income Australians living in the regions.

Recommendation 3

That wholesale broadband performance standards and reliability measures are adopted to underpin the provision of voice and data services over NBN, to deliver more accountability from providers and NBN Co.

Recommendation 4

That RSPs and NBN Co be required to provide up to date and accurate information concerning coverage and reliability of network services to consumers in a format they can use.

Recommendation 5

That government articulate a policy vision for targeted strategies to support digital literacy in regional and remote Australia.

Recommendation 6

The government develop a comprehensive Indigenous Telecommunications strategy to ensure Indigenous digital inclusion.

Recommendation 7

That only those with a genuine need for the service, without alternative options should be put on Sky Muster.

Recommendation 8

That the ACCC be sufficiently resourced to carry out the Broadband Performance Monitoring and Reporting Program across all NBN technologies.

Recommendation 9

- *That guidelines for future publically funded mobile network expansion take into account the public benefit of new coverage for vulnerable populations and important community locations.*
- *That the government commit to long term public funding being made available for open access mobile network expansion in regional and remote Australia.*

Recommendation 10

That retail service providers be required to provide detailed information concerning what technical measures or equipment that are available to consumers to enhance their mobile reception.

Recommendation 11

An ADSL Future Service Strategy which factors in implications by and for the NBN rollout should be formulated by government in consultation with consumers. This ADSL future service plan should be clearly explained to affected customers.

Recommendation 12

That the ACCC undertake an inquiry into the barriers to and level of competition in regional and remote telecommunication markets.

Recommendation 13

That the ACMA in conjunction with the ACCC examine options for promoting the sharing of spectrum in regional and rural Australia to ensure that competition is not diminished through the loss of competitive broadband services.

Recommendation 14

- *That the government prioritise the passage of the Telecommunications Legislation Amendment (Competition and Consumer) Bill 2018 in the upcoming spring Parliamentary sitting.*
- *That the Department of Communications and the Arts work with Telstra to develop improved arrangements for adequate performance levels and repair timeframes in the delivery of current USO services.*
- *That the Government develop a future universal service guarantee for voice services with adequate performances levels and reliability measures, across all delivery technologies.*

Recommendation 15

That the Department of Communications and the Arts conduct research on the use of payphones in remote communities and areas without mobile coverage before considering any options to reduce Telstra's $44m payphone obligation.

Barriers to greater use of digital technologies

Question 1

What are the main barriers to people in regional communities increasing their use of digital technologies and possible solutions for overcoming these barriers?

Regional Australians face barriers to increasing their use of digital technologies that are diverse as the communities and regions in which they live, and the unique challenges that they face often require place and population specific policy interventions in order to be effective. There are however commonalities in the barriers faced by regional Australians in making greater use of digital technologies which may broadly be defined as:

- Infrastructure and equipment;
- Affordability;
- Awareness, digital literacy and user appropriate services.

These factors align with international research undertaken by the OECD (2018, p. 44-46) into the driving factors of the rural digital divide. The OECD also identifies trust as a significant barrier to uptake of digital services for some individuals (2018, p. 45). A lack of trust in the internet is generally a reflection of lower levels of digital literacy and confidence in engaging with the online world, and as a consequence these issues have been considered together.

Infrastructure and equipment

In recent years the level of infrastructure investment in telecommunications, public and private has been significant, with $10.8 billion invested in 2016-17 (BITRE 2017, p. 259) This investment is reflective of an ongoing trend of exceptionally high levels of investment reflecting both the rollout of the National Broadband Network and greater investments by private operators in next generation telecommunications infrastructure.

The level of investment in telecommunications infrastructure has also been significant at a national level, and in 2016-17 accounted for 22.6% of total major engineering work done in 2016-17, outstripping the levels of investment in water and energy infrastructure (BITRE 2017, p. 259).

The investments in regional telecommunications as part of the national broadband network have been significant and led for many consumers to considerable improvements in the speeds and reliability of the services that they can now access. The NBN has also enhanced competition in the retail space by providing a level playing field through uniform wholesale pricing.

Mobile infrastructure

ACCAN, as a member of the Rural, Regional and Remote Communications Coalition (RRRCC), supports long term public funding for open access mobile network expansion in regional and remote Australia. Accordingly ACCAN supports the efforts of the Federal government in providing approximately $220 million in government funds through the mobile blackspots program (DOCA 2018), a program that has been successful in leveraging a total investment of $680 million (DOCA 2018). The funding contributions by state governments have also been significant.

Investments in mobile infrastructure have been modest in comparison to those in fixed services infrastructure. As a consequence there continue to be barriers to regional communities leveraging mobile networks to support more sophisticated digital applications including internet-of-things technologies. These would enhance the productivity of existing industries and facilitate the emergence of new industries.

The level of investment in mobile infrastructure is important because for many communities it represents their primary source of connectivity. For remote Indigenous communities where many consumers rely primarily on mobile services lack of coverage can result in significant access limitations to essential services. Mobile infrastructure also plays an important public safety role in emergency situations. The important social and economic benefits that accrue to communities are often understated when considering the potential for further investment (Viscusi & Masterman 2017).

Equipment

Although all access to telecommunications services inherently requires some form of access equipment, for regional Australians the technical equipment required to be connected is often substantially greater than that needed by metropolitan residents. For consumers the increased need for technical equipment raises two core issues, cost and complexities in accessing or configuring equipment.

Accordingly, there are two core challenges faced by regional and remote Australians in respect to accessing telecommunications equipment; cost and information. As the technical needs of individuals are often unique and bespoke equipment arrangements need to be made between consumers and service providers, there is a need for greater efforts by retailers, installers and equipment providers to inform consumers about the best option for their unique needs, and for post purchase support.

With respect to the costs of equipment, telecommunications equipment accounts for approximately 20% of total communications expenditure by households (Ogle 2017, p.1), with the average Australian household spending $10.60 a week on communications equipment.

However, the costs faced by Australians residing in regional and remote Australia are likely to be materially higher than the average expenditure figures set out above. At a state and territory level, those jurisdictions with a high proportion of individuals residing in remote and extremely remote locations such as the Northern Territory have commensurately higher expenditure levels for equipment – approximately 59% above national averages (Ogle 2017, p.7).[1]

Affordability

Affordability and uniform pricing

The primary measure taken to support affordable access to communication services now and into the future is the policy of uniform wholesale pricing adopted as part of the statement of expectations issued to NBN Co by the original shareholding ministers (Wong and Conroy 2010). The policy of uniform pricing ensures that consumers residing in regional and remote Australia have access to broadband services at the same wholesale price level as those in metropolitan centres.

Uniform pricing policy refers to the setting of a single national price for a service irrespective of the underlying cost of provision. A consequence of uniform pricing is that some consumers pay more for a service than it costs to provide, and others are able to access that service at a price below its cost.

In order to support uniform pricing, an internal cross-subsidy is currently managed by NBN Co with additional revenue of $7.10 per month being collected per premise to support the approximately 1 million services that are not commercially viable (Parliament of the Commonwealth of Australia 2018, p. 7-8). For those premises in the remotest parts of the country the cost associated with provision is higher and as a consequence the effective cross-subsidy is materially larger standing at around $105-110 per premise per month (Parliament of the Commonwealth of Australia 2018, p. 7-8).

The adoption of uniform pricing has facilitated some level of equity between metropolitan, regional and remote consumers. However, although uniform pricing goes some way to addressing the affordability of services for consumers in regional areas, many vulnerable regional groups continue to face affordability challenges.

Although an essential policy to support equitable access to broadband services at an affordable price, uniform pricing is just that – a policy. Accordingly a revision of the statement of expectations by the shareholding ministers could potentially unwind this important measure of financial support. ACCAN believes that this is inappropriate, and notes that should the financial viability of NBN Co diminish over time there is currently no

[1]. The robustness of the underlying data set is important, and the figures for the Northern Territory should be treated with greater caution as the smaller sample size can result in outliers affecting results.

guaranteed policy support in place to ensure affordable and equitable access to broadband services by regional Australia.

ACCAN supports a long term commitment to the funding of affordable telecommunications in regional Australia. ACCAN has previously supported an approach that funds affordable telecommunications programs via the tax system, which is progressive and would not negatively impact competition.

Recommendation 1

That the government commit to the ongoing funding of broadband services in regional, rural and remote Australia and commit to a long-term funding policy.

Income inequality between and within regions varies considerably (ABS 2018a), reflecting the wide distribution of consumers facing affordability challenges. ACCAN believes in future an additional more targeted program should be undertaken to address the affordability challenges faced by regional and remote consumers. Focusing on the consumers themselves will allow for the design of more effective policy measures. Particular groups affected by affordability challenges in regional areas are those on low incomes, Indigenous communities and older people.

