



Australian Government

Regional Telecommunications Review

2021 Regional Telecommunications Review

A step change in demand



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Letter of Transmittal



Australian Government
Regional Telecommunications Review

13 December 2021

Senator the Hon Bridget McKenzie
Minister for Regionalisation, Regional Communications and Regional Education
Minister for Emergency Management and National Recovery and Resilience
senator.mckenzie@aph.gov.au
Parliament House
Canberra ACT 2600

Dear Minister,

Together with my colleagues, Ms Kristy Sparrow, Ms Sue Middleton, Professor Hugh Bradlow and Mr Michael Cosgrave, I am pleased to present the 2021 Report of the Regional Telecommunications Independent Review Committee.

In undertaking this Review the Committee has canvassed the views of consumers, organisations, businesses and individuals across regional Australia. In addition to numerous online public consultations and stakeholder meetings, the Committee received over 650 submissions, reflecting the critical importance of communications in regional, remote and rural communities.

There has been a step change in the demand for telecommunications, and the arrangements for ensuring the needs of regional communities are met must reflect this change. There is a new paradigm in the way we use telecommunications and Australia will be relying even more on digital connectivity as it strives to become a leading digital economy.

Reliable telecommunications are essential for everyday life in regional, rural and remote Australia and have assumed a role much more on par with electricity. This is evident when the communications system goes down as in recent bush fires, floods, and cyclones. In the same way that we need to keep the lights going, we also need to keep data flowing.

Australia is now at a crossroads where it can either risk the digital divide expanding, or see the regions flourish. It is important that the digital divide does not widen, and that regional, rural and remote Australians are not left behind as Australia reaps the benefits of the digital economy.

The decisions that are made now will determine whether the regions live up to their extraordinary potential as a great place to live, work, invest and do business.

I commend this report to you.

Yours sincerely

A handwritten signature in black ink, appearing to read 'LH'.

Luke Hartsuyker

Chair, Regional Telecommunications Independent Review Committee



Executive Summary

Every three years, under Part 9B of the Telecommunications (Consumer Protection and Service Standards) Act 1999, a Regional Telecommunications Independent Review Committee (the Committee) is formed to conduct a review into the adequacy of telecommunications in regional, rural and remote parts of Australia.

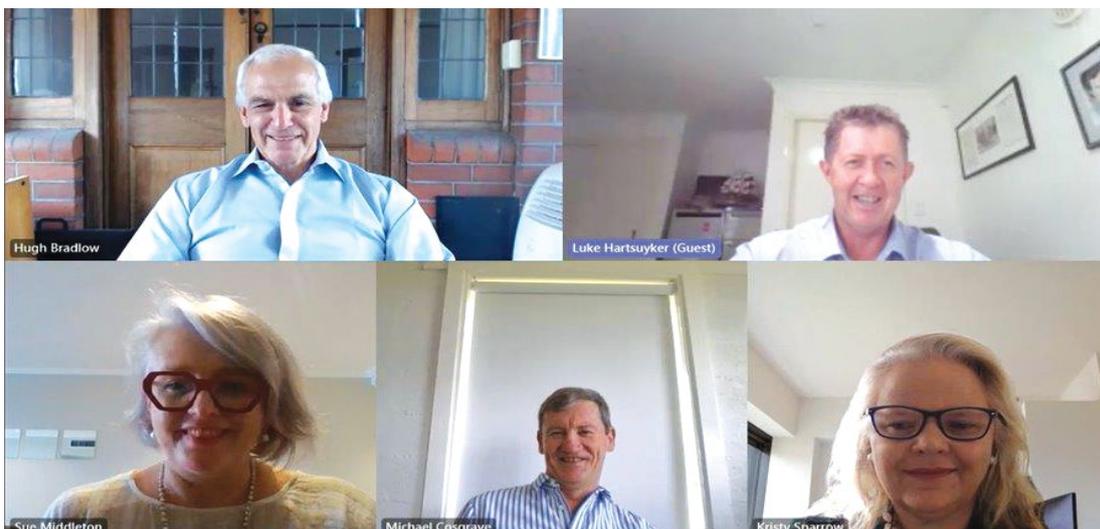
In undertaking its review, the Committee must have regard to whether people in regional, rural and remote Australia have equitable access to telecommunications services that are significant to them and currently available in urban areas. The review is to be informed by public consultation with people in regional, rural and remote areas.

The 2021 Regional Telecommunications Review (the Review) commenced on 2 June 2021 with the announcement of the 2021 Committee by the then Minister for Regional Health, Regional Communications and Local Government, the Hon Mark Coulton MP. The five members of the Committee are the Hon Luke Hartsuyker (Chair), Ms Kristy Sparrow (Deputy Chair), Ms Sue Middleton, Professor Hugh Bradlow and Mr Michael Cosgrave.

Over the past six months, the Committee has undertaken an extensive series of consultations with governments, industry, and regional, rural and remote Australians. Consistent with our Terms of Reference, the Committee has placed a particular focus on delivering a 'report card' to the Australian Government on its existing policies and programs, the impacts of COVID-19, the role of emerging technologies, the reliability of services, and the role of telecommunications in supporting broader regional development and investment.

The Australian telecommunications landscape in regional, rural and remote areas, including the peri-urban fringe where the bush meets the suburbs, has undertaken a significant step change since the 2018 Edwards Review. This is particularly true in relation to the ongoing demand for data.

Much of the recent pressure on mobile and broadband networks at first glance appears to be due to an increased number of people working and studying from home due to the COVID-19 pandemic. However, the reality is that, even since the 2018 Edwards Review, connectivity has assumed a more vital role in the lives of all Australians and the Australian



The 2021 RTIRC Committee: Hon Luke Hartsuyker (Chair), Ms Kristy Sparrow (Deputy Chair), Ms Sue Middleton, Professor Hugh Bradlow and Mr Michael Cosgrave.

economy, including in regional areas. As both government and commercial services are increasingly delivered online, and the range of digital tools for work, study and leisure grow, there has been a significant, but in the main predictable, increase in the ongoing demand for data by both individuals and businesses.

The Committee considers that this step change in the ongoing demand for data warrants a step change in the policies and programs which support the delivery of telecommunications services in the bush. Through initiatives like the 2030 Digital Economy Strategy (DES), the Australian Government has recognised that Australia's place in the world will be defined by how we adapt to digital technologies and modernise our economy over the next decade. Regional, rural and remote Australia will play a vital part in realising the DES goal for Australia to be a leading digital economy and society by 2030.

Participation in the digital economy can only occur where there is a strong foundation in digital infrastructure and skills. For many Australians in regional, rural and remote Australia, laying these foundations remains a work in progress. With the completion of the initial volume build of the National Broadband Network (NBN),¹ and the announcement of further fixed line upgrades to address future demand, the demarcation between those in the NBN fixed line footprint and those outside of it threatens to compound existing digital divides unless more is done for users of the NBN fixed wireless and satellite networks.

'Place-based' investments through programs like the Australian Government's Regional Connectivity Program (RCP), as well as legislated service mandates under the Universal Service Guarantee (USG) and other arrangements, go some way to address these issues. Services like the Regional Tech Hub also help to build much needed connectivity literacy in regional areas. However, it is critical that these programs and policies are significantly expanded and subject to continual review and revision to make sure that they remain fit-for-purpose.

This report identifies 16 key findings in relation to these issues. It also provides 12 recommendations by which the Australian government can help to lay the foundations of a more accessible, competitive, and reliable regional telecommunications landscape which is able to leverage the opportunities of the digital economy. The discussion below summarises the key findings, and identifies how they relate to the Committee's recommendations. The key findings have been organised under four headings:

1. The 'Patchwork Quilt' of connectivity
2. Reliability, resilience and redundancy
3. The demand for data and
4. Connectivity literacy and digital inclusion

The 'Patchwork Quilt' of connectivity

Key findings

1. **Increased coordination and investment between the Australian, state and territory governments is needed to address a 'patchwork quilt' approach to connectivity in the regions.**
Relates to Recommendations: 1, 2
2. **Local councils and other regional stakeholders are increasingly expected to facilitate telecommunications service delivery, but are not appropriately resourced to identify connectivity needs and support the deployment of suitable solutions.**
Relates to Recommendations: 1, 5
3. **Supply side issues, including backbone fibre and spectrum access, are barriers to competition and innovation in regional telecommunications markets.**
Relates to Recommendations: 1, 2

¹ The Hon Paul Fletcher MP, Minister for Communications, Urban Infrastructure, Cities and the Arts, NBN declared built and fully operational [Media Release] Commonwealth of Australia, 23 December 2020. <https://minister.infrastructure.gov.au/fletcher/media-release/nbn-declared-built-and-fully-operational>

Digital connectivity is critical to the growth and resilience of the Australian economy, including in regional, rural and remote Australia. This is reflected in the Australian Government's recently released DES, which sets out a vision for the digitisation of almost all aspects of Australian society by 2030. Other policies focussed on the development and productivity of the regions, including the Australian Government's Northern Australia and Regionalisation agendas, also recognise the importance of high-speed, high capacity digital infrastructure and services in underpinning economic opportunity and delivering long-term, sustainable social growth outside of urban areas.

The 2018 Edwards Review found that while all Australians have guaranteed access to a baseline level of connectivity through the NBN and other guarantees, there was scope for government and industry to provide targeted uplifts to connectivity in areas of economic and social significance outside the fixed line NBN footprint where it would be otherwise uncommercial to do so. Since then, Australian, state and territory governments and the telecommunications industry have made a series of investments in regional connectivity, utilising a 'place-based' approach which is informed by and responds to community needs.

This approach has been well-received by industry and regional communities and businesses. However, the Committee is concerned that the 'place-based' approach as it currently stands may not be sufficiently informed by strategic analysis of economic and social needs or coordination between different levels of government on infrastructure investment initiatives. This may lead to sub-optimal outcomes over the longer-term.

The current design and process around initiatives like the RCP can be better aligned with other Australian Government strategic priorities, as well as the strategic priorities of state and territory governments and local communities. Additionally, greater funding

certainty over longer time-frames will provide the scale of investment - from both government and private sector investors - needed to undertake significant infrastructure builds which can deliver wholesale uplifts to digital connectivity across regions of growth.

As key project partners in the 'place-based' approach, local councils and regional stakeholder organisations also need to be more empowered to identify, evaluate, endorse and support opportunities to uplift digital connectivity in their regions. These organisations increasingly feel like they are partly responsible for the delivery of telecommunications services, but also do not feel sufficiently resourced, either financially or in terms of knowledge, to manage this responsibility. Access to support, including independent advice and needs-analysis, will help these organisations to deliver meaningful connectivity outcomes for their communities.

Alongside this, there are opportunities for growth in secondary telecommunications markets and other sectors which are being constrained by limited access to supply-side resources like fibre backbone and radiofrequency spectrum. A number of smaller providers are deploying small-scale networks on individual farms to solve connectivity issues which cannot be addressed through larger networks. Other players, like the emerging space industry and some local councils in remote areas, are looking to access spare and diverse fibre capacity to supply commercial or public connectivity services.

Additional investment to provide access to fibre backbone, in particular, may help to unlock these markets, increasing competition and encouraging the delivery of last mile connectivity solutions. This will be most effective where stakeholders have access to transparent information on the location of backbone infrastructure to inform planning and investment.

Reliability, resilience and redundancy

Key findings

4. There is an urgent need to consider the future of the Universal Service Obligation in order to provide reliable voice services to rural and remote consumers.
Relates to Recommendations: 7, 8
5. There are significant issues with the maintenance and repair of telecommunications networks, particularly copper landlines, in regional, rural and remote areas.
Relates to Recommendations: 7, 8
6. In instances of natural disasters and emergencies, connectivity is significantly impacted by power and network outages. This reduces access to recovery and support.
Relates to Recommendations: 3
7. Mobile coverage continues to improve, but expanding reliable coverage to priority areas is becoming more difficult.
Relates to Recommendations: 9, 10

Access to reliable telecommunications services has never before been more important to regional, rural and remote Australians. Since 2018, this has been brought home by the devastating impacts of several natural disasters across the country, including the 2019-20 bushfires, the 2021 Eastern Australia floods and Cyclone Seroja, as well as the impact of the COVID-19 pandemic. In all of these events, regional Australians relied on mobile, landline and broadband networks for real-time information, access to emergency services, contact with loved ones, and resources to support postdisaster recovery.

There is continued concern around ongoing service delivery under the Universal Service Obligation (USO), which legislates the provision of standard telephone services and payphone services to all premises in Australia. At present, Telstra delivers approximately 400,000 telephone services outside the NBN fixed line footprint, largely via the copper network. Telstra's ongoing legislated role as the USO provider for voice and payphones is complemented by the \$270 million Telstra USO Performance Agreement (TUSOPA), which contains a copper continuity provision.

However, copper landlines in regional, rural and remote areas are deteriorating and their reliability has been impacted. While voice and broadband services generally experience high levels of availability, low fault rates and are connected and repaired in regulated timeframes, there remains a small cohort of users that experience unacceptable issues in getting their services repaired. It is also becoming more and more difficult to source parts to undertake repair and maintenance on legacy systems like High Capacity Radio Concentrator (HCRC). The current regulatory regime which supports the connection and repair of services needs strengthening and more robust enforcement.

With more than 10 years remaining on the TUSOPA contract before its expiry in 2032, there is strong and pressing need for USO reform to address the substantial ongoing stress on current infrastructure due to ageing technology. The USO must be continued, but it is time for both the Australian Government and Telstra to consider the long term performance and delivery of voice services in advance of and beyond 2032, particularly in relation to copper continuity and the HCRC system.

While a 'technology agnostic' approach to USO service delivery is likely appropriate, reformed arrangements must ensure that alternative service technologies exceed the existing reliability standards of the current solution. This should require the inclusion of backup power and stringent minimum availability and voice quality standards which are enforceable through significant penalties on the USO provider. New solutions must also be affordable for regional users.

Elsewhere, there is a need to improve the resilience of telecommunications infrastructure in areas where there are frequent power outages, particularly those at risk of natural disaster. Mobile base stations, telephone exchanges and other key infrastructure are vulnerable to interruptions to the power network, and are often insufficiently provisioned with auxiliary back-up power to maintain critical communications services during extended power outages. Further funding for existing infrastructure strengthening initiatives, as well as improved information sharing and disaster management planning between state, territory and local governments, the telecommunications industry and the energy sector, will all help to make sure regional communities have access to reliable communications when they need them.

There is also a continuing need to expand mobile coverage and competition in regional, rural and remote Australia. The Australian Government, in partnership with state and territory governments and the telecommunications industry, has delivered over 162,000 square kilometres of new and upgraded handheld mobile coverage through the Mobile Black Spot Program (MBSP). However, as the program pushes further out into more remote areas with reduced return on investment and higher costs of infrastructure deployment, it is increasingly struggling to expand mobile coverage into priority areas. There are also questions as to how well the program is promoting competitive outcomes.

In line with reforms under the most recent round of the MBSP program, measures to support increased passive and active mobile network infrastructure sharing should be included in future rounds in order to promote expanded regional mobile coverage. Policymakers and mobile network operators should also consider the feasibility of trials of domestic roaming on infrastructure in disaster affected areas as part of a range of measures to ensure there is access to reliable communications in emergency situations.

The demand for data

Key findings

8. **Increased ongoing demand for data on regional, rural and remote mobile and fixed wireless networks is not always being met, causing network congestion issues.**
Relates to Recommendations: 6, 9
9. **Although Sky Muster Plus has improved access to data, Sky Muster users are frustrated by insufficient data allowances, high latency and reliability issues.**
Relates to Recommendations: 6
10. **Current minimum broadband speeds are mostly adequate, but will need to increase over time.**
Relates to Recommendations: 8
11. **There are emerging technology options to meet the demand for data but their service performance has not yet been validated.**
Relates to Recommendations: 4

Since 2018, the consumption of data by Australian consumers and businesses has continued to significantly increase Australia-wide. This increase has been somewhat accelerated by the response to the COVID-19 pandemic, which has required Australians to increasingly adopt digital platforms for business, study and work, as well as for access to essential services like groceries, banking, health care and government services. However, it generally reflects a longstanding year-on-year trend, which is largely predictable given the role connectivity now plays in many parts of everyday life. This can only continue into the future.