Affordability challenges faced by low income Australians

Although the quality and variety of services on offer in Australia have increased significantly over time, and there have been improvements in affordability more generally, affordable communications continue to be a challenge for many consumers on low incomes (PC 2017, p. 24). Financial stress continues to be experienced by consumers on low incomes, with 15.6% of consumers in the lowest income quintile indicating they had been unable to pay their utility bills on time in the twelve months leading up to the census (ABS 2018b).

Consumers on low incomes typically spend a significant proportion of their income on telecommunications services. Households in the first and second lowest income deciles on average pay just under 10% and 6% of their disposable income on communication services respectively (BCAR 2017, p. 27). This is well in excess of average household expenditure on communications, which accounts for approximately 3.5% of disposable income (BCAR 2017, p. 27).

There are currently around 747,000 individuals receiving New Start payments as of the 31 April 2018, around 568,000 of whom are individuals who are long-term unemployed – that is have been on payments for a period of more than 12 months (DSS 2018). Of this group over 43% are engaged in formal training, education or professional development with another 11% suffering temporary incapacity, with the remainder searching for or engaging in part time or voluntary work. There are currently 243,778 individuals on Youth Allowance (DSS 2018) which is paid to individuals below 25 who are undertaking training, study or seeking employment.

A significant proportion of individuals on income support payments call regional and remote Australia home, and face significant financial challenges as the economic and industrial composition of regions have evolved and developed over time. Others including those on Youth Allowance are taking the opportunity to enhance their skills to the betterment of regional Australia, often living far from home on limited incomes in order to attend tertiary educational institutions before returning to work in the regions.

For Australians accessing New Start, their income is limited to a fortnightly payment of between $545.80 and $762.40 depending upon their age, partner status and whether they have dependents (DHS 2018a). Individuals on Youth Allowance, that is those under 25 who are either seeking employment or in training, are living on extremely constrained incomes, receiving fortnightly payments varying between $244.10 and $584.20 depending upon relationship status, whether they live with their parents or have children (DHS 2018b).

Affordability challenges faced by Indigenous Australians

In 2014 the total Aboriginal and Torres Strait Islander population was 686,800 representing 3% of the total population, of which 35% were living in major cities, 44% in regional areas, and 21% in remote areas (ABS 2016).

The services accessed by Indigenous Australians have a significant bearing on the costs and affordability challenges that they face, with many utilising pre-paid mobile services which are incrementally more expensive than alternative services. As a consequence Indigenous Australians often use some of the most expensive services on offer, and when they use their available credit lack access to essential telecommunications services.

The affordability challenge faced by Indigenous Australians is reflected in the high proportion of households identified as 'low income, high spending' households.[2] This is a measure of extreme financial vulnerability, and approximately 10% of Indigenous Australian households are classified as low income, high spending households (BCAR 2017, p.29).

Indigenous Australians often have lower incomes and have attained poorer employment outcomes than the general public, with an unemployment rate three times the national average, with 19.3% living in poverty and over-representation in terms of New Start payments (accounting for 9.7% of recipients) and Youth Allowance (accounting for 16.4% of recipients) (ABS 2016).

The levels of poverty in some communities are likely in excess of those reflected in available statistics, with some organisations such as CAYLUS anecdotally advising that in some remote townships that approximately half of the community consistently have no income. The affordability challenges faced by Indigenous Australians are important as access to

[2]. Low income, high spending households are those households with less than half the median income and whose share of expenditure on communications services is more than three times the median.

telecommunications services enables access to opportunities for further education and professional skills development, as well as potential remote employment or self-employment.

Affordability challenges faced by older Australians

Regional and remote Australia is typically older than metropolitan Australia, and is home to a greater proportion of older and low-income individuals (such as pensioners in coastal areas) (ABS 2017). These consumers can face a unique affordability challenge, due to their low incomes and limited access to the most cost-effective and affordable forms of communication services.

Consumers on low incomes tend to substitute fixed line services for mobile services more often than their higher income counterparts (Vertigan Panel 2014a), often due to the relatively low barriers to entry and substantial competition within mobile markets. As the price of fixed-line services increases, substitution to mobile alternatives increases and drives consumers to switch **(**Vertigan Panel 2014a; PC 2017, p. 312). However, in regional and remote areas low income consumers lack the ability to reduce their costs due to limited competition and mobile network constraints. There is accordingly a need to develop affordability measures that support vulnerable populations living in regional and remote areas.

Although internet active seniors have previously been well served and had a variety of affordable options available to them, the switchover to the NBN, as well as reforms to NBN Co's pricing has the potential to pose significant affordability challenges for these consumers, many of whom are on fixed incomes **(**Box 1**)**. Initial research indicates that there is a significant prospect that these consumers will have to either face increased costs or have to engage in switching, which though appropriate for some living in regional areas will be unfeasible for others.

Box 1. Affordability for internet active seniors

Jean is an 88-year old pensioner living in regional South Australia. She has a NBN-based FTTP service with a 12/1 Mbps plan. She accesses the internet from an iPad Mini daily for email, web-browsing, Facebook, watching the odd You-Tube clip and playing Scrabble with her children, grand-children and great-grandchildren. She has no interest in streaming video, or gaming and her data usage runs between 10 and 15GB per month. She currently pays $60 per month for her fixed broadband and voice service, plus additional for calls to mobile (typically adding about $5 per month). She also has a mobile phone on a prepaid plan and incurs another $5-$10 per month on mobile call charges from her mobile. Jean's telecommunication costs of $70-$75 are at the limits of affordability for an aged Australian whose only income is the pension.

If NBN prices increase, Jean's contingency plan is to disconnect from the NBN - to migrate all her phone usage to a mobile phone plan at $9.90/month (unlimited calls and text) and her broadband usage to a $29.99/month (15 GB per month data quota).

In considering the challenges faced by low-income Australians living in regional and remote areas, it is fundamentally important to look at these individuals by reference to their needs and usage rather than make generalisations. Approximately 55.3% of individuals over 65 use the internet (ABS 2018c) and as a consequence are accessing multiple or more expensive services than the remaining 44.7% of individuals who primarily use voice services.

Recommendation 2

That the government commit to reviewing existing affordability policies including the Centrelink Telephone Allowance to provide greater support to low income Australians living in the regions.

Reliability and Affordability

There is a strong connection between the reliability of services available to regional communities and affordability, with many consumers retaining additional mobile or fixed line services to supplement their primary telecommunications service. This is done because the underlying primary service isn't sufficiently reliable to provide consumers with confidence that the service will work on demand or during emergencies, or it is perceived to be unreliable.

For many consumers the lack of a reliable service means that in order to ensure continuous access they must purchase multiple services as redundancies. This is a core driver of the affordability challenge in regional and remote Australia. Further efforts to address continuity of services and enhance reliability should allow for individuals to reduce the duplication of services and increase affordability.

In addition, the perception that services are unreliable has resulted in reluctance on the part of some consumers to take up services that historically failed to meet their expectations. Anecdotal evidence indicates that this has been a factor in the low level of take up of services by some consumers within the Sky Muster satellite service footprint, who have either had a poor experience as part of the Interim Satellite Service or NBN migration, or are aware of the difficulties faced by other consumers as part of this process. This is despite material improvements in service provision and technical reliability.

The unnecessary duplication of services due to perceptions of poor reliability results in regional consumers facing costs far in excess of those faced by their metropolitan counterparts. There is a continued role for NBN and service providers to enhance the information available to consumers concerning the level of reliability and service standards that regional consumers can expect when accessing different service offerings.

In order to address this problem, it is essential that wholesale customer service guarantees and reliability measures are revised and adopted to underpin the provision of fixed voice and data services, to deliver more accountability from providers and NBN Co. These measures are needed to build trust in network performance. In the absence of such measures, consumers and small businesses in regional areas will continue to have to spend sums well in excess of their metropolitan counterparts just to ensure continuity of service.

ACCAN has had a long held policy position that there is a need for a customer service and reliability standard to support the delivery of reliable voice and broadband services into the future (ACCAN 2016). As part of these standards wholesale service obligations that set out timeframes for connections, fault repairs and reliability should be specified and appropriate incentives should be set to ensure compliance.

In the interim, the accurate and timely provision of information concerning the reliability of different network services by RSPs and NBN Co will allow for consumers to make informed choices about what services to purchase. This is particularly important going forward, as increasingly reliable services in some parts of regional Australia (e.g. more populous coastal areas) may enable consumers to reduce their overall expenditure.

Recommendation 3

That wholesale broadband performance standards and reliability measures are adopted to underpin the provision of voice and data services over NBN, to deliver more accountability from providers and NBN Co.

Recommendation 4

That RSPs and NBN Co be required to provide up to date and accurate information concerning coverage and reliability of network services to consumers in a format they can use.

Fixed Wireless and Satellite Affordability

The affordability of fixed wireless and satellite services has improved considerably since the rollout of the NBN, though as noted above ongoing concerns regarding the reliability of services have meant that not all consumers have been in a position to reduce their overall expenditure on telecommunications.