The increasing demand for data in regional, rural and remote Australia is not always being adequately met by the oftentimes constrained connectivity options available to regional consumers. Participants in the Review have reported significant congestion issues, particularly on the mobile and NBN fixed wireless networks, which are impacting everyday business transactions and other activities. While the costs of continuous capacity upgrades are high, telecommunications network operators have a responsibility to invest in their networks to prevent major network congestion which impacts quality of service.

With the completion of the NBN initial rollout, NBN Co Limited (NBN Co) is pursuing opportunities to upgrade its network in line with growth in demand. While the fixed line NBN services available in urban areas and regional centres are set to benefit from significant network investment in the near future, users outside of the fixed line footprint who currently receive baseline services through satellite and fixed wireless are in danger of being left behind without similar investments.

On the Sky Muster satellite network, the introduction of unmetered data for most digital activities through Sky Muster Plus in 2019 has significantly improved the value and quality of the service for many users. However, many users may not be aware of the Sky Muster Plus product. Additionally, issues of high latency and service reliability will continue to impact performance, particularly for real-time applications. Sky Muster users, on all plans, are also restricted from freely utilising their full connection due to 'peak' and 'off-peak' data allocations and limits at various times of the day. On the fixed wireless network, there is the potential to deliver improved bandwidth and to extend the reach of this network into Sky Muster areas. This will allow more users to access the faster network speeds possible on the fixed wireless network.

Importantly, since 2018 the Australian Government has progressed the USG, which now includes legislated peak speed targets for the NBN and other wholesale broadband networks. While these targets establish a baseline for service delivery, as the demand for data increases into the future there will be a need to regularly review and update them to compel wholesale network providers to upgrade their regional networks in line with consumer needs. The further development of the USG through performance standards, rules and benchmarks should also concentrate on strengthening the service obligations on providers.

As the demand for data increases across a number of areas, including through the uptake of devices connected to the Internet of Things (IoT), emerging technologies like Low Earth Orbit (LEO) satellites, Low Power Wide Area Networks (LP-WAN) and 5G cellular technology are likely to play a larger role in the Australian telecommunications landscape. The deployment of some of these networks, like 5G, is being driven on a commercial basis. However, at this early stage, the long-term success of others, particularly LEO satellites, is unclear. Through a trial initiative, there is scope for the Australian Government to validate the potential applications, economic viability and reliability of these new technologies where there is a significant degree of uncertainty about their service performance and overall cost effectiveness.

Connectivity literacy and digital inclusion

Key findings

12. Regional consumers, businesses and local governments experience difficulty in resolving telecommunications issues and providers are not adequately addressing the complex needs of regional users.
Relates to Recommendations: 5, 7
13. Regional consumers, businesses and local government need access to independent advice and improved connectivity literacy to support them in making informed connectivity choices.
Relates to Recommendations: 1, 5
14. Predictive coverage maps and other public information do not accurately reflect on-the-ground telecommunications experience. There is significant misinformation about the availability of telecommunications services.
Relates to Recommendations: 5, 9
15. The cost of telecommunications services remains high for vulnerable groups in remote Australia. This is impacting on their access to essential services.
Relates to Recommendations: 11, 12
16. Continued engagement with Indigenous Australians in regional, rural and remote communities is needed to address ongoing issues of access, affordability and digital ability.
Relates to Recommendations: 5, 11, 12

Connectivity literacy, first coined by Better Internet for Rural, Regional and Remote Australia (BIRRR), refers to the skills and knowledge needed by a consumer to get connected and stay connected to telecommunications services. For some consumers connectivity literacy is the first step on the path to digital literacy; however, for others, being digitally literate does not necessarily mean that they have the skills to get connected. Many variables can impact connectivity literacy, particularly for regional, rural and remote users. This includes misinformation and disinformation, inconsistent and complex terminology, and a lack of transparency and support from providers.

Many regional users are dealing with complexities in identifying and resolving service and infrastructure problems. However, the complexity of regional connectivity issues and solutions is not only poorly understood by consumers and regional users, but also telecommunications providers and customer service staff. The variety of technology types, a lack of appropriate diagnostic tools, and a carousel of shifting accountability between wholesale and retail providers, means that resolving simple issues can take excessive time, commitment and persistence. There is a need for improved customer service processes which recognise and respond to the unique needs of regional users.

Regional users, including consumers, businesses and local governments, also need access to independent advice on available connectivity options to assist them in making informed decisions. Improved connectivity literacy will empower these cohorts against the significant misinformation on telecommunications services in regional areas and help them navigate the complexities of the market. In response to the 2018 Edwards Review, the Australian Government has funded the delivery of a Regional Tech Hub, which provides independent, free advice about telecommunications services. While this is a good first step, there is scope to expand the work and resourcing of the Regional Tech Hub, including more proactive regional engagement with consumers, to increase connectivity literacy at the grassroots level.

In order to improve the level of connectivity literacy in regional, rural and remote Australia, there is also a need for greater public visibility regarding the 'on-the-ground' availability and performance of voice and data networks. Much of the coverage information available to consumers uses either predictive assumptions which do not reflect lived experience, or inconsistent terminology which makes it difficult to compare competing service offerings. Consumers, businesses and policymakers need to be able to access accurate and granular coverage information which is contestable through 'on-the-ground' performance data. The Australian Government can play a role in collecting, standardising, publishing and challenging this coverage information to support users.

The affordability of telecommunications services for regional, rural and remote Australians is an ongoing issue. Although telecommunications affordability is improving, regional Australians are paying a higher proportion of their income on telecommunications than their urban counterparts due to reduced consumer choice in technologies and plans, as well as the need to maintain multiple forms of connectivity where

services are unreliable. As government services move online, the affordability of data is a key concern. Unmetering or 'de-rating' the data charges from the use of platforms like myGov, as well as offering a subsidised NBN product for low-income earners, are measures which could improve equitable access to essential online services.

Continued engagement with Aboriginal and Torres Strait Islander Australians in regional, rural and remote communities is also needed to address ongoing issues of access, affordability and digital ability. The specific cultural and connectivity needs of these Australians requires a dedicated approach, including through the Closing the Gap priority reforms and the in-development Indigenous Digital Inclusion Plan. Community-led digital inclusion programs, such as InDigiMOB, and investments in last-mile infrastructure and community aggregation services like public Wi-Fi are also essential in improving connectivity outcomes in remote communities.

Recommendations

1. Longer term approach to regional communications infrastructure and digital skills

The Committee recommends the development of a long term investment and planning framework for digital infrastructure and regional digital capability. This includes increased coordination and investment between the Australian, state and territory governments and other relevant sectors to address connectivity in the regions.

2. Enhanced Connectivity Investments

The Committee recommends that the Government continues, but significantly strengthens and enhances, its commitment to large-scale multi-year connectivity investments. This recognises the increased importance of digital infrastructure as a critical foundation to grow the digital economy, support regionalisation and social inclusion.

The Committee further recommends that:

- the Government continues to support provision of new mobile coverage;
- the Government continues to be guided in its investments by the approach taken in the Regional Connectivity Program, incorporating a strategic place-based approach; and
- the Government's investments should also:
 - encompass broader regional and industry sectoral outcomes;
 - address capacity and competition issues by providing additional backbone solutions; and
 - consider funding vehicles which leverage private sector co-investment.

3. Regional Telecommunications Resilience

The Committee recommends that Government commits to a substantial Regional Telecommunications Resilience Fund, targeted towards initiatives to improve emergency and network resilience across vulnerable communities, enhancing funding for the Strengthening Telecommunications Against Natural Disasters (STAND) package, including the Mobile Network Hardening Program.

The Committee further recommends that a focus be given to:

- better coordination between the telecommunications industry, energy providers and emergency services; and
- standards of maintenance and preparation for emergency events.

4. Emerging Technology Trial

The Committee recommends that the Government fund innovation trials to validate the value and reliability of new technology solutions able to address broadband and mobile coverage across regional, rural and remote Australia.

The Committee further recommends that the focus of the funding be targeted toward those technologies that have not yet been deployed commercially at scale or are not currently provided by existing commercial solutions.

5. Connectivity Literacy

The Committee recommends that the Government continues to commit to the provision of accessible and independent information for regional consumers, business and local government. This includes providing a significant focus on:

- a substantially enhanced and sufficiently resourced Regional Tech Hub actively engaged with regional and industry stakeholders;
- resourcing the development and maintenance of a digital tool to provide specific information on connectivity options;
- ensuring the ACCC continues to make enforcement of misleading and deceptive disinformation in the telecommunications industry a priority; and
- supporting and expanding community digital literacy programs, funded through the telecommunications industry.

6. NBN Co regional delivery

The Committee recommends that NBN Co commits to providing holistic upgrades to their regional fixed wireless network to allow users to access faster network speeds and minimize network congestion by:

- strengthening the network to make more bandwidth available to users; and
- extending the reach of the network into areas currently serviced by Sky Muster satellite.

The Committee further recommends that NBN Co provides greater value on the Sky Muster satellite product by enhancing peak and off-peak times and data allocations and promoting the availability of Sky Muster Plus to users.

7. Network Performance and Reliability

The Committee recommends that the Government develops and enforces minimum wholesale and retail service, performance and reliability standards appropriate for each service type (fixed and landline, mobile, fixed wireless, satellites).

The Committee further recommends that:

- escalating penalties for failure to meet standards appropriate for each service type are introduced and enforced; and
- wholesalers and retailers must make practical and useable information available to consumers about network performance in 'real time'.

8. Adequacy of USO/USG

The Committee recommends that:

- there is strong and pressing need for USO reform to address the substantial ongoing stress on current infrastructure due to ageing technology; and
- the reformed arrangements allow for a technology agnostic approach to USO service delivery, providing it exceeds the existing reliability standards of the current solution.

The Committee further recommends that the minimum USG standards, including download/upload speeds and performance during peak or busy hours, will need to increase and should be subject to an annual review, particularly for consumers outside the NBN fixed line footprint.

9. Mobile Services

The Committee recommends that the Government ensures measures are undertaken to increase the accuracy and transparency of mobile network quality and coverage information, including network congestion. This includes measures to collect and standardise mobile network coverage information and develop a tool to empower consumers to compare network performance and service availability.

The Committee further recommends that:

- the Government provides funding to undertake an investigation and audit to collect and report mobile coverage performance across regional Australia, including congestion; and
- the Government undertakes a feasibility study to consider the capability for mobile roaming to be deployed in emergency circumstances.

10. Shared Network Access

The Committee recommends that preference is given to Government funded mobile infrastructure providing shared network access. This includes a particular focus in the design of the Mobile Black Spot Program towards:

- neutral host solutions, including consideration of payments toward operational and maintenance expenses; and
- innovative funding models used in other jurisdictions to encourage participation.

11. Indigenous Communities

The Committee recommends that in consultation with Indigenous organisations and communities, the Government continues to focus on needs of Indigenous Australians living in regional, rural and remote areas surrounding access, affordability and digital ability. This includes:

- applying the National Indigenous Inclusion Plan;
- addressing targets within the National Agreement on Closing the Gap; and
- supporting existing community digital inclusion programs, such as InDigiMOB.

12. Affordability

The Committee recommends the removal of data charges for low income and income support recipient consumers in regional, rural and remote Australia accessing all Australian, state and territory government services, to improve the affordability of telecommunications for these users.

The Committee further recommends that:

- the Government introduces this measure initially during the current upgrade of myGov and introduction of Online Employment Services; and
- NBN Co implements a product for low income and income support recipient consumers across all technologies in regional, rural and remote areas.

Introduction

A Regional Telecommunications Independent Review Committee (the Committee) is established every three years by Part 9B of the Telecommunications (Consumer Protection and Service Standards) Act 1999 (the Act). The 2021 Committee is comprised of the Hon Luke Hartsuyker (Chair), Ms Kristy Sparrow, Ms Sue Middleton, Mr Michael Cosgrave, and Professor Hugh Bradlow. Biographies for the Committee are at Appendix 1.

Since its commencement, the Committee has examined the importance and usage of telecommunications services in regional, rural and remote parts of Australia. The Review report and recommendations are based on the Committee's findings through public consultation, stakeholder engagement and written submissions.

This is the fifth legislative regional telecommunications review, following on from the 2018 Review chaired by Mr Sean Edwards. The Committee was asked to provide its report to the Minister for Emergency Management and National Recovery and Resilience and Minister for Regionalisation, Regional Communications and Regional Education, Senator the Hon Bridget McKenzie, by 31 December 2021.

Terms of Reference

Sections 158P and 158Q of the Act contain the terms of reference for the RTIRC and the conduct of regional telecommunications reviews. The full Terms of Reference for the 2021 Review are:

1. The Regional Telecommunications Independent Review Committee must conduct a review of the adequacy of telecommunications services in regional, rural, and remote parts of Australia.
2. In determining the adequacy of those services, the Committee must have regard to whether people in regional, rural and remote parts of Australia have equitable access to telecommunications services that are significant to people in those parts of Australia, and currently available in one or more parts of urban Australia.
3. In conducting the review, the Committee must make provision for public consultation and consultation with people in regional, rural and remote parts of Australia.
4. In conducting the review, the Committee is to have regard to:
 - a. the impact of the Government's policies and programs for improving connectivity, competition and digital literacy in regional, rural and remote areas, including rollout of the National Broadband Network, the Mobile Black Spot Program, the Regional Connectivity Program and the Regional Tech Hub;
 - b. insights from COVID-19 on consumer access to and usage of broadband and mobile technology in regional, rural and remote areas;
 - c. emerging technologies that could lead to significant changes in how telecommunications services are delivered in regional, rural and remote parts of Australia in the next 5-10 years;
 - d. service reliability and impacts on customers and communities in regional and remote areas.
5. Taking into account Term of Reference 4, the Committee is to consider:
 - a. whether changes are warranted to existing Government policies and programs to ensure they continue to be effective, fit for purpose and are maximising the social and economic potential from existing and emerging technological advances;
 - b. policy settings that might be needed to support more rapid rollout of and investment in new telecommunications technologies in regional areas;



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- c. ways in which improvements in digital connectivity could support the Government's broader regional development policies and priorities, such as decentralisation and the development of Northern Australia;
 - d. ways in which State, Territory, and Federal programs to support regional connectivity could be further coordinated.
5. The report may set out recommendations to the Australian Government.
 6. In formulating a recommendation that the Australian Government should take a particular action, the Committee must assess the costs and benefits of that action.
 7. The Committee must prepare a report of the review by 31 December 2021 or earlier and give it to the Minister for Regional Communications.

Importance of telecommunications

Access to 21st century telecommunications is more important than ever before, particularly for Australians living in regional, rural and remote areas. Just like roads and rail, telecommunications is essential for keeping Australians connected.

The Australian telecommunications environment in regional, rural and remote areas has undertaken a significant step change since the 2018 Edwards Review in the consumption of telecommunications services, particularly data. Several significant developments have occurred in this period, such as the completion of the initial volume build of the NBN in 2020.

Telecommunications permeates and underpins almost every aspect of our lives and its importance has been highlighted through recent events such as natural disasters and the COVID-19 pandemic. There is a reinforced need for reliable telecommunications to support public safety, day-to-day business, social contact and access to essential services like health and education.



North NSW and Central Coast consultation, Thursday 26 August 2021

Regional Australians depend on telecommunications for many services and transactions which urban Australians are able to access in person. This includes greater use of telecommunications for accessing health and education, and other government services. This has been even more imperative during COVID-19 as has been apparent to Australians across the country during lockdowns and travel restrictions, further increasing the demand for data. There's a sense that priorities have shifted irrevocably during the pandemic.

Government has also recognised that Australia's place in the world will be defined by how we adapt to digital technologies and modernise our economy over the next decade. In 2021, the Australian Government released its strategy for Australia to be a leading digital economy and society by 2030.

A fundamental goal is for all Australians to have access to digital skills and technologies. Participation in the digital economy can only occur where there is a strong foundation in digital infrastructure and skills. For many Australians in regional, rural and remote Australia, laying these foundations remains a work in progress.

Connectivity is required to enable people to live, work and invest in regional areas. The regions offer attractive lifestyle amenities for many people and regional Australia is experiencing renewed interest from business and government. The opportunity for regional growth requires residents and businesses to be able to access telecommunications services that are closer in functionality and resilience to those available in urban areas.

This has been particularly demonstrated by the increasing net migration rates to regional areas during the COVID pandemic. Many industries have realised the opportunity for the workforce successfully working remotely. Now, it is increasingly possible to live where you want without being as constrained by the jobs, services and opportunities that are physically in the area. The changing nature of work continues to impact the demand for data and connectivity. The regions offer significant lifestyle amenity, and regional communities are keen to attract and retain skilled professionals and families to the regions.

However, there are still connectivity shortfalls in regional, rural and remote Australia which need to be addressed if the opportunities in these areas are to be realised. Public consultations and submissions have highlighted a number of key themes regarding the level of digital connectivity in regional areas.

These include:

- the importance of resilient and reliable telecommunications networks, both in emergencies and as essential and business services are increasingly delivered online;
- the ongoing demand for mobile coverage and capacity in regional areas, particularly on regional transport routes and across farms;
- the ongoing demand for high-speed, low latency broadband services to support local industries, regional migration and access to services;
- the value of independent telecommunications advice, improved connectivity, and literacy education to empower regional consumers to make informed decisions;
- the scope for strategic coordination between governments and industry on telecommunications infrastructure investments;
- the potential of emerging technologies and innovative place-based solutions to provide voice and data services to rural and remote areas;
- the need to develop and enforce standards for telecommunications performance and service.

While government programs and policies are working to address many of these issues, the scale of investment in regional telecommunications needs to substantially increase to meet the connectivity needs of communities and businesses. This can unlock the economic and social opportunities offered by the regions and achieve the goals of government initiatives like the DES.

Consultation

Public consultation is an essential part of the Regional Telecommunications Review, required under the establishing laws and Terms of Reference. This requirement ensures that the Review is informed by the current experiences of those living and working in regional, rural and remote Australia.

As with previous Reviews, public consultation for the 2021 Review was guided by the release of an Issues Paper on 14 July 2021. The Issues Paper set out the key areas of interest for the Review including questions interested parties could use to develop written submissions to the Committee.

The Committee accepted written submissions until 30 September 2021. We received more than 650 submissions from members of the public, community organisations, businesses, and local, state and territory governments. The majority of these (371 submissions, or 57 per cent) were from individuals. Non-confidential submissions were published on the Department of Infrastructure, Transport, Regional Development and Communications (the Department) 'Have Your Say' page on 8 November 2021.

Additionally, the Committee received a significant number of comments from individuals on posts advertising the Review across the Department of Infrastructure, Transport, Regional Development and Communications social media channels, including Facebook, Twitter and LinkedIn. While these comments were not treated as formal submissions to the Review, they were nonetheless considered as part of the Committee's deliberations. A sample of social media feedback is at Appendix 1.

As with the 2018 Edwards Review, the Committee also planned an extensive series of in-person consultation sessions across regional, rural and remote Australia from late July 2021. This reflected our strong desire to engage with communities and businesses where they live and operate, enabling us to see and hear first-hand the telecommunications issues experienced by regional, rural and remote users.

As part of the proposed in-person consultation program, the Committee would have attended and presented at important stakeholder events, including the Isolated Children's Parents' Association (ICPA) National Conference in Longreach, and the Developing Northern Australia Conference in Darwin. We extend our thanks to the organisers of these events for inviting us to attend.

However, as with many plans in 2021, our proposed consultation schedule was significantly impacted by measures introduced in response to COVID-19 outbreaks. Lockdowns directly impacted several of our Committee members and members of the departmental Secretariat, and others were unable to travel due to interstate border restrictions.

After much deliberation, it was decided that in-person consultations could not go ahead. Instead, the Committee scheduled a series of 26 public consultations via the Microsoft Teams video conferencing platform, with dial-in telephone options also provided. These consultations were loosely organised by geographic region, although we welcomed anyone who wished to make themselves available at a session. The list of sessions is in Appendix 2. Two sessions were cancelled due to low registration, with registered attendees invited via email to join another session.

Almost 500 people attended the consultation sessions. In our view, discussions were robust, engaging and respectful, and provided the Committee with extremely valuable insights into key areas of concern for regional, rural and

remote users. Representatives from Telstra and NBN Co also participated in each session. This enabled several attendees to raise specific issues with their services which were followed up outside of the consultation. The Committee thanks industry representatives for making themselves available during the consultations.

Given the importance of in-person consultation for many regional, rural and remote people, as well as the potential for connectivity issues to impact the success of online consultations, the Secretariat distributed a feedback survey to attendees to improve the consultation process and identify key learnings which may be of use to future online committee hearings in regional areas. Additional information, including the results of the survey, is at Appendix 1.

The record number of submissions and high level of engagement in public consultations reinforces the ever increasing and critical importance of digital connectivity to regional, rural and remote Australians. The Committee would like to extend our thanks and acknowledgment to all those who took the time to attend an online consultation session or provide a written submission.

Findings

As outlined above, during the course of the Review, the Committee heard from people in regional, rural and remote areas to better understand the barriers people in regional communities face when it comes to using digital technologies and services.

The Committee made 16 key findings. The discussion below sets out these findings, and identifies how they relate to the Committee's recommendations. The key findings have been organised under four headings:

1. The 'Patchwork Quilt' of connectivity
2. Reliability, resilience and redundancy
3. The demand for data, and
4. Connectivity literacy and digital inclusion

The 'Patchwork Quilt' of connectivity

Key findings

1. **Increased coordination and investment between the Australian, state and territory governments is needed to address a 'patchwork quilt' approach to connectivity in the regions.**
Relates to Recommendations: 1, 2
2. **Local councils and other regional stakeholders are increasingly expected to facilitate telecommunications service delivery, but are not appropriately resourced to identify connectivity needs and support the deployment of suitable solutions.**
Relates to Recommendations: 1, 5

3. **Supply side issues, including backbone fibre and spectrum access, are barriers to competition and innovation in regional telecommunications markets.**
Relates to Recommendations: 1, 2

Digital connectivity is critical to the growth and resilience of the Australian economy, including in regional, rural and remote Australia.

The Australian Government's DES, released in May 2021, sets out a vision for the digitisation of almost all aspects of Australian society by 2030. This includes a focus on the uptake of advanced digital services and technologies across small-medium-sized enterprises (SMEs) and in globally competitive industry sectors like manufacturing, agriculture, mining and construction. Additionally, the DES prioritises the development of an innovative tech sector, comprising areas like agritech and the creative industries, and the seamless delivery of government services through digital platforms.²

It is clear that regional, rural and remote Australia will have a vital part in realising the DES goals. Regional Australia accounts for approximately one-third of the Australian population, and some 40 per cent of Australia's total economic output.³ Key regional sectors like agriculture, manufacturing and mining contribute significantly to our economy, complemented by growing opportunities in health, education, tourism and other services. Many of these are driven by small businesses. Equitable access to, and engagement with, the digital economy will be vital in supporting the productivity and success of these regional industries, thus driving national economic growth.

² Department of the Prime Minister and Cabinet, *Digital Economy Strategy 2030*, Commonwealth of Australia, 2021. <https://www.digitaleconomy.pmc.gov.au>

³ Parliament of Australia, *Regions at the Ready: Investing in Australia's Future*, House of Representatives Select Committee on Regional Development and Decentralisation, Commonwealth of Australia, June 2018, p 23. www.aph.gov.au/Parliamentary_Business/Committees/House/Former_Committees/Regional_Development_and_Decentralisation/RDD/Final_Report

The Australian Government is prioritising regional development initiatives to support economic growth, particularly in Northern Australia. The Office of Northern Australia's *Our North Our Future: White Paper on Developing Northern Australia* notes the economic potential of Northern Australia (defined as the region above the Tropic of Capricorn and the Northern Territory) in minerals, energy, agriculture and tourism, particularly regarding export potential to Asia.⁴ The White Paper highlights the need to reduce barriers to economic investment, including a lack of enabling infrastructure.

More recently, the Australian Government has announced work on a 'regionalisation' agenda, focused on driving private-sector employment, population growth and economic diversification in regional areas. This agenda leverages the increasing rate of net internal migration to large regional centres during and following the COVID-19 pandemic, as professionals and working families are attracted to the financial and lifestyle benefits offered by the regions.⁵ Large investments in infrastructure projects, such as the 1,716 km Inland Rail corridor between Brisbane and Melbourne, will also underpin opportunities for regional growth.⁶

The success of the DES, Our North Our Future, the regionalisation agenda and other regional development initiatives will rely, in no small part, on the deployment of modern telecommunications infrastructure in regional, rural and remote areas. Alongside energy and transport infrastructure, access to high-speed, high capacity connectivity is increasingly critical to attracting and supporting new investment opportunities and migration to regional areas.⁷ Connectivity is also a key factor in enabling regional migration. According to YouGov research commissioned by NBN Co, 74 per cent of Australians believe that access to fast and reliable broadband is necessary to achieve a flexible lifestyle, including relocation to regional areas.⁸

However, in more remote areas, the high cost of infrastructure deployment and limited consumer demand often reduces commercial incentives for telecommunications providers to invest in new mobile and broadband infrastructure, including in areas of importance for regional economies and communities. In acknowledgement of this, government programs like the RCP, an outcome of the 2018 Edwards Review, are subsidising the capital costs of deploying 'place-based' digital infrastructure which supports the economic and social needs of regional communities.

4 Department of Infrastructure, Transport, Regional Development and Communications, *Our North, Our Future: 2021-2026 'Targeted Growth'*, The Office of Northern Australia, Commonwealth of Australia, November 2021. www.infrastructure.gov.au/territories-regions-cities/regions/northern-australia

5 The Hon Bridget McKenzie, Minister for Regionalisation, Regional Communications and Regional Education, *Regionalisation National Address*, Wodonga, 12 November 2021.

6 The Hon Barnaby Joyce, Deputy Prime Minister, *Address to the National Press Club*, National Press Club, Canberra, 3 September 2021.

7 Queensland Department of Communities, Housing and Digital Economy, submission, p 6. <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-617-queensland-department-of-housing-communities-and-the-digital-economy-submission.pdf>

8 NBN Co, *Australians e-scape to the country* [media release], 26 November 2020. <https://www.nbnco.com.au/corporate-information/media-centre/media-statements/national-flexible-lifestyle>

This investment is a strong step in the right direction. However, the Committee is concerned that both the quantum of funding currently allocated to regional connectivity, as well as the fragmented timing and approaches of various Australian, state and territory government funding programs, do not address the connectivity needs in regional areas to the extent necessary to drive the development of regional economies. A more strategic approach to regional telecommunications infrastructure deployment is needed to help regional Australia meet its potential.

Finding 1: Increased coordination and investment between the Australian, state and territory governments is needed to address a 'patchwork quilt' approach to connectivity in the regions.

Since 2018, the Australian Government has allocated over \$420 million in grant funding for new and upgraded digital connectivity infrastructure in regional, rural and remote area.⁹

This comprises investments over multiple rounds of broad grants initiatives like the MBSP and RCP, as well as more targeted initiatives including the Alternative Voice Service Trials (AVST), the Mobile Network Hardening Program (MNHP) and the Peri-Urban Mobile Program (PUMP). In the same period, state and territory governments have allocated funding to a mixture of discrete grants initiatives, as well as providing co-funding for Australian Government programs.

In response to the findings of the 2018 Edwards Review and the completion of the NBN, the majority of these initiatives have adopted a 'place-based' approach to improving telecommunications. This approach recognises that, while the NBN and other telecommunications guarantees provide a baseline level of connectivity in regional, rural and remote areas, there is scope for government and industry to provide targeted uplifts to connectivity in areas of economic and social significance where it would be otherwise uncommercial to do so.

This approach to telecommunications infrastructure investment has been well received in regional, rural and remote areas, with consultation attendees and submissions to the Review noting the benefits of 'place-based' initiatives like the RCP in funding the delivery of new and improved mobile and broadband connectivity to meet local needs. Based on the feedback from industry, community and government participants in these programs, the Committee is satisfied that the 'place-based' approach to investment is effective in complementing baseline services in regional areas.

However, the Committee is concerned that the 'place-based' approach as it currently stands may not be sufficiently informed by strategic analysis of economic and social needs or coordination between different levels of government on infrastructure investment initiatives. This may lead to sub-optimal outcomes over the longer-term.

⁹ This figure is in addition to the total cost of the NBN, as well as the ongoing \$270 million per year cost of the USO.

Indeed, some stakeholders have suggested that the multitude of separate and often competing Australian, state and territory government investments may be compounding existing digital divides in regional areas by deploying small-scale telecommunications interventions which lack interoperability and consistency, even within regions.

The Committee heard examples of this, including instances where fibre connectivity, funded by state education departments, has been delivered to schools without access being provided to the surrounding community. Also, as identified by the ICPA and some other Review participants, broadband procurement processes undertaken by state departments, may not always deliver solutions that meet the particular needs of regional schools, health centres and the wider area.¹⁰

While these individual solutions each provide improved connectivity where it is needed, this fragmented ‘patchwork’ approach presents a missed opportunity for strategic collaboration between levels of government to leverage ‘place-based’ interventions and deliver connectivity uplifts at a wider scale in regional areas of need. This can increase the cost of connectivity for regional users if they require multiple subscriptions to fully leverage available connectivity options. It can also widen digital divides if certain solutions do not have a clear upgrade path to meet increased demand for data over time, given emerging congestion issues (see Finding 8).

‘[The] ongoing investment by all levels of government to bridge the digital gap. This activity, while with the best intent, has taken place in an uncoordinated manner, resulting in what has become defined as a ‘patchwork quilt’ of connectivity in the region.’

*Western Queensland Alliance
of Councils submission*

Part of the problem appears to be the contrasting ways in which Australian, state and territory governments identify and allocate funding to ‘place-based’ telecommunications projects. In particular, state and territory governments report that they are increasingly developing and using state infrastructure strategies, which identify priorities for long-term regional growth in key economic sectors, to inform their investment in telecommunications infrastructure. This includes their participation in Australian Government programs like the MBSP and RCP.

However, some of these jurisdictions have expressed frustration that Australian Government programs do not always take into account broader strategic priorities in allocating funding. The Committee understands that the application process for the MBSP, for example, involves the mobile network operators and infrastructure providers identifying potential sites for funding. While this is intended to encourage participation in these programs by allowing mobile network operators to select sites based on commercial drivers, often these sites do not align with state and territory government strategic priorities. Conversely, where state and territory governments do identify priority locations for funding, these areas may not offer sufficient commercial incentive for providers to co-invest in new infrastructure.

¹⁰ ICPA, submission, p 5. <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-583-icpa.pdf>

During consultations, the Committee heard of instances of significant Australian, state and territory government investments to establish new advanced manufacturing facilities and industrial precincts in areas such as Parkes, NSW and Emerald, Queensland. However, these have not been supported by the provisioning of enterprise-grade digital connectivity infrastructure, either by NBN Co or on a third-party basis. Without access to appropriate connectivity options, particularly in relation to fibre backbone connectivity, these facilities are unable to leverage autonomy, cloud services and other productivity measures, setting them at a disadvantage to their urban competitors and reducing the flow-on benefits of government investment.

While these economic precincts are guaranteed access to baseline services through the NBN, it is critical that enterprise-grade connectivity infrastructure is provisioned as part of their development to ensure their competitiveness and productivity. There is a role for all levels of government to work together to identify connectivity requirements as part of investments in shared strategic priorities, such as major industrial precincts. This means ensuring that adequate funding and other necessary resources like needs-analysis are provided to support these connectivity requirements.