The implementation of uniform pricing policy at the wholesale level has meant that the retail prices on offer for fixed wireless services are now broadly comparable to those for fixed line services in metropolitan centres. As can be expected in a competitive retail market there is considerable variation in the prices, speeds, data volumes and services on offer.

The ongoing affordability of fixed wireless services is however more questionable as wholesale pricing reforms may result in high minimum wholesale prices, and consequently higher retail prices. These reforms appear primarily directed towards ensuring a minimum level of bandwidth provision per customer and are consistent with similar proposals for reform for fixed line services. ACCAN has recently published a blog on the potential affordability implications of pricing reform in the fixed line NBN footprint, and the same concerns arise for fixed wireless services (2018).

The uniform pricing policy is providing considerable pricing relief for those consumers using satellite services. Data constraints continue to be an issue for many consumers using these services, though the doubling of data allowances has gone some way to addressing this issue. Although Sky Muster services are fundamentally different in terms of the data volume and underlying technical capacity, consumers are now able to access services at retail prices approaching those seen in previous years in fixed line metropolitan markets.

ACCAN supports fair and equitable access to Sky Muster for those with genuine a need for the service, and supports access which reflects the residential, educational and business needs of rural and regional Australia. To this end ACCAN supports further efforts on the part of government to provide clarity to consumer and businesses concerning the ongoing funding of policies such as uniform pricing to ensure that the needs of consumers and businesses are met.

Awareness, digital literacy and appropriate services

Although many Australians living in regional and remote areas are aware of the services on offer to them, and have sufficient digital literacy to engage with available services, some individuals face difficulties. The population of regional and remote Australia is as diverse as the landscape itself and although policies have been effective in addressing the needs of some regional communities, other groups have not been particularly well served.

In particular ACCAN believes that there is greater scope for targeted digital literacy support for older Australians and Indigenous Australians residing in regional and remote areas. The successes achieved as part of historic and some ongoing digital literacy programs should be capitalised upon in order to ensure equitable access to digital services into the future.

Recommendation 5

That government articulate a policy vision for targeted strategies to support digital literacy in regional and remote Australia.

Maximising the benefits of broadband

Question 2

How are people in regional communities currently using their broadband service and how might they increase the benefits of using this technology?

People in regional communities are currently using their broadband services in a variety of ways, and according to the latest census figures actively use their services for:

- Banking (76%)
- Social networking (76-78%)
- Purchasing goods or services (70%)
- Entertainment (66-75%)
- Formal education (24-28%)
- Health services (41-45%)

(ABS 2018c)[3]

More recent sample polls collected by Better Internet for Rural, Regional and Remote Australia (BIRRR), reflect a diversity of uses of broadband services for people in regional Australia, with individuals using broadband for: email, social networking, research, business, shopping, government services, education, streaming, cloud storage, community and volunteer work, health, wifi calling, gaming and to support agricultural monitoring equipment such as water monitors.

The benefits of using broadband services to support telehealth and education are clear. ACCAN strongly supports proposals for greater assistance to be given to families and individual consumers undertaking education in regional and remote Australia. The Isolated Children's Parent's Association has clearly identified the need for greater access to telecommunications services for pre-school, school aged children and tertiary students undertaking distance education. The benefit of broadband is hugely significant if it allows access to educational opportunities that would not otherwise be available in rural and remote areas.

For individuals accessing remote health services, the potential health benefits associated with greater connectivity are material. As applications develop that allow the accurate tracking of health conditions, monitoring of the effects of medication (and reminders to take it) and for early diagnosis material benefits should flow. At a more basic level better access to reliable and effective remote health services should allow individuals to reduce the time and cost associated with frequent travel to access health services.

[3]. The ranges reflect the variation between inner regional, outer regional and remote areas.

As technology advances further, the potential for digital connectivity to support autonomous vehicles also presents significant benefits in terms of accidents avoided both on public roads and in industry and agricultural settings. Remote monitoring may also reduce the amount of physical travel within farms to check water supplies and livestock, reducing the overall level of strain and exposure to risk factors.

ACCAN believes that the benefits of broadband can be enhanced more broadly through comprehensive policy efforts to support better infrastructure, more affordable services and digital literacy in the regions to support digital inclusion and engagement.

Question 3

What data-intensive activities are occurring in regional, rural and remote Australia? What digital technologies are needed for these?

ACCAN is aware that the data-intensive activities occurring in regional, rural and remote Australia vary considerably as a function of the capacity of the underlying network to support specific activities, digital literacy and demand as well as the level of consumer expenditure. The core determining factor for consumers' usage in regional, rural and remote Australia appears to be the capacity of existing infrastructure to supply services to support specific activities.

Research undertaken by BIRRR indicates that consumers are using the following data intense services: remote desktop programs, online tutorials (videos etc), software and device updates, cloud storage, accessing government websites, streaming, commercial applications (stock control, transport and freight etc), video conferencing, agricultural monitoring equipment, telehealth, drones and gaming.

ACCAN is not in a position to advise the RTIRC as to what specific technologies would be required to support specific data intensive applications, but we support investments in digital technologies and infrastructure to meet the needs and aspirations of regional and rural Australia.

In the long term the fixed wireless and satellite infrastructure currently in place is unlikely to be able to meet the long term data needs of regional Australia. As demand for data grows the capacity of the existing infrastructure is likely to be exceeded particularly during periods of peak usage. This issue has been acknowledged by NBN Co which has stated that the costs associated with an upgrade of the fixed wireless network are currently prohibitive given existing funding arrangements (Crozier 2018).

As the demand for data increases in regional and remote communities, there will be an increased need to examine the potential for deployment of 5G in regional centres and low earth orbiting satellites to provide greater connectivity in remote areas. Although at this point in time these technologies are still in development, they have the potential to provide more reliable and cost effective telecommunication services to regional Australia in the future.

Question 4

How can regional businesses better utilise digital technologies to maximise economic benefits?

Maximising economic benefits

In broad terms the greater utilisation of digital technologies is likely to increase economic benefits in a number of ways:

- Lowering input costs (e.g. travel times; time taken to source parts; or lower labour costs through telecommuting);
- Allow better targeting of finite resources e.g. via water monitoring and remote control;
- Increasing revenue by providing access to new markets;
- Allowing for the creation of new business opportunities.

For further specific detail, ACCAN would encourage the committee to consider the sector-specific submissions made by the relevant peak bodies for industry.

The benefits of so far…

The enabling capacity of modern telecommunications have allowed for Australians in regional and remote areas to start their own businesses with between 1,900 – 5,400 businesses forming regions with high NBN rollout. Those regions that have a high level of NBN rollout also have higher rates of self-employment with between 3,400-6,400 individuals leveraging greater connectivity to create new employment opportunities for themselves (NBN Co. 2018a, p. 8).

Early estimates indicate that the NBN has helped to drive $1.2 billion in additional economic activity and created 2,900 jobs in 2017 (NBN Co. 2018a, p. 15). As the focus of much of the initial rollout many of these economic gains have flowed through the regions, which now have significantly improved services and are now in a greater position to leverage the potential of the digital economy. The economic benefits of the NBN are expected to increase over time and by 2021 the contribution of the NBN to the economy is estimated to be $10.4 billion, with 31,000 additional jobs created (NBN Co. 2018a, p. 15).

The benefits of digital technology are of course not merely limited to the benefits attributable to the NBN but most recently the significant investments associated with the NBN project have been a material source of economic benefit for regional and remote Australia. Detailed modelling has been undertaken concerning the material productivity gains associated with the use of digital technology and ICT domestically (BCAR 2016).

Indigenous access to telecommunications

Question 5

What can be done to improve access to and uptake of telecommunications services in remote Indigenous communities?

In keeping with the barriers outlined above, ACCAN considers it is appropriate for the government to consider a comprehensive suite of policies to support greater access to and uptake of telecommunications services in remote Indigenous communities. Access to digital services is particularly poor in remote Indigenous communities, with approximately 53.1% of those individuals living in these areas having accessed the internet in the last twelve months (ABS 2016).

Affordability

Affordability continues to be a challenge for many individuals and households on low incomes living in remote communities, with over 151,000 individuals indicating that they had a personal income of less than $500 a week as of the last census.[4] ACCAN considers that targeted financial support to address the particular affordability challenges faced by Indigenous communities would facilitate greater access to and uptake of telecommunications services.

Research undertaken as part of the digital inclusion index, found that Indigenous Australians typically spent around the same amount on their digital services as the rest of the population. However as a result of their higher reliance on pre-paid mobile services Indigenous Australians were receiving considerably less value for their expenditure (Thomas et al. 2017, p. 17).[5] There should be a concerted effort made to provide information about more affordable mobile products to remote communities, and ensure that these products are available through community stores (for example, mobile reseller products using the Telstra network offered at lower prices).