In our view, this speaks to a need for improved cross-government collaboration in setting and acting upon strategic priorities for regional telecommunications investment through a formal investment and planning framework. The Committee considers that a more effective targeted approach to regional telecommunications investment should encompass the Australian Government partnering directly with state and territory governments to identify shared priority regions or corridors of economic and social growth. Funding could then be offered for the telecommunications industry to partner with the local community on the co-design of telecommunications infrastructure projects which address the identified digital connectivity needs of these regions.

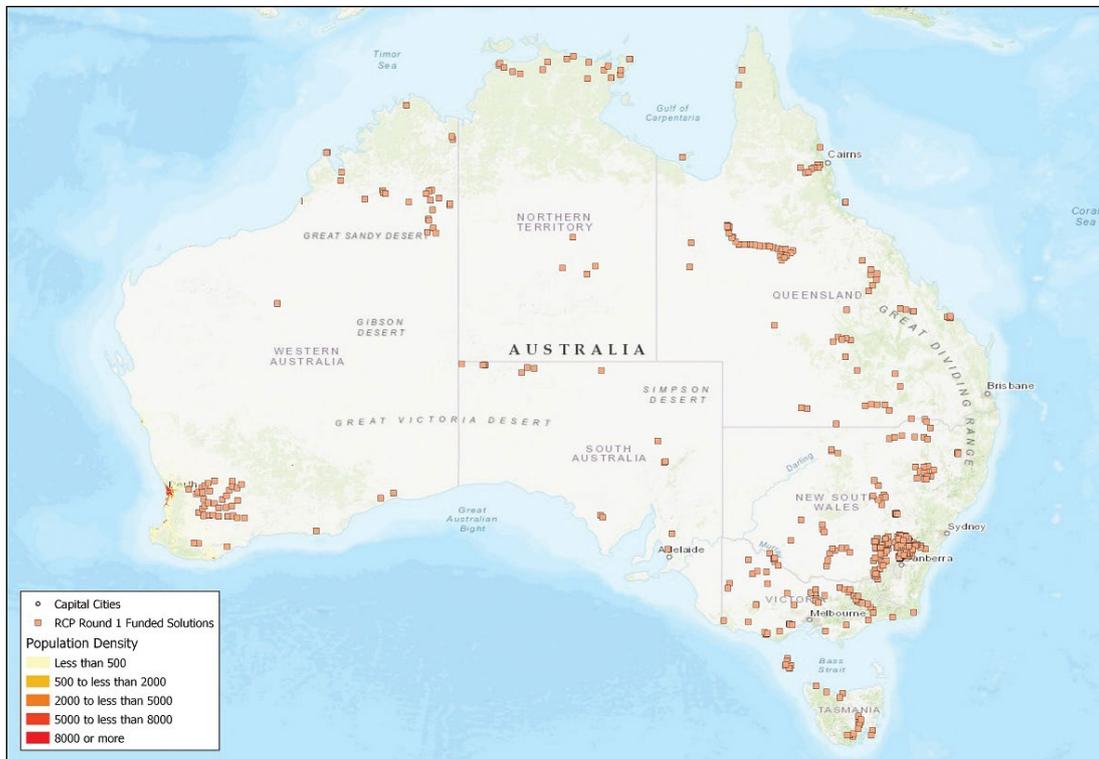
This approach could support the Australian Government's broader regional development policies and priorities, such as regionalisation and the development of Northern Australia. Many of these policies focus on combining resources across all levels of government and industry to identify and develop opportunities in specific industry sectors to form the foundations of future economic growth in regional Australia.

As noted under Finding 2, the development of strategic priorities for 'place-based' interventions should be informed by strong and continued engagement with local communities. This potentially includes supporting regional stakeholder organisations to undertake analysis of digital shortfalls and opportunities which underpin the strategic framework and empower communities to engage with government and industry on potential telecommunications projects.

Gaining a common shared understanding of the location and coverage of current terrestrial fixed and mobile infrastructure, preferably through 'living' interactive mapping, will be an important early step in developing a more strategic approach and providing a robust evidence base for future funding and Reviews. This is addressed further under Finding 14.

Additionally, in our view the scale of investment through individual rounds of the MBSP and RCP is not by itself sufficient to deliver broad uplifts to digital connectivity in regions of economic and social significance. For instance, Round 1 of the RCP provided \$106.7 million (GST exclusive) in Australian Government funding, which generated \$105 million in co-contributions from applicants, state and territory governments, and third parties. This investment is funding the delivery of 132 individual projects, ranging from single mobile base stations to long-distance fibre backbone upgrades, with an average total cost of approximately \$1.6 million per solution.

Map 1 – Funded solutions – Regional Connectivity Program



Source: Bureau of Communications, Arts and Regional Research, October 2021

This investment is addressing localised last-mile connectivity issues in a number of areas, and more funding has been allocated through Round 2 of the RCP (up to \$112 million) and Round 6 of the MBSP (up to \$80 million), including dedicated funding for projects in the north through the Connecting Northern Australia initiative. However, some state and territory governments are seeking to invest significantly greater amounts of funding to target persistent digital connectivity shortfalls across wide areas, as identified in their respective infrastructure strategies.

There is an opportunity for the Australian Government to substantially increase the scale of its investment in order to support these strategic priorities and deliver growth across entire regions or economic sectors in regional areas. This would be of particular use to deliver projects like new backbone fibre routes which may also unlock new opportunities in regional areas (see Finding 3).

Increased government investment offered over a longer timeframe, moderated by a formal planning and investment framework, would provide co-investors more certainty around funding. This may increase the confidence of a wider range of private sector investors in choosing to co-fund significant infrastructure builds at scale in otherwise less commercial areas. It would also allow co-investors to undertake the necessary planning, stakeholder engagement and budgetary processes to facilitate large-scale regional connectivity uplifts.

The Committee considers that there may also be alternative mechanisms to efficiently manage and allocate this increased funding against strategic priorities over the long-term, particularly in encouraging additional private sector participation in telecommunications infrastructure financing.

We note, for example, the Northern Australia Infrastructure Facility (NAIF), a development financier with a \$5 billion lending facility from the Australian Government. NAIF uses a strategic approach to provide loans to infrastructure projects across Northern Australia which deliver public benefit and encourage long-term economic and social growth.¹¹ We encourage the Australian Government to consider the benefits of integrating similar strategic investment principles and practices into the 'place-based' approach of connectivity grants programs like the RCP.

Given the increasing importance of digital connectivity in enabling economic and social outcomes now and into the future, we argue that telecommunications infrastructure should be considered the equal of transport and energy infrastructure in terms of scale, funding and planning. A more strategic framework for 'place-based' telecommunications infrastructure deployment, informed by improved cross-government collaboration, as well as substantially increased investment over a longer period, is needed to leverage regional development opportunities through the digital economy.

Finding 2: Local councils and other regional stakeholders are increasingly expected to facilitate telecommunications service delivery, but are not appropriately resourced to identify connectivity needs and support the deployment of suitable solutions.

In addition to a more strategic approach to telecommunications investments to support Australian, state and territory government development priorities, it is critical that telecommunications project partners at the regional and community level, such as local councils and regional stakeholder organisations, are supported to undertake analysis of 'place-based' digital demand and to make informed decisions about appropriate solutions to address digital shortfalls in their regions.

Throughout the consultation process, the Committee has heard that local councils and regional stakeholder organisations are increasingly expected to act on behalf of Australian, state and territory governments as facilitators for the deployment of telecommunications infrastructure to support economic and social outcomes. Indeed, some programs, like the RCP and NBN Co's Regional Co-Investment Fund (RCIF), encourage local councils to support applications for grant funding by providing support through the form of financial co-contributions, responses to merit criteria, evidence of community need or a combination of all of these.

While these contributions are not always mandatory and the threshold is not high, they do present a cost impost for regional councils. In regional, rural and remote areas, local councils often operate in resource-constrained environments. In many instances, vast distances, a low ratepayer base and the financial impacts of ongoing drought and natural disasters mean that councils must prioritise their core service delivery obligations, reducing their capacity to contribute funding for telecommunications upgrades.

As such, some stakeholders have expressed particular concern that coinvestment programs neglect the areas which are most in need of improved access to digital connectivity, but which have the least capacity to contribute financially, as these areas may not be as commercially attractive to the telecommunications companies.

'The government programs are dependent on population volume and commercial viability for the telcos ...The Shire is extremely remote. As such, the need for good telecommunications is vital ... our need is great.'

Shire of Ngaanyatjarraku, (WA) submission

11 Northern Australia Infrastructure Facility(NAIF), 'About Us' [website], n.d. <https://naif.gov.au/who-we-are/about-us/>

Additionally, although councils and other regional stakeholders are well-placed to undertake localised planning activities to identify regional digital issues and opportunities, many report that they do not have adequate resourcing or technical expertise to do so. The Committee has heard that while councils are broadly aware of issues like poor mobile coverage, lack of in-house technical staff, knowledge, and training means that they struggle to systematically quantify these issues and understand the most appropriate technological solutions for their communities. Some council representatives also noted to the Committee that telecommunications is not a local government responsibility, and questioned why they should need to develop in-house capabilities or to co-fund infrastructure upgrades.

'The shifting of responsibility and cost onto Local Government for the provision of communications infrastructure remains problematic. Programs... that require local communities to contribute to the cost of installing... communications infrastructure that is available in urban areas (is) inequitable.'

Adelaide Hills Council submission

Where regional councils and other regional stakeholders are asked to contribute resources - whether financial or in the form of information or skills - to 'place-based' telecommunications infrastructure funding initiatives, disparities in the level of resourcing and knowledge available to these organisations threaten to contribute to the 'patchwork quilt' of regional connectivity. Councils with ready access to these resources are more likely to attract continual upgrades and those without, while still receiving baseline services, may fall behind.

The strategic approach to 'place-based' infrastructure deployment identified under Finding 1 requires interventions to be supported by informed councils and development organisations with access to accurate data on digital shortfalls and opportunities. This will help ensure funding is prioritised on the basis of demonstrated need or benefit. It will also empower local communities to engage proactively in the development of strategic frameworks and the solution design and funding application processes, which is key to ensuring that the 'place-based' approach delivers outcomes that appropriately meet community needs.

There are a number of good examples of digital planning and analysis occurring at a regional level (see Case Study 1). The Committee considers there is a role for the Australian, state and territory governments to provide dedicated resources to support councils and other regional stakeholders to identify digital shortfalls and opportunities. This could involve independent expert advice to assist local governments or regional stakeholders to undertake digital planning, participate in telecommunications infrastructure programs, and drive outcomes which meet community needs. Improved access to accurate, transparent and consistent data on existing infrastructure and network coverage will also assist this process (see Finding 14).

Case Study 1 – Regional Digital Plans – Victoria

The Victorian Government Department of Jobs, Precincts and Regions has funded Victoria's nine 'Regional Partnerships' to undertake localised Regional Digital Plans.

Informed by data from the 'State-Level Information Management System', online and face-to-face interviews, and expert advice, these plans provide a comprehensive analysis of digital infrastructure demand and supply across significant places, major transport corridors and key industry sectors in each region. They also consider the evolving digital intensity of key sectors and an assessment of existing digital skills to identify specific priorities for future government investment.

These plans established a common evidence base and analytical framework to discuss regional connectivity issues, while also promoting a more nuanced understanding of place-based connectivity issues and needs. Collaboration on the plans also helped to develop a network of engaged regional stakeholders with greater understanding of their local digital connectivity challenges

Since their development, Digital Plans have been used by Regional Partnerships, local stakeholders and the Victorian Government to support the identification of local investment priorities to attract program funding, engagement with carriers on coverage gaps and local priorities, and advocacy to the Victorian and Australian governments on local priorities and persistent gaps.

Source: Victorian Government submission

Additionally, we note that councils are involved in telecommunications deployment through the development and planning approvals processes for which they are responsible. As such, the lack of digital planning and technical capability can impact their ability to engage on an equal footing with service providers to develop technology solutions which are appropriate for local geographic, economic and social needs both now and into the future. Without access to independent analysis and advice on digital demand and supply, local councils face the risk of relying on vendors or providers with a commercial interest in certain technologies, or otherwise neglecting the particular digital needs of specific areas.

Telecommunications providers have also highlighted the benefits of improved collaboration with local councils and communities early in the deployment process to assist with project implementation. In a number of cases, the deployment of new mobile or fixed wireless infrastructure has been frustrated by community objection to the proposed location or technology, or issues finding and gaining access to suitable land for infrastructure deployment. Collaborative planning and engagement between local governments, communities and providers on digital priorities and solutions at an early stage may help to improve the timely deployment of infrastructure in line with community expectations.

In relation to new real estate projects, the Australian Government's Telecommunications in New Developments (TIND) policy, together with the Statutory Infrastructure Provider (SIP) regime, work together to ensure people have ready access to telecommunications when building new developments. These policies put the onus on developers to contract carriers to install networks in new suburbs. In most instances, NBN Co (as the default national SIP) will determine the delivery technology and provide wholesale broadband connectivity.

Given councils need to consider development applications, they are in a strong position to remind developers to engage early with NBN Co or other carriers to ensure telecommunications are provided in their developments and to optimise the solution delivered. The Committee has heard of instances where NBN Co is providing fixed wireless or satellite in new developments in regional areas because developers have not considered or elected to pay more to have fibre installed, even though they are adjacent to the existing fixed line footprint.

Given the increasing importance of digital connectivity, we consider it is in the interests of wider community for NBN Co to follow the 'fixed line first' preference set out in the TIND policy,¹² and to ensure it has access to necessary information like growth forecasts to inform its decision-making processes. Access to the best possible broadband will help attract professionals and advanced digital users from urban areas. Engagement by councils in the provision of telecommunications in new developments, informed by independent advice on connectivity needs, may assist in getting fibre services delivered where they are needed in regional areas.

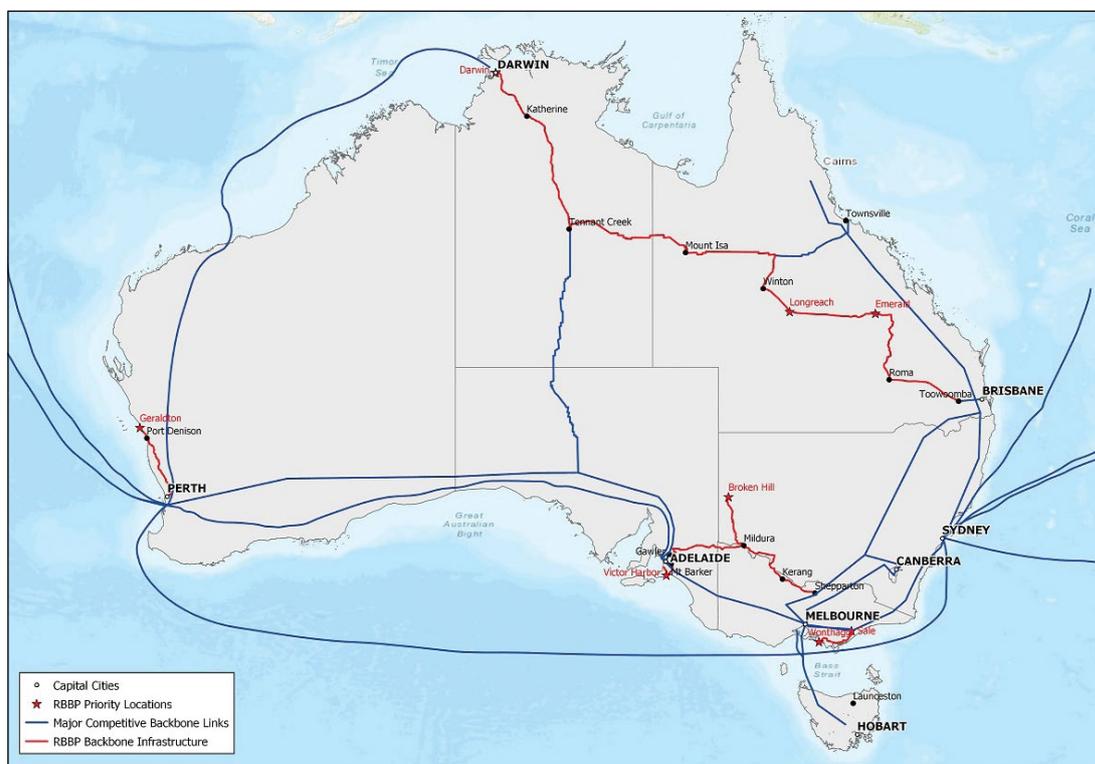
Finding 3: Supply side issues, including backbone fibre and spectrum access, are barriers to competition and innovation in regional telecommunications markets.

As discussed above, the bulk of government investment in regional telecommunications has largely focused the provision of the 'last-mile' infrastructure that delivers services directly to end-users using a 'place-based' approach. Australian, state and territory government investment programs like the MBSP, RCP and Digital Farm Grants initiative (Western Australia) have sought to address the high capital costs of deploying this infrastructure in regional, rural and remote areas of need.

However, we are also concerned on the delivery of wholesale transmission services in regional Australia, particularly in relation to availability and access to the fibre backbone networks which carry aggregated data over long distances and provide capacity for mobile and broadband networks. These services are predominantly supplied by large, vertically integrated providers like Telstra, although other wholesalers (like Vocus), government agencies, utilities providers, education facilities and rail companies also maintain quantities of fibre for their own communications needs.

¹² Where NBN Co is servicing a new development that is outside but adjacent to its long-term fixed-line footprint, it should consider using fixed-line technology, noting that this is the default technology platform under the SIP regime. A new development is considered to be adjacent to NBN Co's fixed line footprint if the development's nearest boundary is 1,000 metres or less from the nearest point of NBN Co's fixed line footprint boundary. (Source: Department of Infrastructure Transport Regional Development and Communications, Telecommunications in new developments policy [policy document], Commonwealth of Australia, 1 September 2020. <https://www.infrastructure.gov.au/media-centre/publications/2020-telecommunications-new-developments-policy>)

Map 2 – Long-haul fibre backbone routes



Source: Bureau of Communications, Arts and Regional Research, Long Haul Fibre Backbone Routes, Commonwealth of Australia, October 2021

Domestic transmission capacity prices are regulated by the ACCC on transmission routes where competition is considered insufficient, partly in order to allow smaller providers to supply downstream telecommunications services. In its submission to the Review, the ACCC notes that competition is slowly improving in regional areas and regulated prices are also reducing over time. However, the ACCC submission to the Review points out that 98.3 per cent of regional exchange service areas remain regulated, and Telstra remains the dominant supplier of transmission services in regional Australia.

A number of participants in the Review have reported that, despite regulation, the cost of fibre access in regional areas remains high. This, alongside a lack of fibre diversity (in other words, redundant route options), may act as a barrier to leveraging new economic diversification opportunities in regional areas.

For instance, there are significant investments being made in the emerging space industry, which is estimated to be worth \$12 billion to Australia's GDP by 2030.¹³ Parts of regional Australia enjoy a comparative advantage in this sector due to their geographic position. Businesses in these regions, like WA's Capricorn Space, are providing ground station services, such as data transfer and tracking, for satellite operators. This includes for the providers of LEO satellite broadband services.

¹³ Australian Space Agency, *Advancing Space: Australian Civil Space Strategy 2019-2028*, Commonwealth of Australia, April 2019. <https://www.industry.gov.au/data-and-publications/australian-civil-space-strategy-2019-2028>

However, in order for regional businesses to leverage these opportunities and compete with businesses in the wider Asia-Pacific region, they require access to cost-effective, diverse and high-capacity fibre backhaul links which meet the data needs of clients.

Other contributors to the Review have expressed the desire to access existing fibre networks to deploy improved telecommunications services to their communities. In both an online consultation and submission, representatives from the Shire of Ngaanyatjarraku in remote Western Australia noted there is a major fibre route traversing the Great Central Road, with access pits in a community within the Shire. The Shire has engaged with private providers regarding the potential to deploy community Wi-Fi to address local network congestion and provide access to essential online services. However, they identified they are unable to utilise the existing fibre due to the high cost of access.¹⁴

We have heard similar claims from other councils, who also note a lack of public information on the availability of fibre in their regions to inform potential investment in 'last-mile' infrastructure. In submissions and consultations, councils have asked for publicly available and comprehensive mapping of both fibre routes and their network capacity in order to identify gaps in access or redundancy, as well as opportunities to use spare capacity on existing fibre to deploy telecommunications services to their communities.

There are a number of ongoing efforts to increase the diversity and affordability of fibre to unlock digital opportunities, including in regional areas. This includes the current proposal from the HyperOne company to deploy a 20,000 kilometre fibre network capable of delivering 10,000 TB per second, with some 2,000 fibre 'off-ramps' to support telecommunications use-cases in regional communities. Analysis from Deloitte suggests this project may help to drive \$22.6 billion in digital productivity gains.¹⁵

State governments are also opening up spare capacity on fibre used for state-owned utilities and rail in regional areas. For instance, QCN Fibre, a Queensland State Government Owned Corporation, utilises spare capacity on Powerlink and Energy Queensland's 12,000 kilometre fibre network across regional Queensland to provide wholesale transmission capacity to internet and retail service providers (RSPs) at metro-equivalent pricing. Similarly, in Victoria, VicTrack has deployed fibre capacity along rail easements in regional areas and has made this available to broadband providers to deliver business fibre services to regional centres.

Historically, the Australian Government has also made investments to address transmission shortfalls in regional areas. Under the Regional Backbone Blackspots Program (RBBP), the Australian Government, in partnership with Vocus (formerly NextGen Networks), funded the construction of 6,000 kilometres of new fibre in areas where there was a lack of wholesale competition. Vocus, as operator of the network, is required to offer transmission services on open and equivalent terms. In its submission to the Review, Vocus reports that backhaul costs on RBBP routes are lower than those serviced by a single provider.¹⁶

14 Shire of Ngaanyatjarraku, submission. <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-106-shire-of-ngaanyatjarraku-sanitized.pdf>

15 Hyper.one, Hyperone To Help Unlock Digital Economy's 22b In Benefits For Australia [Media Release], Hyper.one, August 2021. <https://hyper.one/release-august-2021/>

16 Vocus, submission, p 2. <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-566-vocus.pdf>



Wi-Fi tower tensioning, courtesy of Andrew Sevil, Whyenbah

The Committee considers availability and access to backbone fibre is a critical element in the delivery of improved telecommunications services, including competition and innovation, in regional, rural and remote areas. This supports valuable opportunities for economic expansion and diversification. As discussed under Finding 1, we recommend the Australian Government work constructively with state, territory and local governments, as well as industry, to identify strategic opportunities for co-funded deployment of new fibre or upgrades to existing fibre in order to encourage competition in regional, rural and remote areas. This may include requiring fibre to be laid as part of government investments in new transport infrastructure builds.

We also note feedback from smaller telecommunications providers suggesting issues in accessing radiofrequency spectrum in regional areas may also be a barrier to the delivery of innovative last-mile solutions for place-based connectivity issues, particularly in the agriculture sector.

The Australian Broadband Advisory Council (ABAC) Agri-tech Expert Working Group (AEWG) has found that, despite generally receiving some level of mobile and NBN coverage, many regional farming properties suffer from localised connectivity gaps (defined by the AEWG as ‘salt and pepper’ connectivity) which impact the uptake of decision agriculture technologies.¹⁷ This is consistent with what we have heard through submissions and the consultation process.

However, the AEWG also identified that a competitive market of more bespoke telecommunication providers has emerged to address small scale ‘salt and pepper’ connectivity issues on-farm, which it suggests are not efficiently addressed through the expansion of commercial mobile coverage or the NBN. During the Review, the Committee has met with a number of these providers, who offer a variety of products such as modular private LTE, narrowband IoT and Wi-Fi networks. These products can be customised and deployed across farming properties, supporting the use of agritech and business tools, and providing improved emergency safety coverage for workers.

¹⁷ A Koch et al, Agri-tech Expert Working Group Report, ABAC, June 2021. <https://www.infrastructure.gov.au/departments/media/publications/agri-tech-expert-working-group-report>

Submissions from these providers note the benefits of access to appropriate spectrum to deliver coverage to large areas. However, they claim that there are difficulties in accessing this spectrum, which is typically already owned by large mobile network operators. Not having sufficient spectrum access leads to higher costs due to the need to use alternative access arrangements.

For instance, these providers may be required to use more readily accessible higher frequency spectrum, which has a more limited coverage footprint. This can mean that providers must deploy more physical infrastructure to provide the same coverage as is possible from lower frequency spectrum, increasing capital costs.

The Committee encourages all telecommunications providers to engage constructively on ways to share resources in order to provide complementary coverage at different scales. We also encourage that as part of future spectrum allocation processes, such as the re-issue of existing spectrum licences, consideration be given to an appropriate balance of the use of spectrum to better deliver services across regional, rural and remote areas. Given the timing around future allocations, we note this may be an issue for more detailed consideration in the 2024 Review.

Reliability, resilience and redundancy

Key findings

4. **There is an urgent need to consider the future of the Universal Service Obligation in order to provide reliable voice services to rural and remote consumers.**
Relates to Recommendations: 7, 8
5. **There are significant issues with the maintenance and repair of telecommunications networks, particularly copper landlines, in regional, rural and remote areas.**
Relates to Recommendations: 7, 8

6. **In instances of natural disasters and emergencies, connectivity is significantly impacted by power and network outages. This reduces access to recovery and support.**
Relates to Recommendations: 3

7. **Mobile coverage continues to improve, but expanding reliable coverage to priority areas is becoming more difficult.**
Relates to Recommendations: 9, 10

Access to reliable telecommunications services has never before been more important to regional, rural and remote Australians. In particular, the devastating impacts of several natural disasters across the country since 2018, including the 2019-20 bushfires, the 2021 Eastern Australia floods and Cyclone Seroja, as well as COVID-19, have highlighted the need for reliable and adequate regional telecommunications services.

In all of these events, regional Australians (including those on the peri-urban fringes of major cities) relied on mobile and broadband networks for real-time information, access to emergency services, contact with loved ones, and resources to support postdisaster recovery.

However, gaps in coverage, particularly on mobile networks, continue to be a key barrier to telecommunications reliability in regional areas. Given current technology limitations and cost, there will be some gaps. However, despite significant government and industry investment in new mobile infrastructure across Australia, many priority areas, including major transport corridors, disaster-prone communities, tourist areas, and facilities like schools, hospitals and halls, do not have adequate coverage. As coverage expands outwards, return on infrastructure investment decreases, impacting the ongoing effectiveness of existing programs like the MBSP.



2019 floods at Etta Plains, Julia Creek, photo by Tania Cowie.

Where mobile coverage is inadequate, landline telephony remains essential for regional users. The Australian Government has guaranteed the universal provision of voice services under legislation. This obligation is underpinned by a consumer safeguard framework designed to ensure that services are reliably connected and repaired. However, this is a legacy arrangement and elements of it are under increasing pressure. Copper and other networks used to provide landline services in the regions are deteriorating, and not enough is being done under the existing consumer safeguard framework to ensure that they are appropriately maintained to the standards expected by regional users.

It is also important to note that no communications system is totally resilient. Natural disasters like bushfires and extreme weather events place pressure on all parts of telecommunications networks. Network outages caused by loss of mains power and damage can affect local emergency coordination efforts and the operation of public warning systems.

Temporary or persistent network outages also cause disruption to everyday life, including work and study. Outages may mean that regional businesses cannot communicate with clients or process customer payments. Issues with telecommunications can affect residents' access to basic services such as groceries, banking or

emergency services. Therefore, it is critical that networks are made strong against outages, and that businesses and consumers have redundant (or backup) connectivity options when other services fail.

In this challenging landscape, we argue there is a role for both government and industry to do more to ensure the reliability, resilience and redundancy of regional telecommunications networks. The Committee is concerned that without better interventions, businesses and consumers in regional, rural and remote Australia may not have access to vital telecommunications services when they need them the most.

Finding 4: There is an urgent need to consider the future of the Universal Service Obligation in order to provide reliable voice services to rural and remote consumers.

As with previous Reviews, this Committee has heard continued concern around ongoing service delivery under the USO, which legislates the provision of standard telephone services and payphone services to all people in Australia on a reasonable basis.

Telstra's ongoing legislated role as the USO provider for voice and payphones is complemented by the TUSOPA. Under this agreement, which runs to 2032, Telstra receives \$230 million per annum (GST exclusive) to provide fixed telephone services and \$40 million per annum (GST exclusive) to provide payphone services. USO and other public interest telecommunications services are funded by Australian Government funding (which contributes \$100 million per annum), with the remaining funding required raised from an industry levy.

The USO covers the provision of telephone services nationally, including in urban areas where Telstra uses the NBN. However, the role of the USO often focuses on rural and remote areas where Telstra still needs to provide its own infrastructure if required, and where the provision of telephone services remains generally uncommercial.

The TUSOPA contains a copper continuity provision, which requires Telstra to maintain existing copper landlines in areas outside of the NBN fixed line footprint. At present, Telstra delivers approximately 400,000 telephone services outside the NBN fixed line footprint, largely via the copper network, as well as HCRC and Wireless Local Loop (WLL) systems and, in limited cases, USO satellite.

Landline voice services continue to provide critical communications access in parts of regional, rural and remote Australia, particularly in areas with limited or no mobile coverage. Compared to other connectivity options, landlines are also generally less dependent on external power, and therefore not as affected by power outages.

Submissions to the Review on the role of copper lines were mixed. As in previous Reviews, some consumers highlighted the particularly important role that landlines play in connecting isolated properties to the outside world when other communications services are unavailable. However other submissions indicated they had issues in getting a landline connected or had 'given up' on their copper line due to its unreliability, difficulty in resolving faults, or the availability of alternative connectivity options.

'Landlines are essential in our non-mobile world. However when the landline is out of order it leaves us without any phone connections. Over the past 10 years, this occurs at least 4 times a year with durations ranging from 24 hours to up to three weeks.'

NSW Farmers (Guyra resident) submission

However, with more than 10 years remaining on the TUSOPA contract, it is clear to the Committee that the current USO arrangements are under significant stress and require strengthening or a new approach in order to effectively service consumers to 2032 and beyond. Throughout the Review, we have heard that many copper landlines in regional, rural and remote areas are deteriorating and their reliability has been impacted. As noted in more detail under Finding 5, this raises questions as to how well the network is being maintained.

Equally, Telstra reports it is becoming more and more difficult to source parts to undertake repair and maintenance on legacy systems. For example, in its submission, Telstra indicates there are just over 10,000 HCRC services left in operation. In response to the 2018 Review, Telstra migrated some HCRC customers over to NextG Wireless Local Loop (NGWL). Telstra has speculated that that around 43 per cent of remaining HCRC services could possibly be migrated to the 4G home voice solution in the future, but there are no imminent plans to exit the HCRC service.

As part of its response to the 2018 Edwards Review, the Australian Government committed \$2 million (GST exclusive) to its AVST program. The AVST is intended to identify, test and raise awareness of different ways to deliver voice services in rural and remote areas, particularly those currently served by copper or HCRC networks. AVST funding was awarded under a competitive process, where providers brought forward proposed trial solutions. Six grantees — Concerotel, NBN Co, Optus, Pivotel, Telstra and Zetifi — were selected to deliver up to 885 trial services in rural and remote locations across Australia for 12 months to June 2022.

The majority of these trials utilise Voice over Internet Protocol (VoIP) technologies over satellite, fixed wireless and mobile networks. Given that most mainstream voice services already use VoIP, we are disappointed by the nature of the trial solutions put forward by a relatively limited number of applicants. We also note that some trial providers may have excluded particular cohorts, such as HCRC customers and businesses, who are important users of USO services. We are concerned that the AVST will not provide meaningful landline alternatives with the redundancy and reliability necessary for the delivery of voice services in regional areas.

Regional, rural and remote consumers in the Sky Muster footprint are hesitant to endorse alternatives to the current USO construct which would result in both their voice and data services being provided over satellite. As discussed under Finding 9, latency on geostationary satellites like Sky Muster causes inappropriate delay on voice services. There are also concerns that both voice and data delivered over a single satellite platform would reduce the service redundancy currently available to users, especially in the event of rain fade, heavy cloud or network equipment faults and power outages which would disrupt both services and leave consumers exposed.