Infrastructure

Although investments in telecommunications infrastructure in regional and remote areas have been significant, these investments have not always reflected the usage patterns, demands and needs of specific communities. For Indigenous Australians in regional and remote areas

[4]. Census of Population and Housing, 2016, TableBuilder.
[5]. The research drew upon information obtained from urban and regional Indigenous communities, though the results match other reports and trend data.

mobile phones are the preferred and primary means of accessing telecommunications services (ABS 2018c).[6]

As a consequence the limited investments in mobile infrastructure in remote communities have restricted the ability of individuals to access essential services at reasonable cost. ACCAN believes that a more targeted approach must be taken to infrastructure investment with an emphasis placed on public wifi, mobile coverage and alternative technologies that extend mobile coverage along remote thoroughfares (Box 2). In particular ACCAN believes that greater emphasis needs to be placed on affordable or free connectivity infrastructure such as public wifi to ensure a minimum level of access for those members of the community of limited financial means.

Box 2. Public Wifi and remote Indigenous communities

There is a clear and present need for greater investment in public wifi resources in regional communities, with the magnitude of the benefits associated with wifi investments significantly outweighing the costs. The deployment of public wifi infrastructure often costs a fraction of more expensive private alternatives such as mobile towers, and imposes no cost to the community.

Public wifi assets can be managed and regulated within communities to prevent the use of bandwidth for inappropriate purposes such as cyber-bullying. Through community management of the resource arrangements can be put in place to ensure that individuals can use essential services such as Centrelink, online banking and use free wifi for messaging and calling to stay in contact with their community or seek assistance in an emergency.

Alternative technologies

Investment in alternative technologies has the potential to provide significant benefits to remote Indigenous communities by providing infrastructure solutions that match communities infrastructure needs. Innovative technologies such as passive mobile coverage extenders developed by Indigenous organisations such as the Centre for Appropriate Technology for remote use should be examined carefully as part of a broader program of investment (CfAT 2018).

Passive repeater towers can extend mobile coverage up to 100km from existing mobile towers, at a cost from as low as $25,000 – a fraction of the total cost of macro-cells which typically cost $1 million. These passive repeaters are also mobile and can be redeployed to ensure that infrastructure is located where there is the greatest demonstrated need. As a low cost coverage solution the total benefits that accrue from a network of passive repeaters may

[6]. ABS data indicates households in regional and remote areas typically use more mobile devices on average per household than desktop or laptop computers. The preference for mobile devices is also reflected in other studies.

be sufficient to facilitate investment in circumstances where the total costs associated with full scale mobile towers may be too great relative to the benefits to justify investment.

ACCAN supports the exploration of the potential of alternative technologies as part of an ongoing program of investment in infrastructure projects that reflect the unique challenges and needs of remote communities. Investments in infrastructure that align with community needs are likely to yield material benefits, in terms of greater digital inclusion, greater economic opportunities and improvements in public safety outcomes, an often under-valued consideration in infrastructure investment decisions (Viscusi & Masterman 2017).

Digital literacy

Indigenous Australians have generally attained lower levels of digital literacy than the general population (Thomas et al. 2017, p. 17) and despite material improvements in digital literacy in remote communities, the development of skills has not occurred across all elements of the community. This has limited the potential benefits that can be gained from digital inclusion (Rennie et al. 2016). ACCAN believes that there is a need for ongoing support of digital literacy programs currently in place, with a view to further expansion of programs to ensure that all members of the community are able to access support.

Recommendation 6

The government develop a comprehensive Indigenous Telecommunications strategy to ensure Indigenous digital inclusion.

Question 6

Are there practical examples of how communications services can improve the well-being of people in remote Indigenous communities?

ACCAN has been advised by Central Australian Youth Link Up Service (CAYLUS) and other community organisations that there are material improvements to peoples' well-being in remote Indigenous communities through greater access to communications services including through:

- improving access to educational opportunities, health and government services;
- creating opportunities for employment;
- facilitating the development of remote community social and micro enterprises;
- reducing the risks of substance misuse, self-harm and suicide through greater access to support services;
- supporting ongoing self-directed learning and skills development in remote communities;

- enabling individuals to create media and share their culture through the work of remote media organisations such as the Indigenous Remote Communication Association (IRCA).

The benefits that flow from communications services are diverse and well documented, but often undervalued. Access to simple communications services can make material differences to the lives of individuals living in remote Indigenous communities, particularly for those with manageable but chronic diseases such as diabetes, which is the predominate cause of amputation in Indigenous communities (Rennie et al. 2016, p. 13). Combining cost-effective equipment such as basic blood sugar monitors, cloud computing should allow for the efficient provision of remote health services and prevent many of the serious complications of readily treatable conditions.

Digital literacy for regional and remote Australia

Question 7

What skills do people need to get the most from their digital technologies, and where can they learn these skills?

The skills that people need to get the most from their digital technologies vary considerably, with many consumers requiring general digital literacy skills, while individuals operating a business may require more technical skills to fully leverage the economic benefits of digital technologies.

As a member of the RRRCC, ACCAN supports the full resourcing of capacity building programs that build digital ability, and development of effective problem support services for regional, rural and remote businesses and consumers. To this end ACCAN supports greater efforts on the part of government to identify existing and emerging gaps in digital literacy in remote and regional Australia and to develop and implement targeted digital literacy campaigns that leverage community expertise to meet the needs of all Australians.

Indigenous Australians

The benefits of targeted literacy programs are starting to emerge, and at an anecdotal level ACCAN is aware of significant benefits flowing from programs within Indigenous communities to boost digital literacy such as inDigiMOB run by the IRCA in the Northern Territory. The inDigiMOB program provides a suite of resources including technical, training and infrastructure support to communities and local organisations that they can take advantage of according to their particular needs.

The inDigiMOB program seeks to build the digital literacy and capacity within communities through a network of local digital mentors and digital literacy training workshops in order to create an environment in which digital literacy can continue to build over time. As part of the program the IRCA has also linked up with tertiary education institutes to provide remote educational opportunities to leverage

The work of other community organisations such the CAYLUS through their computer lab program and on site digital support services are also producing promising results. CAYLUS has reported that as the roll out of computer labs to over 20 libraries and community centres in and around central Australia have resulted in material improvements in digital literacy among users and access to a variety of essential services.

Seniors

For seniors the work of organisations such as the Good Things Foundation, which is currently co-ordinating and supporting community based organisations to provide education and training as part of the Federal government's Be Connected program, has resulted in significant improvements in digital literacy. The Be Connected program builds upon the work of earlier programs and leverages existing community organisations to facilitate the delivery of digital literacy services for seniors in environments and contexts in which they can feel comfortable.

The program focuses upon the development of skills for seniors at their own pace and from initial reports is producing material improvements in digital literacy for those individuals who have engaged with the service. Although active throughout the country, in many regional and remote areas this program is not yet available in locations accessible to many seniors due to the distance of community centres or towns hosting where these services are offered. Accordingly there is scope for further investments and tailoring of these programs to assist individuals to access them and to engage more fully with the digital world.

Local programs including those supported by ACCAN such as 'Know Your Gizmo' demonstrate the significant benefits that can flow from community based programs that leverage the expertise of particular members (volunteer high school students) of the community to assist seniors. The program which was initially rolled in 2012 out with the financial support of an ACCAN grant to the Albury Wodonga Volunteer Resource Bureau at the Albury High School has now expanded to several high schools within the Albury Wodonga region (ACCAN 2012).

Digital literacy for industry

In addition to community based programs for individuals to build general digital literacy skills, there is also a clear and pressing need for more formal technical programs to be made available in regional and remote Australia to support local industries to capitalise on the potential productivity gains that flow from the digital economy.

The digital literacy needs for industry are often sector and technology specific and consequently the provision of digital literacy training and support may be best undertaken by the private rather than the public sector. Although a general level of training and support may be provided by government, the public sector is not well placed to fund or select which technical programs may be relevant to industry or specific businesses.

The costs and benefits in terms of additional productivity or returns to individual businesses mean that individuals within a given industry are also best placed to assess what level of investment in technical or digital literacy skills are likely to generate a return for their business. Moreover as the business stands to benefits from its clients undergoing advanced or specialist training, it is appropriate that these costs are met by businesses.

Network infrastructure

Question 8

Have you had ongoing issues affecting your satellite or fixed wireless broadband service? If so how have you overcome these issues?

Satellite Services

Early users of Sky Muster received unsatisfactory service levels and network performance, with often unexplained and prolonged loss of service, and multiple dropouts. However, reports of issues and problems with the service have declined as the service has rolled out.

ACCAN continues to receive anecdotal reports of periodic issues affecting consumers' satellite service, but has not received reports of ongoing or material service issues.

The initial experience of consumers in migration onto the interim satellite service and then onto Sky Muster, which for some consumers was characterised by poor services appears to have had a lasting effect on consumer views concerning reliability and performance. Although this perception has begun to shift as the reliability of services has improved.