As indicated in its December 2018 announcement on the USG, the Australian Government's position is that no changes to the current USO arrangements should be made until there are fit-for-purpose alternative voice options. In our opinion, given the level of community concern regarding the quality and reliability of landline services in regional, rural and remote areas, while the USO must be continued, it is time for both the Australian Government and Telstra to consider the long term performance and delivery of voice services in advance of and beyond 2032, particularly in relation to copper continuity and the HCRC system.

We are concerned that without proactive reform, there is a risk of harm to isolated consumers who rely on rapidly deteriorating landline voice systems. Whilst we do not underestimate the difficulties or cost, without reform users will not have access to a ubiquitous, sustainable and reliable network solution in the longer term. However, we note that this will require affected rural and remote customers to be assured of the reliability of the alternative solutions.

Both Telstra and potential competitors have taken the position that a 'technology agnostic' approach to voice delivery over the USO is preferable, both in terms of cost and outcome. While we accept this in-principle, we recommend that any revisions to the USO (including the TUSOPA) which allow flexibility in service technologies should require that users have access to separate connectivity options for voice and data.

The use of alternative technologies for USO voice delivery should also require the inclusion of backup power and stringent minimum availability and voice quality standards which are enforceable through significant penalties on the USO provider. The concerns we raise under Finding 8 around mobile network congestion and performance would need to be addressed if mobile services were to be a credible part of the solution. Expanded mobile coverage could also help provide part of the USO solution. New solutions must also be affordable for regional users.

Finding 5: There are significant issues with the maintenance and repair of telecommunications networks, particularly copper landlines, in regional, rural and remote areas.

The Committee considers it is vital to ensure the proper maintenance and timely repair of the telecommunications services which regional, rural and remote Australians rely on. Generally, voice and broadband services experience high levels of availability and low fault rates and are connected and repaired in regulated timeframes. However, a small cohort of users, often in remote areas, continue to experience unacceptable issues in getting their services repaired.

This is especially problematic when there are widespread community faults and outages, no mobile coverage and no mechanism to report these at scale. As raised under Finding 12, we are also concerned that difficulties in accessing Telstra's call centre and the absence of a dedicated 'gateway' for regional consumers may be leading to customer fatigue and therefore systemic underreporting of faults on Telstra's network.

The provision of voice services under the USO is supported by the CSG Standard and the Network Reliability Framework (NRF). The CSG Standard establishes the statutory maximum timeframes for the connection and repair of standard telephone services. In rural communities (201 to 9,999 people) and remote communities (up to 200 people), Telstra is required to either repair faults on USO services within two and three working days respectively, to offer alternative solutions, or to pay compensation.

The NRF is a licence condition that requires Telstra to report nationally and at 44 field service areas on performance of CSG services, including faults and average service availability, at an aggregate level.¹⁸ NRF reporting from September 2021 indicates that 99.97 per cent of CSG services nationwide experienced no faults, and CSG services were available 99.81 per cent of the time on average.¹⁹

However, we are concerned these high-level national metrics do not capture serious instances of repeated faults for individual services, particularly on copper landlines in rural and remote areas. We note that, in effect, 10 per cent of faults do not need to be repaired within the regulated timeframes to meet the CSG Standard. Despite the NRF obligations, there is a lack of publicly available data on the performance of individual USO services and it is therefore difficult to accurately examine. We echo calls made in the 2018 Edwards Review that the Australian Government undertake an audit of repair timeframes on regional, rural and remote landline services.

We do note, however, that approximately 16 per cent of submissions to the Review referred to the operation of landline services. In submissions and consultations, consumers reported frequent issues on their landline services, with long wait times for service restoration of many weeks and even months. In its submission to the Review, the Telecommunications Industry Ombudsman (TIO) also provides case studies of serious delays in rectifying landline outages, and reports that it received 3,833 complaints regarding regional landline services in 2020-21 (although it is noted that this number has declined year-on-year since 2018-19).²⁰

¹⁸ The NRF contains three levels of reporting. Level 1 is at a national and field service area level. Level 2 reviews the performance of local cable runs. Level 3 examines individual service performance, including instances of multiple faults in a certain period. Level 1 data is reported on Telstra's website; however, Level 2 and 3 data is no longer made publicly available.

¹⁹ Telstra, *Network Reliability Framework for fixed voice service*, [Webpage] Telstra 2021. <https://www.telstra.com.au/consumer-advice/customer-service/network-reliability>

²⁰ Telecommunications Industry Ombudsman (TIO), submission, pp 7, 11. <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-376-telecommunication-industry-ombudsman-s-2.pdf>.

Recently a number of phones in the area were not working for more than a month ... Telstra manages the copper network but its own systems mean faults are only repaired once reported ... What takes a day in the city takes weeks here.'

Stuart Wilson, Glen Valley and Friends Community Action Group submission

The common thread between many of these cases is poorly maintained copper infrastructure. Participants in the Review relayed deeply disturbing accounts of aerial cables 'hanging' loosely from trees, poles or fences, fallen cables being poorly secured, ground cables being repeatedly run over by heavy vehicles or crushed by trees, damage by wildlife and rodents and frayed or unsheathed landlines sitting in pits for long periods and being exposed to rain water.

'Original ... line to house... was damaged...and subsequently repaired when a truck pulled it out ... [it] has gladwrap plastic style tape wrapping it to [the] pole. New cable was not installed – old one just hoisted.'

Arnold and Thirza Teuben submission

In its submission to the Review, Telstra indicates that it has invested significantly in upgrades and repairs to its fixed networks in regional areas, including the copper access network. Telstra's remediation efforts involve the use of network and consumer data to identify issues, followed by fieldwork to scope cable pathways and undertake repairs such as replacing cables or removing unnecessary network elements like pair gains systems which can cause faults. Telstra estimates that its program of work will prevent 18,000 faults across the network to June 2022.

While we welcome this remediation work, in our view the current consumer safeguard framework does not place sufficient onus on Telstra to proactively maintain its copper network to the standards regional, rural and remote consumers expect. While under the NRF Telstra is required to report on and remediate its poorest performing copper runs and individual CSG services which experience multiple faults in a particular period, there do not appear to be strong obligations on Telstra under existing regulation or the TUSOPA to demonstrate regular maintenance of the network to prevent faults occurring in the first instance. Annual reporting on Telstra's maintenance program would be a useful addition to the monitoring and auditing of USO performance.

The CSG Standard establishes timeframes for connections, repairs and appointments, which are supported by per-diem compensation fees for impacted users. However, these compensation measures for individuals under the CSG Standard and other mechanisms, such as the Australian Consumer Law, often do not appear to incentivise Telstra and other providers to remediate services in a timely fashion. The Committee has heard that escalation of faults to the TIO can be a lengthy process that often leads only to a credit being applied without the fault being appropriately addressed, leaving the issue to reoccur.

Similarly, provisions in the CSG Standard requiring an interim (such as a mobile or satellite service) or alternative voice service (such as a call redirection to another phone) be offered in the event of a fault can reduce a provider's accountability where it is not possible to remediate the service within CSG Standard timeframes. However, as identified by the TIO and other contributors, in some instances interim phone services have not arrived in time to be useful or have not worked properly.²¹ In other cases, users have been sent mobile devices as an interim solution despite having limited or no mobile coverage in their area.

21 TIO, submission, p 11.

Our concerns also apply to the broadband data services provided under the USG. Currently, NBN Co is required to address network faults within set timeframes established under its Wholesale Broadband Agreement (WBA), as negotiated with RSPs. A rebate is provided to RSPs in some instances where NBN Co does not meet this obligation, which may be passed on to impacted consumers at the RSPs' discretion.

Again, this focus on rebates does not, in our opinion, provide sufficient motivation for NBN Co to address repeated service reliability issues and it is not clear that a broadly negotiated agreement focusing on average performance sufficiently protects the cohort of consumers with difficult and repeated faults. While the Australian Government has proposed draft standards, rules and benchmarks for wholesale broadband services under the SIP regime, which would apply to NBN Co and other SIPs, it is unclear as to how rigorous these might be as they are still to be implemented.

We also note that mobile voice and data services are not subject to any regulatory availability or repair standards, apart from general consumer guarantees in the Australian Consumer Law. This reflects the generally competitive nature of the mobile market (predominantly in urban areas), where dissatisfied consumers can switch networks. However, in many regional, rural and remote areas, the absence of competing providers of mobile voice and data markets mean there can be insufficient competitive pressure to incentivise providers to undertake timely maintenance and repairs on mobile network infrastructure. The Committee has heard instances of faults on regional mobile base stations going unaddressed for extended periods, with significant impacts for local businesses and residents, particularly in relation to the operation of EFTPOS.

Given that NBN Sky Muster and fixed wireless services are available in areas serviced by copper telephony under the USG, there is also no firm obligation on ADSL providers to guarantee repair timeframes. Similarly, many of the issues with the copper network reported to the Committee have been from those who use this service exclusively for ADSL broadband rather than voice, or utilise third-party voice services where Telstra, as wholesaler, may not be subject to the CSG Standard. These consumers are not covered by connection or fault repair timeframes.

Instead, mobile and ADSL providers generally establish 'best effort' restoration commitments through Service Level Agreements with consumers, though the exact undertakings can vary considerably between providers. The Committee considers that, in many instances, these undertakings are insufficient in addressing issues, and recommends that performance, repair and reliability standards are developed for these services.

In regional, rural and remote areas, it is critical to have a working service in what are sometimes life-or-death situations. To ensure this, many consumers have multiple telecommunications services to provide redundancy when it is most needed, even at considerable additional expense to themselves. The success of this practice, however, relies on each telecommunications option being adequately maintained and promptly repaired when necessary. We do not believe this is currently always the case in regional areas.

Regional, rural and remote consumers would be better served by a regulatory regime for repairs and maintenance which, instead of applying individual rebates or compensation, is enforced across all technologies and which uses significant, escalating penalties to make sure providers are encouraged to actively prevent, identify and resolve network faults.

Finding 6: In instances of natural disasters and emergencies, connectivity is significantly impacted by power and network outages. This reduces access to recovery and support.

Telecommunications networks are playing an increasingly vital role during natural disasters like bushfires, cyclones and floods. Throughout consultations, emergency services personnel reported that dedicated emergency networks, such as trunked government radio, quickly become congested during emergency situations and therefore are generally reserved for short, sharp voice communications. As such, commercial mobile and broadband services are often used to communicate real-time information, including data, between and within emergency services agencies during emergencies.

'[The] RFS are concerned over the significant number of mobile black spots, multiple areas with no more than 3G coverage and no, or very limited, access to the Internet, which ... has caused significant stress for many residents and put ... stress on emergency operations.'

NSW Rural Fire Service - Hornsby
Ku-ring-gai District submission

Mobile and fixed broadband networks have also become one of the primary ways in which individuals gain real-time information during natural disasters, complementing television and radio. Several state governments have developed apps and websites providing mapping and status updates on bushfires and other disasters. Where network coverage is available (including where residents can access SMS over Wi-Fi), mobile network operators can also send out Emergency Alerts via text message to inform residents of impending emergencies, giving them valuable time to enact their emergency plans.



Starlink dish, courtesy of Michael Kelland, Yarramalong NSW

'The Nambucca LGA experienced the Kian Road bushfire natural disaster ... Much of the ... impacted area has no mobile coverage. In some instances, emergency evacuation orders had to be provided by a helicopter flying ahead of the fire front using a loudspeaker.'

Regional Development Australia (RDA)
Mid North Coast submission

'Cyclone Seroja recently cut a swath of destruction through the Mid West. Rural areas subsequently lost electricity supply and ... their telecommunications systems. These two systems were down for literally months.'

City of Greater Geraldton submission

Digital connectivity is also an important part of the disaster recovery process, particularly in isolated regional, rural and remote communities. Residents in disaster-impacted communities need reliable telecommunications to apply for temporary support payments, liaise with insurance agencies, access financial services and communicate with health professionals and loved ones.

However, recent natural disasters have exposed significant vulnerabilities in regional telecommunications networks, especially in relation to power. The ACMA enquiry into the impacts of the 2019-20 bushfires on the telecommunications network, for instance, found that there were almost 900 outage incidents of four hours or more across fixed-line, mobile and fixed wireless networks, with the vast majority caused by mains power outages.²² Similar issues were experienced in the aftermath of Tropical Cyclone Seroja in West Australia in April 2021 and storms in Victoria in June 2021, as power outages at single points of failure led to extended network outages across entire regions.

'During power cuts Telstra land line services (and ADSL internet) now cease after 6 - 14 hours as Telstra has not maintained a back-up generator at the local ... exchange ... The entire valley lost power for 4-7 days during the 2020 and 2021 floods ... residents had no way of confirming their welfare status.'

The Macdonald Valley Association submission

Given the importance of digital connectivity in both the response and recovery processes, the impacts of network outages due to power failure can be severe. Numerous participants in the Review have expressed their fear around loss of life or limb during recent bushfires, weather events and floods, compounded by the inability to communicate with emergency services personnel for assistance or receive real-time updates on the rapidly evolving situation. Telecommunications outages caused by loss of mains power and damage to networks can also disrupt supply chains and access to essential services, such as fuel and groceries, in the aftermath of disaster events.

²² Australian Communications and Media Authority (ACMA), *Impacts of the 2019-20 bushfires on the Telecommunications network*, ACMA, April 2020. <https://www.acma.gov.au/publications/2020-04/report/impacts-2019-20-bushfires-telecommunications-network>

*'At petrol stations [on the South Coast, following the 2019-20 bushfires], no-one could pay for fuel because no one has cash anymore. They couldn't get EFTPOS machines working because they couldn't get a transmission line out there, so no-one could pay ... [People] had money in the bank but couldn't even pull it out of an ATM.'*²³

Shane Fitzsimmons, Commissioner,
Resilience NSW

It should be noted that power outages are not localised to periods of natural disaster. A number of submissions highlight the impacts of regular power outages on access to telecommunications services, including where end-user devices such as modems rely on power. Similar to issues of congestion or poor coverage, outages can cause disruption to everyday activities and increase the vulnerability of individuals who require access to reliable telecommunications in the case of medical emergencies. More can be done to ensure that users are aware of the importance of maintaining an in-home backup power supply in the event of outages, which will allow some technologies like satellite to continue operating. A redundant satellite connection can also be useful for businesses in operating EFTPOS and other business functions in the event of mobile network outages.

The Committee has heard that there is a need to improve the resilience of telecommunications infrastructure in areas where there are frequent power outages, particularly those at risk of natural disaster and where there are geographic vulnerabilities (such as towns with one road in and out). Mobile base stations, fixed wireless towers and landline network exchanges are often supported by an auxiliary battery backup or on-site generator, which provides temporary power supply in the event of mains power failure to allow time for service restoration activities. However, in many instances these backups only last for several hours, leaving sites vulnerable to extended outage when mains power cannot be restored before the backup runs out.

'The Telstra Facility failed on 15 December because the Telstra on-site back up battery has a life of only around eight hours ... On one occasion the fuel ran out because a contractor had not refuelled it.'

Mt Wilson/Mt Irvine Rural Fire Brigade
submission

²³ P McDonald, 'NSW RFS Commissioner Shane Fitzsimmons on his last day and moving on to head disaster agency', ABC News 30 April 2020. <https://www.abc.net.au/news/2020-04-30/nsw-rfs-commissioner-shane-fitzsimmons-last-day/12198974>

While it is both cost-prohibitive and unnecessary to significantly upgrade battery backups at all sites, the Committee agrees that the resilience of key pieces of network infrastructure in disaster-prone areas should be strengthened through targeted upgrades. In response to the 2019-20 bushfires, the Australian Government has provided \$37.1 million in initiatives to prevent, mitigate and manage network outages in natural disasters through the STAND package.

This package includes \$18 million for the MNHP, which funds telecommunications providers to deploy upgraded backup power, emergency power solutions for rapid service restoration, and other hardening measures. Other measures include \$10 million for the deployment of temporary telecommunications facilities such as Cells on Wheels and NBN Co Road Muster trucks, \$7 million for the installation of NBN Sky Muster services at emergency centres, and \$2.1 million to improve public information on access to telecommunications in natural disasters.