However, there are a range of issues faced by consumers on these services:

- the deterrent effect of initial problems with Sky Muster services which caused instability and unusable services;
- limited data allowances which restrict the use of broadband plans;
- the need and cost for multiple networks and services (landline, mobile, Sky Muster) in order to maintain the level of reliable connectivity needed, and;
- limitations on the use of some content and websites, for example farming auction websites.

Of particular concern to ACCAN are reports of the level of disruption currently being faced by consumers in tropical Northern Australia using Sky Muster services issues associated with atmospheric disruptions, particularly during the wet season. If satellite services cannot be provided with any degree of reliability, ACCAN believes that alternative service options must be examined to ensure that communities do not face disconnection for prolonged periods of time.

Where consumers have faced ongoing issues with their services there have been two core sources of assistance, community based organisations and service providers. ACCAN is aware that for many consumers the assistance of organisations such as BIRRR and local efforts by regional communications advocates has been essential to the resolution of their difficulties. The contributions of these organisations to consumers cannot be understated.

In addition to the efforts of community organisations, NBN Co through the NBN Local program have provided significant assistance to a variety of consumers around the country who have been facing difficulties in accessing NBN services.

ADSL to Satellite

There are a number of premises which previously used fixed line technologies such as ADSL that have been designated as NBN satellite services. There are potentially thousands of customers in this situation, who face reduced levels of broadband services as part of switchover. ACCAN believes the number of premises designated to receive satellite services should be constrained to those with a genuine need for the service as the addition of premises increases overall demand on the finite capacity of the service, thus diminishing the quality for those on the service.

The transition to the Sky Muster service should for consumers currently on an ADSL service represent an improvement in their service, rather than a downgrade. For some currently on well performing ADSL services which may cease to be offered in the future the switch to Sky Muster may represent a material decline. ACCAN believes that further consideration should be made concerning the transition of individuals on ADSL services that may degrade, decline or be switched off over time and how this can managed into the future to ensure consumers get the best possible service outcomes.

Recommendation 7

That only those with a genuine need for the service, without alternative options should be put on Sky Muster.

Fixed Wireless Services

There are approximately 230,000 premises connected to the fixed wireless footprint, moving to a projected 600,000 once rollout is completed (ACCC 2018b). Although for many consumers the fixed wireless service that they are receiving is in keeping with their expectations, there is currently a significant proportion of consumers on fixed wireless services have experienced ongoing congestion when accessing their service. The experience of consumers on congested cells and the significant detriment that they are facing is set out in detail in Box 3.

Box 3. Consumers on congested towers

Consumers on congested cells are obtaining service outcomes well below those that they reasonably expected when switching to the NBN. The loss faced by consumers is difficult to measure; however the Vertigan Panel calculated that consumers would be willing to pay approximately $2.5 per mbps, Vertigan Panel (2014b, p. 63). Consumers on some congested cells are currently paying an effective price of between $5-15 mbps and under proposed NBN pricing changes consumers on these towers would face prices potentially 3-6 times more than they would be willing to pay.

The above figure is an estimate, and ACCAN appreciates that were time-of-day data usage profiles available a more realistic estimate could be made as to the true value of the underlying service outcome to consumers.

Acknowledging this qualification, the substantive point is that the service being provided to consumers is not in keeping with their expectations and is priced well in excess of their willingness to pay.

While acknowledging that an upgrade program is in place, ACCAN considers that in the interim consistently poor service outcomes will result in diminished consumer confidence and trust in NBN Co. This could lead to lead to significant market problems for the NBN, as consumers explore other available broadband options that they perceive as better value (Akerlof 1970).

ACCAN appreciates that the immediate and correct focus of NBN Co is to rectify the congestion issues for those cells that are affected. However, in the interim ACCAN believes that consumers on congested cells should not be subjected to any form of wholesale price increase, or indeed reforms to pricing that may mean consumers are sold services that cannot be supplied. Consumers on congested cells should be compensated for poorly performing services.

Although NBN Co is not directly responsible for retail plans, wholesale pricing reforms should not lead to a reduction in the choice of plans sold, and in consumers being shifted on to speed tiers that cannot be attained. This would result in poor outcomes for consumers using fixed wireless services, and place retailers in a difficult position.

For the approximately 6% of consumers on congested cells – that is those cells achieving speeds below 6 mbps in peak periods – the speed of the service that they are receiving is well below that which may be reasonably expected. ACCAN believes that the outcomes achieved for consumers on these towers is unacceptable, and although we welcome efforts by NBN Co to rectify congestion, we have concerns that the congestion problems faced by consumers are likely to increase as usage of fixed wireless services increase over time.

Although NBN Co has committed to a fast-tracked program of tower upgrades, given the average demand for data increase approximately 40% per year these upgrades are likely to only represent a temporary solution to the problems faced by consumers on congested fixed wireless towers.

Monitoring of Fixed Wireless Services

ACCAN believes that further work is required by all parties to ensure that the services provided via the fixed wireless network are in keeping with the reasonable expectations of consumers.

In order to ensure that consumers are receiving the services that they have purchased and paid for it is essential for the existing ACCC monitoring program to be rolled out across all technologies including fixed wireless and satellite. At a minimum the performance of services and attainable speeds should be communicated to consumers in order to ensure that they face no disadvantage or detriment in the market when seeking to purchase communications services.

Recommendation 8

That the ACCC be sufficiently resourced to carry out the Broadband Performance Monitoring and Reporting Program across all NBN technologies.

Recently the ACMA adopted the *Telecommunications Service Provider (NBN Service Migration) Determination 2018* which requires service providers to test connections after activation and allow consumers to change the speed level (and price of their) contract or to cancel a contract and move to another provider. ACCAN considers that in the light of the poor performance of achieved on congested cells that in addition to ACCC monitoring, the extension of these remedies to consumers is appropriate where a tower fails to attain an advertised speed.

Sky Muster take up

Question 9

If you are in an area with access to the Sky Muster satellite service and you have not taken it up, why not?

We are aware of several factors contributing to the low rates of take up with the Sky Muster satellite footprint. These factors include:

- poor historical experiences in accessing NBN satellite services;
- the deterrent effect of the perception that services are poor;
- the consumer has a fixed line ADSL service that meets their needs or an alternative service;
- a lack of need for broadband services;
- affordability of maintaining multiple services.
- inconsistent information concerning Sky Muster service availability.

Mobile Blackspots Program

Question 10

What economic or social indicators could be used to guide investment to further improve mobile coverage?

ACCAN supports the continuation of the Mobile Blackspots Program and welcomes the opportunity to comment on investment principles. The Mobile Blackspot Program has been successful in leveraging a total investment of $680 million in better mobile coverage for regional and remote Australia, through a relatively modest contribution of $220 million by government (DOCA 2018).

It has been a highly successful program in providing better mobile coverage to the regions, but we believe some elements of the program may be reformed to ensure that it supports the best possible outcomes for regional communities. We note that concerns were raised about Round 1 by the Australian National Audit Office, who considered that new coverage may not have been adequately promoted and value for money achieved in all instances (ANAO 2016, p. 7-9).

ACCAN believes that the criteria for the assessment of potential projects could be refined to better target funds to ensure the greatest benefit from investments:

- The adoption of a minimum coverage requirement to ensure that new and extended coverage is promoted;
- The removal of the current Member of Parliament priority nomination criteria to place greater emphasis on local and community input in the program;
- The addition of further criteria to support further targeting of projects that provide a benefit to vulnerable populations.
- The addition of further criteria to prioritise funding for mobile towers that would provide coverage to important community locations e.g. schools and emergency evacuation centres

ACCAN is aware that some regional evacuation centres and schools have limited or no mobile coverage, and that substantial public benefits would be created through better coverage of these locations. In New South Wales alone ACCAN has been advised that there are a minimum of seven schools that have no coverage by the Isolated Children's Parent's Association of New South Wales (ICPA NSW). As noted by the ICPA NSW, the existing criteria may favour the construction of towers in areas with higher populations with preference given on the basis of the number of premises covered by a tower. However this approach may not be consistent with the objective of the program to maximum coverage and the benefits to regional communities of extended and new coverage.

The important social and economic benefits that accrue to communities are often understated when considering the potential for further investment (Viscusi & Masterman 2017). ACCAN believes that in considering the location of towers, the significant potential public benefits in terms of improved safety is an appropriate and relevant consideration given the public nature of the expenditure.

Along with other members of the Regional, Rural and Remote Communications Coalition, ACCAN supports greater open access by all mobile networks to publically funded infrastructure. This will enhance competition and allow consumers a choice of provider where possible.

Recommendation 9

- *That guidelines for future publically funded mobile network expansion take into account the public benefit of new coverage for vulnerable populations and important community locations.*
- *That the government commit to long term public funding being made available for open access mobile network expansion in regional and remote Australia.*

Improving mobile reception

Question 11

Is information readily available regarding how to use devices to improve mobile reception in areas with poor coverage?

Information is readily available from the mobile network providers on devices to boost mobile reception, (for example, see https://www.telstra.com.au/coverage-networks/network-coverage-extension-devices). However, we are aware that there are ongoing issues with the use of illegal repeaters that block reception for other uses. One recent example given was of an illegal repeater interfering with reception of an entire area of a regional centre, indicating that the impact can be significant, and result in real detriment for affected consumers. In many instances consumers are using illegal repeaters as a result of a lack of adequate knowledge and information.

ACCAN considers that this problem could be addressed by targeted programs by RSPs to communicate the problems associated with illegal repeaters to members of the community, and for consumers to be advised about legal alternatives.

Recommendation 10

That retail service providers be required to provide detailed information concerning what technical measures or equipment that are available to consumers to enhance their mobile reception.

Legitimate mobile repeaters are sold by service providers at a considerably higher price than the underlying cost of design and manufacture. As a consequence consumers are purchasing cheaper illegal and illegitimate repeaters which they can afford, resulting in network disruption and loss of service. The excessive pricing of legitimate repeaters is reflected in the capacity of service providers to offer significant discounts in recent periods while maintaining overall positive revenue for these devices.

ACCAN considers that the excess pricing of legitimate repeaters is resulting in losses to consumers as a result of poor signals and losses to service providers through wasted staff resources and time attempting to identify and remove illegal repeaters is avoidable. We understand that the costs of putting staff and engineers in the field to identify these illegal repeaters are significant.

We believe that service providers should carefully examine their pricing of legitimate repeaters and provide this equipment at the lowest profitable cost in order to minimise the considerable costs that are being faced by consumers and service providers through disruption and wasted staff resources.

Emerging digital services

Question 12

What emerging digital services will be of most benefit to regional businesses and what are the data needs of these services?

Connectivity is key to supporting further productivity gains in regional Australia. For some sectors such as agriculture, mining and government services the potential for gains is clear. The potential for new businesses and industries to be created as a result of greater connectivity is less clear, though ACCAN notes there are emerging signs that the NBN is playing an important enabling role in this regard

For agriculture in particular, which has had less opportunity to leverage the productivity gains associated with digital communications, the estimated benefits of greater connectivity are $20.3 billion in additional production and $24.6 billion in gains to GDP (CRDC 2017, p.7). Detailed information concerning the potential gains by agricultural sub-sector is set out in the Cotton Research and Development Corporation report.

The potential gains to regional Australia through greater digital inclusion and smart cities applications are also likely to be material. In particular the potential for internet-of-things services to reduce the costs of supplying town water, waste management services and maintenance of community infrastructure are likely to be significant.

The potential for enhancements to productivity as a result of increased access to digital services are clear, and ACCAN supports efforts by government to identify sector-specific data needs to better target infrastructure investments.

Data needs of business

There are fundamentally two core requirements for regional businesses seeking to utilise digital services; firstly that the service be able to perform a given task or tasks and secondly that the service be able to perform consistently (in terms of both latency and reliability). The relevance of these requirements to particular businesses varies as a function of the services that businesses are seeking to access.

Broadband services in regional Australia

Question 13

What broadband services are people using other than those available through the NBN?

ADSL

A significant proportion of regional consumers continue to access ADSL fixed line broadband services as their preferred form of internet connection in regional areas. According to the most recent figures available from the NBN, there are:

- 431,320 premises ready to connect to Sky Muster;
- 608,722 premises ready to connect to the fixed wireless network.

However the numbers of activated premises are:

- 90,970 premises are connected to Sky Muster;
- 243, 219 premises connected to the fixed wireless network.

(NBN Co. 2018b)

This indicates that as a minimum approximately 706,000 premises have yet to choose to switch over the NBN and are retaining their existing ADSL connections. This figure may however understate the total number of active ADSL connections, with many consumers on the Sky Muster services indicating to ACCAN that they are retaining their ADSL service in order to ensure continuity of service.

ACCAN believes that for consumers on the ADSL network, greater clarity needs to be provided to allow them to have confidence that they will continue to be able to access broadband services into the future. To this end we support government outlining a formal policy concerning the continuation of legacy fixed line services following the completion of the rollout of the NBN.

Recommendation 11

An ADSL Future Service Strategy which factors in implications by and for the NBN rollout should be formulated by government in consultation with consumers. This ADSL future service plan should be clearly explained to affected customers.

Mobile Broadband

A significant number of consumers in regional and remote Australia are using mobile broadband from major service providers as their main form of internet connection. Recent research undertaken by BIRRR indicates that a substantial minority (35.5%) of consumers rely primarily on mobile broadband as their preferred form of connectivity.

This is broadly in keeping with ACCAN's own previous research and recent census statistics concerning the use of mobile services (ABS 2018c). For consumers mobile broadband services are often the lowest cost service at an entry point level, though the average cost of data often exceeds that of alternative services. Accordingly mobile services are often attractive to consumers, particularly those on low incomes that reside in regional and remote areas.

Although mobile broadband services are essential to regional and remote communities, the level of investment in the infrastructure that underpins these services is often limited, resulting in congestion and poor coverage. In order to ensure that the full potential of these broadband services are achieved there is a need for further investment in mobile broadband infrastructure including towers and supporting backhaul.

Wireless Internet Providers (WISPs)

Over 200,000 Australians living in regional Australia are using services provided by more than 40 wireless internet service providers. Depending on market definition, this accounts for between 5-20% of market share, noting that this share varies considerably across geographic markets.

WISPs provide low cost and tailored wireless broadband internet services to their customers. Although the business models of WISPs vary considerably, their appeal to consumers in regional and remote Australia is driven by the tailored advice they provide to consumers, the infrastructure and technical services (including constructing, repairing and selling equipment) and the ongoing customer service levels they maintain.

The provision of broadband services by WISPs is also undertaken on a competitive and flexible basis, with WISPs often working with individuals, community groups and local governments to provide various levels of service to multiple parties through co-owned and managed infrastructure. These services often add significant value through the provision of better services in regional centres and agricultural areas, which are often not captured when examining broadband markets on a number of premise or subscribers served basis.

Competition in regional broadband services

Question 14

How can more competition be encouraged in the provision of broadband services in regional Australia?

ACCAN supports greater efforts by government to enhance the level of competition in the provision of broadband services in regional Australia. Competition improves consumer outcomes by providing incentives for service providers to offer consumers greater choice of services, at lower prices and provide better customer service.

Telecommunications services are provided through infrastructure which may be described as a natural monopoly - that is the average unit cost of supplying the service declines as scale increases. As a consequence of the significant initial investments required for telecommunications networks and the declining cost of providing services as scale increases, the market for communication services has typically been highly concentrated and dominated by a few large businesses. The concentration of the market however can lead to poorer outcomes for consumers (Box 4).

Box 4. Concentration and consumer outcomes

Australia has a highly concentrated communications market with three entities accounting for almost 100% of the market (Grattan Institute 2017). Although concentration is but one of many indicators relevant in assessing the potential for anti-competitive activity, it is accepted the level of concentration in the Australian communications market is well in excess of those observed in competitive markets that work well (ACCC 2018a).

The way in which concentration affects market functioning and consumers outcomes is best described by Professor Stephen King:

> Market shares and concentration interact with competition through the structure of the market. All other things being equal, increased concentration due to an increase in the market share of a single firm will tend to increase that firm's ability to raise its profits by raising its own prices, lowering its service levels or otherwise engaging in less competitive activity.
>
> (King 2009, p. 265)

The lack of competitive pressure associated with this market structure has been identified as a potential driver of excess prices for data and voice services and led to 'extraordinarily high' returns being achieved (Grattan 2017, p. 31). A lack of competition has also been reflected in poor service quality outcomes and a high incidence of complaints from consumers who have faced poorer outcomes than could be reasonably expected in a competitive market (ACMA 2018; TIO 2018).

Regional telecommunications markets have generally been more concentrated than those in metropolitan centres, although the advent of NBN services has stimulated more competition in the broadband market. Generally, greater concentration has led to considerably worse service outcomes being realised for regional consumers, reflected in the poor service outcomes typically faced by consumers using Telstra voice services.

ACCAN believes that there is a strong case for a further research to be undertaken into the relative level of competition in regional telecommunications markets, with an examination of the geographic dimensions of competition for a variety of essential telecommunications services.

Recommendation 12

That the ACCC undertake an inquiry into the barriers to and level of competition in regional and remote telecommunication markets.

WISPs and competition

WISPs play an important role in providing competition for the provision of broadband services in rural and remote Australia. Although WISPs are comparatively small relative to major service providers, they can provide effective price competition by maintaining operating structures with lower overheads as well as providing customised infrastructure that is simply too costly or complex for other service providers to offer at a mass-market level.

WISPs provide important competitive pressures on retail service providers in those regions in which they operate. This provides consumers greater choice, better value and more reliable services. The capacity of WISPs to effectively compete with established providers is reflected in the significant market share that they have achieved in regional and remote Australia with more than 200,000 customers.