The Committee welcomes these measures, but believes more funding should be allocated to STAND, particularly the MNHP component, to support network resilience at a broader scale across regional, rural and remote areas. This should also be done in a strategic way with significant involvement from local communities and state and territory governments, consistent with our observations under Finding 1 and Finding 2.

‘While the activities being undertaken through STAND are good, the level of funding allocated on a national basis is insufficient to address the scale of network vulnerabilities across Australia. The Victorian Government encourages the Commonwealth to ... expand infrastructure hardening and resiliency improvement measures.’

Victorian Government submission

The Committee has also heard that there is ongoing work needed to improve the consistency of coordination between governments, the energy sector and telecommunications providers on emergency management processes. During the Committee’s public online consultations in Western Australia, state agency representatives provided some positive case studies of improved information sharing between governments and utilities providers to identify critical infrastructure. Conversely, however, local government representatives in Queensland consultations criticised a lack of engagement by the telecommunications providers in local disaster management processes.

Consistent with the Royal Commission into National Natural Disaster Arrangements, it is clear a more consistent national framework is required to ensure that there is real-time communication around power issues and other factors that will affect critical telecommunications infrastructure during disasters. Improved information sharing will assist both governments and utilities providers to provide vital telecommunications service continuity during and in the aftermath of disasters.

As part of this, many stakeholders have recommended that telecommunications be recognised as an essential service across Australian jurisdictions. Both community and industry stakeholders have expressed frustration about restrictions around undertaking preventative and restorative measures such as land clearing or generator refuelling at local telecommunications sites.

A consistent essential services definition and management framework across state and territory governments would assist preventative maintenance and preparation to improve network resilience before, during and after natural disasters. We encourage governments to consider this option.

The Committee also finally notes the work being progressed on Public Safety Mobile Broadband and Emergency Cell Broadcasting. Australian Government, state and territory governments and the telecommunications industry should continue to progress work on these initiatives, which will improve dedicated communications and real-time data sharing between emergency services agencies during disasters, as well as providing timely emergency warning information to members of the public in disaster-prone areas based on location, rather than provider.

Finding 7: Mobile coverage continues to improve, but expanding reliable coverage to priority areas is becoming more difficult.

Reliable access to mobile connectivity continues to be of critical importance to people living, working and travelling in regional, rural and remote Australia. Indeed, the vast majority of individual submissions to this Review have highlighted both the role that mobile coverage plays in the economic productivity and social wellbeing of regional consumers, and conversely, the serious impacts that a lack of mobile reception can have when people need it most.

'There [are] very few areas that [have] mobile phone coverage including where we live ... when there was a fatal accident outside our property. People had to leave the scene to make a phone call to emergency services. If there is ever an accident on our property or that of our neighbours, calling for help is not an option.'

NSW Farmers (Yarrowich resident) submission

'[Poor mobile service] compromises my ability ... as a volunteer emergency service driver with the RFS. I am one of three active qualified drivers ... If there is no driver ... we have no way of communicating with other ... crews to respond to the emergency.'

Rick Murray submission

According to mobile network operators, mobile coverage is now indicatively available to an estimated 99.5 per cent of the Australian population and 33 per cent of the Australian landmass. However, as discussed under Finding 14, we have doubts about the accuracy and consistency of the mobile coverage data available to consumers.

Indeed, the Committee has continued to hear of persistent mobile black spots in many regional, rural and remote areas, particularly outside of regional centres, towns and transport corridors. This includes places like farming homesteads, local roads and national parks where there is demand for reliable mobile coverage to support productivity and public safety. 'In-fill' coverage issues, where reception is patchy in localised areas of their premises or neighbourhood despite coverage being generally available, are also evident, particularly in areas on the peri-urban fringe.

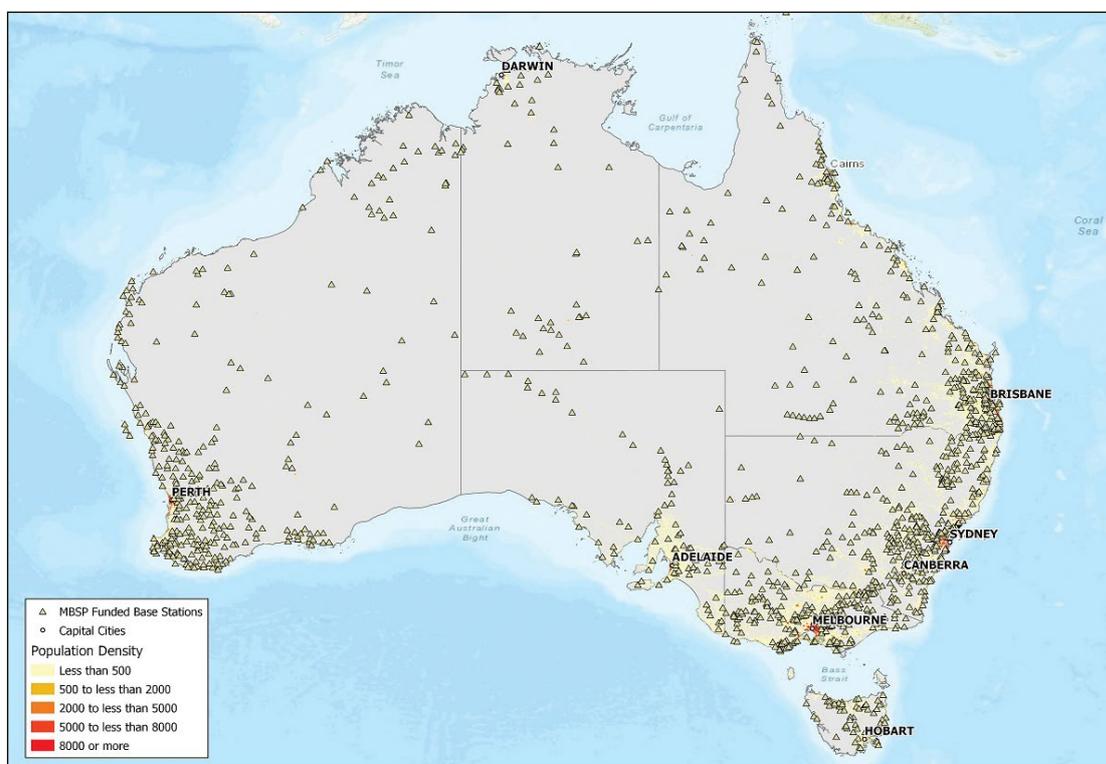


Courtesy of Alix McFarland Creative

The Australian Government has made an ongoing commitment to expanding mobile coverage across regional, rural and remote Australia through the MBSP. This program has utilised co-investment from both industry and state and territory governments to subsidise the capital costs of mobile base station deployment in less commercial areas.

Over rounds 1 to 5A of the MBSP, the Government's commitment of almost \$300 million has leveraged a total investment of more than \$875 million, funding more than 1,270 mobile base stations across Australia. As of November 2021, more than 75 per cent of these base stations are on-air, delivering over 162,000 square kilometres of new and upgraded handheld coverage and 245,000 square kilometres of new external antenna coverage. This coverage footprint includes more than 109,700 premises and 8,600 kilometres of major transportation routes in regional areas.

Map 3 – Funded base stations – Mobile Black Spot Program



Source: Bureau of Communications, Arts and Regional Research, *Funded Base Stations – Mobile Black Spot Program*, Commonwealth of Australia, October 2021

Feedback to the Review regarding the coverage outcomes from the MBSP was generally positive, and the program continues to enjoy broad support from industry, governments and local communities. However, a number of individual, community and industry contributors noted some suboptimal consequences of the current design of the program, particularly in relation to facilitating improved consumer choice of mobile services in regional areas through increased competition.

Telstra has received the vast majority of program funding under the MBSP, entrenching its incumbent competitive advantage over other providers in more remote areas. While most regional consumers use the Telstra network, the lack of coverage from competing providers may limit access to reliable mobile coverage for tourists, freight drivers, itinerant workers and other users of alternative networks.

Additionally, while the MBSP includes provisions for additional providers to co-locate on funded infrastructure, this option has only been taken up at a limited number of sites. Co-location discussions generally occur after funding has been awarded for a particular location, which may not be suitable for an additional provider due to network or physical factors.

Stakeholders also report that there have been instances where an 'island' of coverage from one provider (for instance, through a satellite small cell) has been funded in an area predominantly serviced by another sole provider. In more commercial areas, this can incentivise other providers to invest in competing infrastructure to recapture market share. However, where this does not occur, users are often required to purchase additional plans or equipment at personal expense in order to receive reliable coverage over two networks.

'Telstra may have a continuous network of towers along a major road for a significant distance (with some towers even installed via the 'Blackspot' program), then there is a critical gap in Telstra coverage which does not meet 'Blackspot' criteria as there is already a rival operators tower in place...users...need two different carriers' devices to bridge the gap.'

City of Greater Geraldton submission

Perhaps most critically, as the MBSP pushes mobile coverage further out into more remote areas with lower population density and transportation routes without a fixed customer base, the reduced return on investment for industry participants and the higher costs of infrastructure deployment mean that the program is increasingly struggling to expand mobile coverage further into regional, rural and remote Australia.

The first round of the MBSP saw the Australian Government's contribution of \$110 million yield \$275 million in industry, state government and third-party co-contributions and 499 new mobile base stations. In contrast, the last two rounds of the program, Rounds 5 and 5A, were undersubscribed, with the Australian Government contribution of \$36.8 million during Round 5 (out of \$80 million initially allocated) matched by industry, state and territory governments, and thirdparty co-contributions to fund 182 new sites. The Australian Government's share of funding responsibility for new infrastructure has increased significantly, from 28.6 per cent in Round 1 to 52.9 per cent in Round 5A.

Given the significant costs of network deployment over vast distances, it is impractical to provide universal mobile coverage across the entire Australian landmass. Even where mobile infrastructure exists, coverage outcomes can be influenced by a number of technical and physical factors, including network configuration and local terrain. The congestion issues that we discuss under Finding 8 also influence the reliability of mobile services.

Regardless, the increasing importance of digital connectivity in everyday life means it is incumbent on governments and industry to continue to work together towards the provision of equitable access to reliable mobile coverage in regional, rural and remote Australia.

In response to the program's shifting economics, Round 5A was used to test a range of program designs to continue to expand and improve mobile coverage and competition in priority areas, including natural disaster-prone areas and major transport corridors. In particular, funding was provided for three trials that will test ways that providers can roll out shared mobile infrastructure to reduce costs and provide new coverage from multiple carriers. This includes the use of a 'neutral host' model, as well as domestic roaming at two sites (see Case Study 2).

Although the results of these trials remain to be seen, we consider that this is a step in the right direction for expanding mobile coverage in regional areas. While market conditions in Australia are different to those in other jurisdictions, we note the successful outcomes of passive and active Radio Access Network (RAN) sharing arrangements between multiple carriers in the United Kingdom and New Zealand. These initiatives are using industry cooperation to deliver expanded geographic mobile coverage outcomes at reduced cost to each participating provider.

Case Study 2 – MBSP Round 5A – trial initiatives

Under Round 5A of the MBSP, mobile network infrastructure provider and operator Field Solutions Group (FSG) was awarded funding to undertake two trials of new mobile deployment models in partnership with Optus.

The first trial involves the use of an active neutral host RAN to deliver coverage from FSG's Regional Australia Network and the Optus mobile network on seven new mobile towers along Queensland's Adventure Way between Thargomindah and Cunnamulla. The neutral host model will use a single set of electronics and radio equipment on each tower to deliver coverage from both providers, with the potential to accommodate additional carriers.

The trial aims to demonstrate the technical feasibility of the neutral host model, as well as its benefits in reducing costs for mobile network operators and driving competitive coverage outcomes in less economically viable areas of rural Australia.

The second trial will utilise a domestic roaming arrangement to allow Optus customers to 'roam' onto FSG's Regional Australia Network in regional, rural and remote areas. Under this arrangement, Optus subscribers will be able to continue to use Optus voice and data services on their mobile device when visiting an area with coverage on the FSG Regional Australia Network.

The trial aims to demonstrate the ability for place-based networks in areas unlikely to be served by traditional mobile network operators to realise cost effective connectivity for customers of these providers through a domestic roaming agreement.

Source: Field Solutions Group submission

Additional measures to support increased passive and active mobile network infrastructure sharing should be included in future rounds of the MBSP in order to promote expanded regional mobile coverage. Encouraging multi-provider solutions through the program in the first instance may also help to improve the affordability of mobile services for people living, travelling and working in regional areas.

For instance, in addition to the capital expenditure and capitalised backhaul costs currently funded under the program, funding for specified ongoing operational expenses could be offered for multi-provider solutions, encouraging providers to cooperate on sites of mutual interest.

We note that, under such an arrangement, the Australian Government would likely bear increasing costs for infrastructure deployment through the program. However, this could also allow it to more strategically allocate funding to priority areas, such as major transport and tourist routes, emergency evacuation points, and vulnerable communities in partnership with state and territory governments, consistent with Finding 1 of this Review.

A number of stakeholders have suggested that domestic roaming should be mandated on publicly funded mobile infrastructure to provide open-access mobile coverage to users across all networks. In 2016-17, the ACCC conducted an inquiry into whether to declare a wholesale domestic roaming service. The inquiry found that a roaming declaration would not significantly promote competition in the provision of retail mobile services and could provide a disincentive to geographic-coverage based competition in regional areas. We note that the ACCC has confirmed to the Committee that it has not changed its view on this issue.

We have heard competing arguments on this issue from the three mobile network operators, and note that there are a number of technical and financial issues which would need to be addressed for roaming to be a suitable solution for regional areas on a commercial basis. We do not intend to reopen this discussion in the absence of any industry consensus. In our view, there is still potential for adjustments to existing investment programs to stimulate improved coverage outcomes in the mobile market without undue regulatory intervention.

However, we note that, in addition to tools like cell broadcasting, roaming could help to improve the reliability and utility of mobile networks both during and after natural disasters. In particular, access to reliable mobile connectivity, regardless of provider, would assist emergency personnel to effectively coordinate response measures, particularly where individual networks fail due to power outage or damage but others remain operational. We would therefore encourage both policymakers and mobile network operators to consider the feasibility for roaming to be trialled on infrastructure in disaster affected areas as part of a range of measures to ensure there is access to reliable communications in emergency situations.

Finally, we are concerned the uneven deployment of 5G networks in urban, regional and remote areas may widen the digital divide. Australia's three major mobile network operators, Telstra, Optus and TPG Telecom have commenced the rollout of commercial 5G mobile networks, predominately in urban areas, with Telstra claiming network coverage over 75 per cent of the population including 200 cities and towns across Australia. It is unclear, however, as to whether more rural and remote parts of Australia will receive access to 5G coverage in the near future.

Participants to the Review have also raised concerns around the closure of the Telstra 3G network by 2024. This includes a perception amongst some consumers that the deployment of 4G or 5G networks to replace the 3G network may lead to reduced coverage outcomes in regional areas, which we address under Finding 8 below.

In its submission, Telstra reports to the Committee it has committed to providing '3G-equivalent' 4G coverage before June 2024. Telstra also notes that it is undertaking messaging via SMS, local papers, radio and phone to encourage customers to upgrade technologies and is providing discounts on selected 4G handsets. Telstra customers using the NGWL service for voice will be migrated to the 4G home voice solution from 2023. We encourage Telstra and other mobile network operators to continue to ensure that regional consumers are supported through the transition from 3G services, including by maintaining mobile coverage footprints in regional areas.