WISPs represent an innovative and market-led attempt by local businesses to develop and adapt technological solutions to meet the needs of regional and rural consumers. ACCAN has concerns that should these firms cease to be able to access the spectrum that they require to operate their businesses, that not only will consumers face an immediate loss in service but that the innovation that underpins these services and notably the consistent improvement in these services will be lost, to the detriment of consumers now and into the future.

WISPs often offer networks that are unique to the regions in which they operate and utilise a bespoke configuration of local government backhaul assets as well as private wireless equipment to provide services to their communities. In places such as Western Australia's Wheatbelt this has enabled communities' greater access to fit-for-purpose services and supported local industries to reach their potential. This is particularly concerning given the commitment of state, local and private funds and assets to these projects, and the negative incentives it sets for all parties to invest in order to provide better services for consumers.

Despite playing an important competitive role, the future of WISPs is currently uncertain with the potential for the re-licensing of the 3.6 GHz spectrum band to support the roll out of 5G services. As part of this process those entities currently using this spectrum band will lose their licenses after seven years and have to vacate the spectrum. The spectrum can be re-purchased in an auction with major service providers, but is likely to be priced above the reach of WISPs.

At the present moment, there is little indication that the large service providers will be in a position to exploit the spectrum in regional and remote areas for a considerable period after they have obtained licenses for the 3.6GHz spectrum. Accordingly there is a significant risk that consumers will face a loss of existing services, with no counterbalancing benefit of new services.

Although there are some indications that sharing of spectrum may be negotiated between WISPs and potential purchasers of the licenses at auction, how this could be done within the existing legal framework is not clear and there is considerable uncertainty. Even should such sharing arrangements be capable of being negotiated, the costs (e.g. time and resources involved in negotiation) associated with these transactions could potentially preclude formation of an agreement to the detriment of consumers (Coase 1937).

ACCAN therefore considers that there is a strong basis for examining whether a formal framework can be established to encourage sharing within licensing conditions going forward, noting that in many instances the economic rationale for licensing (constraining externalities) will not be relevant in the regions where WISPs operate.

ACCAN is concerned about the future of these services and the potential impact on the consumers and businesses relying on them if policy settings are not calibrated correctly. For the consumers depending on these services, we believe the highest benefit comes from keeping the services that are available.

Recommendation 13

That the ACMA in conjunction with the ACCC examine options for promoting the sharing of spectrum in regional and rural Australia to ensure that competition is not diminished through the loss of competitive broadband services.

Information and competition in mobile markets

In regional and remote Australia, the scope of coverage and its quality are major factors for consumers when considering which service provider they will use. Where information is available concerning which networks provide the best quality of service, consumers are likely to switch to the network that provides the best service offering for their needs.

However, ACCAN hears many reports from consumers who have purchased services with mobile network providers, only to find that the experience of using the service is not as mapped.

This situation dampens the development of a competitive mobile market in regional areas, because if consumers do not have sufficiently accurate information to switch they will continue to use the provider they are with and tolerate sub-optimal services.

ACCAN is aware that the ACCC is working with mobile network providers to increase the accuracy of coverage information, and strongly supports this approach. Current mapping is developed using predictions based on the theoretical coverage of mobile base stations and cells, and should be supplemented with on the ground data of actual performance. By increasing the transparency of information, consumers will have greater opportunity to purchase the services that meet their needs, and service providers will have to respond to ensure that they maintain their existing market share.

Universal access to voice and data services

ACCAN supports measures in the Telecommunications Legislation Amendment (Competition and Consumer) Bill 2018 that will make NBN the service infrastructure provider (SIP) for connection of end user premises and supply of superfast broadband services to retailers. These are important measures that underpin universal access to broadband. We are hopeful that the Bill will be passed by the Federal Parliament as a priority.

We also acknowledge the Federal Government's commitment to the supply of voice services to all premises on request as proposals for a Universal Service Guarantee are developed by the Department of Communications (Australian Government 2017). While the existing Universal Service Obligation obligates Telstra to provide voice services to all premises on request until 2032, consumers in areas of regional Australia are finding the performance of the service to be unsatisfactory. Concerns are centred around:

- The condition of network infrastructure (copper and HCRC) which has deteriorated significantly resulting in repeated faults and drop outs;
- Delays in fault repairs causing lengthy loss of service, exacerbated by lack of prompt access to parts by Telstra technicians, particularly with the HCRC network (Cripps 2018).

These individual experiences are confirmed by the trends revealed in Telstra's Network Reliability Framework figures for 2016-17, which show an increased duration of time taken to restore faulty services – an average of 97 hours compared to an average of 76 hours in 2015-16. The average figures for non-urban areas are very concerning – 119 hours in 2016-17, compared to 90 hours in 2015-16 (ACMA 2017).

In addition, Telstra's Customer Service Guarantee payments for failing to meet connection and fault repair timeframes have increased substantially in the last two years, from 153,310 payments amounting to $9.29 million in 2015-16, to 198,514 payments amounting to $14.58 million in 2016-17. However, it must be noted that these figures include Telstra standard telephone services delivered over the NBN, and the NBN does not adhere to CSG timeframes in the absence of wholesale service performance standards.

The government is yet to articulate a clear policy position concerning the continuation of standard telephone voice services in regional and remote Australia, However, the current deteriorating performance of the networks used for delivery of the service it unacceptable, and it is clear that measures are required to address this trend. Regional consumers have a number of key concerns that need to be taken account of:

- Despite its deteriorating condition, the redundancy of the copper network in the case of power failures make it the preferred technology;

- NBN Sky Muster satellite is not suitable for delivery of voice services due to latency and service performance vulnerability to atmospheric changes;
- The increased vulnerability of rural and remote consumers if all communications services are supplied via a single technology.

As part of the universal service guarantee we believe that regulated minimum quality standards for voice services must be established. Currently minimum quality levels are set for standard telephone services delivered over copper under an industry code (ACIF 2004). The scope of this Code needs further refinement to ensure full coverage across a variety of technologies, including VoIP. An appropriate starting point for revision is the industry Guideline on Quality of Service Parameters for VoIP (CA 2013).

Minimum quality standards for voice services are essential to ensure that individuals living in remote and regional Australia have a voice service that is of a sufficient level of quality to provide clear and audible sound. These standards are essential, not just so that consumers can receive crisp audio, but because for many individuals with hearing impairments poor quality sound can mean the difference between having a usable service or having effectively no service. In addition, options for power back up for voice services delivered over technology other than the copper network have not been sufficiently developed or explored. Without this assurance, consumers will be reluctant to transition to different technologies.

Recommendation 14

- *That the government prioritise the passage of the Telecommunications Legislation Amendment (Competition and Consumer) Bill 2018 in the upcoming spring Parliamentary sitting.*
- *That the Department of Communications and the Arts work with Telstra to develop improved arrangements for adequate performance levels and repair timeframes in the delivery of current USO services.*
- *That the Government develop a future universal service guarantee for voice services with adequate performances levels and reliability measures, across all delivery technologies.*

Continuation of service

At the present point in time there is limited information concerning the arrangements for the continuation of ADSL or copper voice services in regional and remote Australia following the completion of the rollout of the NBN. Although ACCAN supports the rollout, consumers' have expressed confusion and concern about the continuation of legacy services for those individuals living in the fixed wireless and Sky Muster satellite footprints.

ACCAN has concerns that there is inadequate planning for the continuation of essential voice and ADSL services into the future and that as the legacy fixed line network continues to degrade there is a risk that consumers will lose access to essential services. For those individuals that have switched to NBN services and wish to access broadband services this may not represent a material loss of services, however there remains a significant proportion of consumers that have not and are unlikely to switch to the NBN.

For Australians living in regional and remote areas voice services are essential and a need rather than a want or additive service as they are in parts of metropolitan Australia. The potential for these services to degrade or cease to function pose significant risks to the welfare of Australians in regional and remote areas which cannot be understated. There is accordingly a need for a considered policy approach to ensure that service continuity going forward is managed in accordance with the interests and expectations of regional Australians.

Payphone services in regional and remote communities

In Australia, as has been the trend in other OECD nations, the use of the system of payphones around the country has declined considerably (PC 2017). Despite the decline in relevance of payphones to many individuals and communities in Australia, for those communities where mobile coverage is poor and individuals have exceptionally low incomes payphones continue to be an important source of connectivity.

Payphones play an important public safety role, and although a small proportion of overall emergency calls in Australia, in 2015-16 payphones accounted for almost 203,000 emergency calls (PC 2017, p.12). For remote communications payphones often represent one of the few hard line sources of connectivity that can be consistently relied upon during disruptions to other services. There is consequently a need for these services to be maintained in those communities that require them as an ongoing source of connectivity.

ACCAN has been advised that a number of remote Indigenous communities continue to rely on payphones as an essential source of connectivity due to the significant costs of mobile services and unreliable satellite services. CAYLUS has notified ACCAN that even in regional centres such as Alice Springs, town camp communities often have poor satellite and mobile services as a result of the topography of the region and that as a consequence there are areas such as Hidden Valley (an area 1.5 km from the centre of Alice Springs) that lack adequate mobile coverage.

The withdrawal of payphones in some remote communities has been undertaken with little substantive community consultation, and although ACCAN accepts that the commercial basis for the provision of these services has diminished over time, the need within remote communities has not. The withdrawal of these services has left some areas with limited or poor mobile coverage around Alice Springs with no publicly accessible form of connectivity, which has been detrimental to individuals moving through these areas including the local population and transport workers.

There is a need for the ongoing funding of payphones in those communities with a demonstrable and continuing need. ACCAN's long held position has been that where there is the prospect of payphone withdrawal, communities should be advised of this possibility and be given a full and substantial opportunity to comment on the proposal. Where withdrawal is considered, withdrawal should only occur where there is no demonstrable need on the part of the community, rather than the commercial impact of these services on Telstra, noting that under the existing USO arrangements Telstra is currently required to provide these services and receives $44 million per annum to provide them (PC 2017, p.7).

Recommendation 15

That the Department of Communications and the Arts conduct research on the use of payphones in remote communities and areas without mobile coverage before considering any options to reduce Telstra's $44m payphone obligation.

Reference List

ABS (Australian Bureau of Statistics) 2016, *National Aboriginal and Torres Strait Islander Social Survey, 2014-15*, Canberra.

ABS (Australian Bureau of Statistics) 2017, *Population by Age and Sex, Regions of Australia*, Canberra.

ABS (Australian Bureau of Statistics) 2018a, *Estimates of Personal Income for Small Areas, 2011-2016*, Canberra.

ABS (Australian Bureau of Statistics) 2018b, *Government Benefits, Taxes and Household Income, Australia: Summary of Results 2015-16*, Canberra.

ABS (Australian Bureau of Statistics) 2018c, *Household Use of Information Technology, Australia, 2016-17*, Canberra.

ACCAN (Australian Consumer Communication Action Network) 2012, *Know Your Gizmo*, viewed 8 February 2018, <http://accan.org.au/grants/completed-grants/465-know-your-gizmo>.

ACCAN (Australian Consumer Communication Action Network) 2016, *A Guarantee for the Future - ACCAN's policy position on a customer service and reliability standard*, viewed 8 February 2018, <http://accan.org.au/our-work/policy/1166-future-guarantee>.

ACCAN (Australian Consumer Communication Consumer Action Network) 2018, *ACCAN's Analysis of NBN Co's recently announced Pricing Changes*, viewed 12 June 2018, <http://accan.org.au/hot-issues/1511-accan-s-analysis-of-nbn-co-s-recently-announced-pricing-changes>.

ACCC (Australian Competition and Consumer Commission) 2018a, *Communications Sector Market Study*.

ACCC (Australian Competition and Consumer Commission) 2018b, *NBN Wholesale Market Indicators Report 31 March 2018*.

ACIF (Australian Communications Industry Forum) 2004, *Industry Code ACIF C519:2004 End-to-end Network Performance for the Standard Telephone Service*.

ACMA (Australian Communications and Media Authority) 2017, *Communications Report 2016-17*, Sydney.

ACMA (Australian Communications and Media Authority) 2018, *NBN Consumer Experience - Residential Research Snapshot*, Sydney.

Akerlof, G. 1970, 'The Market for "Lemons" Quality Uncertainty and the Market Mechanism', *Quarterly Journal of Economics*, vol. 84, no. 3, pp. 488–500.

ANAO (Australian National Audit Office) 2016, *Aware of Funding under the Mobile Black Spot Programme*, Canberra.

Australian Government 2017, *Australian Government Response to the Productivity Commission's Inquiry into the Telecommunications Universal Service Obligation*, Canberra.

BCAR (Bureau of Communications and Arts Research) 2016, *IT use and Australia's productivity: Where are we now?*, Canberra.

BCAR (Bureau of Communications and Arts Research) 2017, *Trends and drivers in the affordability of communications services for Australian Households*, trans. BCAR, Working Paper, Canberra.

BITRE (Bureau of Infrastructure, Transport and Regional Economics) 2017, *Australian Infrastructure Statistics Yearbook 2017*, Canberra.

CA (Communications Alliance) 2013, *Industry Guideline G634:2013 Quality of Service parameters for Voice over Internet Protocol (VoIP) services*.

CfAT (Centre for Appropriate Technology) 2018, *The CfAT Ltd Mobile Phone HotSpot*, viewed 2 August 2018, <https://static1.squarespace.com/static/5450868fe4b09b217330bb42/t/5b61141f352f532d2054a584/1533088807869/2018+CfAT+Ltd+Mobile+Phone+Hotspots_v4.pdf>.

Coase, R. 1937, 'The Nature of the Firm', *Economica*, vol. 4, no. 1, pp. 386–405.

CRDC (Cotton Research and Development Corporation Australia) 2017, *Accelerating precision agriculture to decision agriculture: Enabling digital agriculture in Australia*.

Cripps, S. 2018, 'Telstra's lack of replacement for HCRC phones becoming critical, ICPA says', *Queensland Country Life*, 6 August, viewed 6 August 2018, <https://www.queenslandcountrylife.com.au/story/5566967/icpa-hanging-on-the-telephone/>.

Crozier, R. 2018, 'NBN Co could target multi-terabyte fixed wireless users', *itnews*, 4 June, viewed 8 February 2018, <https://www.itnews.com.au/news/nbn-co-could-target-multi-terabyte-fixed-wireless-users-492624>.

DOCA (Department of Communications and the Arts) 2018, 'Mobile Blackspot Program', *Department of Communications and the Arts*, viewed 29 July 2018, <https://www.communications.gov.au/what-we-do/phone/mobile-services-and-coverage/mobile-black-spot-program#rounds-1-and-2>.

DHS (Department of Human Services) 2018a, 'Newstart Allowance - How much can you get?', *Newstart Allowance*, Government, viewed 7 February 2018, <https://www.humanservices.gov.au/individuals/services/centrelink/newstart-allowance/how-much-you-can-get>.

DHS (Department of Human Services) 2018b, 'Youth Allowance for students and Australian Apprentices - How much you can get', *Youth Allowance*, viewed 7 May 2018, <https://www.humanservices.gov.au/individuals/services/centrelink/youth-allowance-students-and-australian-apprentices/how-much-you-can-get>.

DSS (Department of Social Services) 2018, *Labour Market and Related Payments: a Monthly Profile*, Canberra.

Graham, N. 1999, 'Amartya Sen's capabilities approach to the evaluation of welfare: Its application to communications', *Communication, citizenship and social policy: Rethinking the limits of the welfare state*, pp. 113–24.

King, S. 2009, 'The 2008 ACCC merger guidelines: how and why have they changed', *UNSW Law Journal*, vol. 32, no. 1, pp. 263–74.

Minifie, J. Chisholm, C. & Percival, L. 2017, *Competition in Australia: too little of a good thing?* Grattan Institute.

Minister for Finance and Deregulation the Honourable Penny Wong & Minister for Broadband, Communications and the Digital Economy, the Honourable Stephen Conroy 2010, *Statement of Expectations*.

NBN Co. 2018a, *Connecting Australia*, Sydney.

NBN Co. 2018b, *NBN Co Weekly Progress Report - 19 July 2019*.

Ogle, G. 2017, *Telecommunications Expenditure in Australia*, Australian Communications Consumer Action Network, Sydney.

OECD (Organisation for Economic Co-operation and Development) 2018, *Bridging the Rural Digital Divide*, OECD Digital Economy Papers, Paris.

Parliament of the Commonwealth of Australia 2018, *Telecommunications (Regional Broadband Scheme) Charge Bill 2018*, Canberra.

PC (Productivity Commission) 2017, *Telecommunications Universal Service Obligation*, Canberra.

Rennie, E., Hogan, E., Gregory, R., Crouch, A., Wright, A. and Thomas, A. 2016, *Internet on the Outstation: The Digital Divide and Remote Aboriginal Communities*, vol. 19, Print on Demand.

TIO (Telecommunications Industry Ombudsman) 2018, *2016-2017 Annual Report*.

Thomas, J, Barraket, J, Wilson, C, Ewing, S, & MacDonald, T, Tucker, J & Rennie, E, 2017, *Measuring Australia's Digital Divide: The Australian Digital Inclusion Index 2017*, RMIT University, Melbourne, for Telstra.

Vertigan Panel 2014a, *Independent Cost-Benefit Analysis of Broadband and Review of Regulation: Volume I*.

Vertigan Panel 2014b, *Independent Cost-Benefit Analysis of Broadband and Review of Regulation: Volume II - The Costs and Benefits of High-speed Broadband*.

Viscusi, K. & Masterman, C. 2017, 'Income Elasticities and Global Values of a Statistical Life', *Journal of Benefit-Cost Analysis*, vol. 8, no. 2, pp. 226–50.