The demand for data

Key findings

8. **Increased demand for data on regional, rural and remote mobile and fixed wireless networks is not always being met, causing network congestion issues.**
Relates to Recommendations: 6, 9
9. **Although Sky Muster Plus has improved access to data, Sky Muster users are frustrated by insufficient data allowances, high latency and reliability issues.**
Relates to Recommendations: 6
10. **Current minimum broadband speeds are mostly adequate, but will need to increase over time.**
Relates to Recommendations: 8
11. **There are emerging technology options to meet the demand for data but their service performance has not yet been validated.**
Relates to Recommendations: 4

Since the 2018 Edwards Review, the consumption of data by Australian consumers and businesses has continued to significantly increase Australia-wide, the total volume of data downloaded across broadband and mobile services has risen from approximately 6 million terabytes (TB) in December 2018 to 9.5 million TB in December 2020.²⁴ This trend reflects Australian users' ongoing increase in data-intensive digital activities, like high definition video and audio streaming, videoconferencing, cloud applications, and online gaming.

²⁴ ACCC, *Internet activity report: for the period ending 31 December 2020*, ACCC June 2021. <https://www.accc.gov.au/regulated-infrastructure/communications/monitoring-reporting/internet-activity-record-keeping-rule-rkr/december-2020-report>

The growth in data consumption has been a long-standing phenomenon and is largely predictable. Data from NBN Co shows that download consumption per month on the NBN has increased by 820 per cent between December 2012 and June 2019,²⁵ with a further 16 per cent growth in average monthly data download per user between 2018-19 and 2019-20.²⁶ In 2018-19, the non-metro component of total data consumption on the NBN was 48 per cent, with regional monthly average download per user at 246 GB (compared to 270 GB for metro users).²⁷

However, the rising demand for data has nonetheless been exacerbated by the response to the COVID-19 pandemic, including travel restrictions and lockdowns. These measures have required Australians to increasingly adopt digital platforms for business, study and work, as well as for access to essential services like groceries, banking, health care and government services. For individuals and businesses in regional, rural and remote areas, reliance on digital platforms has been compounded by reduced access to 'brick-and-mortar' shopfronts and 'face-to-face' interactions.

NBN Co reports that during the peak of initial COVID-19 lockdowns in April 2020, average monthly downloads were 11 per cent higher than the yearly average, rising from 297 GB to 330 GB. Increased use of data intensive applications like videoconferencing, cloud services and Virtual Private Networks (VPNs) also led to an increase in upload data usage per user, increasing by 27 per cent between February and April 2020 (from 22 GB per month to 34 GB per month).²⁸ As flexible work arrangements continue into the future, upload data consumption is likely to continue to increase.

How Australians access data also continues to change over time. Most data usage occurs on retail NBN services; however, mobile phones remain the device most frequently used to connect to the internet.²⁹ Similarly, the average monthly volume of data downloaded by mobile devices has itself increased.³⁰ Feedback from submissions and public consultations indicates that mobile connectivity is becoming increasingly important in those parts of regional Australia where it can be provided. Indeed, data supplied by Telstra shows that users in regional Australia downloaded more than 43 per cent of the data on its mobile network in FY2020-21.³¹

25 NBN Co, *Australia's nbn data usage surges by almost 25% [Media Release]*, NBN Co, 2 December 2019. <https://www.nbnco.com.au/corporate-information/media-centre/media-statements/data-usage-surges>

26 NBN Co, *Annual Report*, NBN Co, 2020, p 26. <https://www.nbnco.com.au/corporate-information/about-nbn-co/corporate-plan/financial-reports>

27 NBN Co, *Australia's nbn data usage surges by almost 25%*.

28 NBN Co, *Annual Report*, p 24.

29 ACMA, *Communications and media in Australia: Supply and use of services, 2019–20*, ACMA, April 2021, p 7. <https://www.acma.gov.au/publications/2021-04/report/communications-and-media-australia-supply-and-use-services-2019-20>

30 ACCC, *Internet activity report: for the period ending 31 December 2020*, pp 6-7.

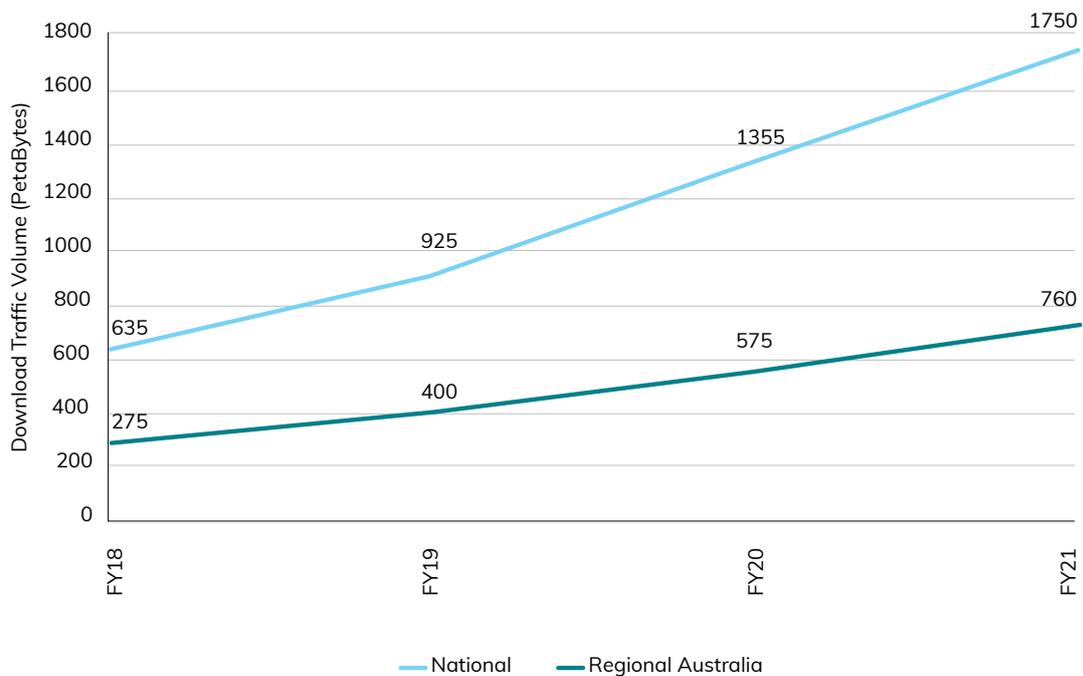
31 Telstra, *submission*, p 20. <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-613-telstra-public.pdf>

Graph 1 – Data growth trends for download traffic volumes since 2018



Source Telstra submission, p19

Graph 2 – Data growth in petabytes for download traffic since 2018



Source Telstra submission, p20



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The demand for data services is also being driven by the integration of entire supply-chains in key regional sectors, like agriculture and manufacturing, into the global digital economy. Primary producers are increasingly using IoT-connected devices to collect, process and analyse data to assist in productivity-enhancing decision-making across areas like nutrient regulation and application, land use, animal health, climate risks, water efficiency and other production related factors. This data also plays a critical role in regulatory compliance, logistics and the marketing of products to consumers. Appropriate connectivity options, including several emerging technologies, are necessary to deliver the potential productivity gains from the increased use of data in regional economic sectors.

However, it is clear to the Committee that the increasing demand for data in regional, rural and remote Australia is not always being adequately met. This is due to the constrained connectivity options available to consumers and businesses in these areas, both in terms of the capacity of the infrastructure and service options provided. In particular, service performance issues across mobile, fixed wireless and satellite networks, including congestion and latency, are impacting the ability for regional users to fully leverage the benefits of digital connectivity.

Finding 8: Increased demand for data on regional, rural and remote mobile and fixed wireless networks is not always being met, causing network congestion issues.

The Committee has heard numerous reports of congestion on the mobile and NBN fixed wireless networks in regional, rural and remote areas. Many attendees to the public consultations noted extremely slow download and upload capacity during peak periods of use, especially in the tourist season and evening period, despite having a strong connection to the network. In some cases, the influx of temporary workers, such as at nearby mining camps, has strained local infrastructure, leading to a sudden deterioration in service quality and reliability due to congestion.

This has had impacts on users' ability to access both data-intensive services like streaming, as well as in some cases, basic functionality like emails, websites, apps and phone calls. Representatives from local businesses, particularly retail and tourism operators, reported impacts on the operability of business software like cloud-based booking systems, payment services and accounting programs.

'During the Dry season, due to the influx in tourists, internet remains very slow ... Many businesses reported this as being very frustrating as they need their internet systems, such as EFTPOS, cloud-based email, reservations when business is at its peak.'

East Kimberley Chamber of Commerce and Industry submission

'Network capacities are often reached during periods of high usage such as online stock auctions when farmers are endeavouring to access the one tower at the same time. For some people, very early mornings are the only time ... networks are not as congested.'

Goondiwindi Regional Council submission

During the pandemic, many regional users have also been unable to use mandatory QR codes to check-in to businesses and locations using the COVID mobile apps, affecting compliance with government COVID-safe requirements. As with a lack of mobile coverage, network congestion can also have safety implications for those working in remote areas or emergency situations such as traffic incidents.

In regional centres and urban areas, issues of congestion are mitigated by a greater density of network cells and tower infrastructure, as well as access to other forms of connectivity like the NBN fixed line network. However, many smaller regional, rural and remote communities may only have access to a single mobile or NBN fixed wireless site. When this site becomes congested, there are limited alternatives available to meet connectivity needs.

Additionally, in some instances, congestion on the network may cause a perceived reduction in coverage as congested cells reduce the range of their service area to try to offload traffic to neighbouring cells (also known as 'cell breathing'). In response, some users have reported being sold signal booster devices by their providers. These devices are intended to address coverage issues, but do not improve

user experience when the network is congested, leading to confusion and frustration amongst consumers (see Findings 12 and 15).

It is noted that telecommunications providers are deploying 4G and 5G mobile networks and other capacity upgrades to meet the increasing demand for data in some regional areas. Telstra, for instance, reports in its submission to the Review that it has committed \$150 million in 2021-22 to address congestion on its network, including at a number of 3G-only sites and high-traffic 4G sites.³² The Committee welcomes this investment.

However, it is clear to the Committee that overall, investment in additional network capacity is not keeping pace with increasing demand in regional, rural and remote areas. We have heard that as regional mobile networks are deployed or upgraded, pent-up demand for data is released and sites quickly become congested again as users readily take full advantage of improved speeds and access to data. This includes sites funded through Australian Government programs like the MBSP, which requires grantees to provide services from funded infrastructure for a minimum of 10 years.

Given this, we are concerned mobile network operators may not be adequately scoping capacity upgrades to account for what are largely predictable trends in data consumption over the long-term. As carriers prioritise the rollout of 5G coverage and other services in more commercial areas, there is a risk rural and remote communities will continue to experience ongoing network congestion issues, entrenching digital disadvantage and impacting users' ability to leverage data-intensive services for work, study and leisure.

Where new connectivity is established either through private investment or Australian Government programs like the MBSP, consumers will understandably use it. Although the costs for network capacity upgrades can be high, particularly in remote areas, ultimately it remains the responsibility of carriers to invest in advance of major network congestion to ensure they are meeting their primary obligation to provide a service that is capable of being used.

³² Telstra, submission, p 8.

In our view, this can be achieved through more effective forward planning to analyse patterns of growth, as well as allocating more resources to undertake capacity upgrades at locations where demand is expected to increase. Where appropriate, government funding vehicles like the RCP could be used to help meet these costs in select rural and remote areas. Governments should also ensure that providers are undertaking ongoing capacity upgrades on infrastructure funded under programs like the MBSP. This must account for ongoing growth in demand, in line with the service commitments providers agree to when awarded funding.

With regard to the NBN Fixed Wireless network, NBN Co has indicated to the Committee that it uses a range of measures to address capacity issues. These include uplifts to cell and backhaul capacity, providing more dedicated resources to downloads and utilising carrier aggregation.³³ In its submission to the Review, NBN Co has flagged the introduction of additional demand management tools which may reduce users' ability to utilise high-intensity applications or download large files which are less time-sensitive. Such tools can help manage bandwidth more fairly between users without impacting the service experience of the vast majority of users.

Since 2019, NBN Co's capacity measures have helped to ameliorate network congestion issues, at least temporarily. The ACCC's Measuring Broadband Australia (MBA) reports that, as of August 2021, download performance on fixed wireless was reduced to 71.6 per cent of peak plan speed during busy hours. However, we note that the MBA report also indicates that upload speeds are only around half the total peak plan speed at all hours.³⁴ In both instances, these statistics lag significantly behind those for NBN fixed line services.

NBN Co also requires all Fixed Wireless network cells to meet a minimum 6 Mbps target 'busy hour' performance and applies a rebate for consistently congested cells. It is noted that NBN Co has almost consistently met this target on 100 per cent of its cells over the year from October 2020 to 2021, with the majority of fixed wireless cells (approximately 75 per cent) delivering an average busy hour download performance of 25 Mbps or greater as of October 2021.³⁵

However, as discussed under Finding 10, we suggest this 6 Mbps target and other speed targets need to be significantly strengthened as demand continues to increase and pressure on the network grows. This is particularly important for upload performance. NBN Co has recently introduced Fixed Wireless Plus plans, which are delivering increased download speeds on the network. However, the Committee has heard that upload speeds on these plans have been reduced from an initial 20 Mbps to just 10 Mbps. This is insufficient for many of the activities higher-bandwidth users are looking to use the service for and inconsistent with the upload speeds available to fixed line consumers.

NBN Co invests approximately \$200 million per year to meet current capacity commitments on the fixed wireless network. To the extent that this funding can only maintain the status quo, we consider that NBN Co has a responsibility to allocate a greater amount of funding to significant fixed wireless network capacity improvements on an ongoing basis, in order to provide usable services to all consumers as the demand for data continues to increase (see Finding 10).

33 NBN Co, submission, p 19. <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-604-nbn.pdf>

34 ACCC, 'Report 14', *Measuring Broadband Australia*, Commonwealth of Australia, August 2021. <https://www.accc.gov.au/regulated-infrastructure/communications/monitoring-reporting/measuring-broadband-australia-program/latest-performance-report/report-14-august-2021>

35 NBN Co, 'October 2021 Monthly Progress Report (Updated)', *Progress reports*, NBN Co, October 2021. <https://www.nbnco.com.au/corporate-information/about-nbn-co/updates/dashboard-october-2021>

Finding 9: Although Sky Muster Plus has improved access to data, Sky Muster users are frustrated by insufficient data allowances, high latency and reliability issues.

The NBN Sky Muster satellite service offering has undergone significant change since the 2018 Edwards Review, which found that data constraints on the platform were holding back its users both economically and socially.³⁶

In August 2019, NBN Co launched Sky Muster Plus, a Layer 3 product that initially provided unmetered access to basic web browsing, email and operating system updates, as well as access to wholesale speed bursts above 25 Mbps for download and 5 Mbps for upload.³⁷ In April 2021, coinciding with (but independent to) the COVID-19 pandemic, unmetered activities on Sky Muster Plus were expanded to cover all online content and applications (excluding video streaming and VPN traffic). NBN Co estimated that, on average, 70 per cent of usage would now be unmetered.³⁸

Sky Muster Plus has approximately 29,000 active users and is experiencing growth of 500 or more new users per week.³⁹ This is reflected in the feedback received through consultations and submissions, which indicates that the improved product has enabled a step change in satellite users' access to and usage of data. Indeed, the inclusion of videoconferencing in unmetered data enabled many Sky Muster Plus users, including Committee member Kristy Sparrow, to actively participate in online consultations for the Review. Other benefits have included better access to education and business services, particularly during COVID-19 social distancing measures.

'We changed to a [Sky Muster] Plus Plan in March ... I had one high school child on teams/zoom ... as well as a Uni student ... I also carried out my normal farm/business ... simultaneously ... Because most of the usage ... is not metered we have never gone over our data usage and are now able to also stream ... Because of the lower meterage our usage is now relevant to a much ... cheaper plan.'

BIRRR (Marcelle) submission

Sky Muster Plus is a welcome improvement for many satellite users, noting that consumer awareness of the product appears to remain relatively low (see Finding 13). However, we are concerned that data constraints remain an inhibitor on usage for both regular Sky Muster users and those requiring a VPN for business and working from home. Individuals and businesses on the Sky Muster service expressed particular frustration around the division between 'peak' and 'off-peak' times and data allowances, with many questioning having to pay for off-peak data, which often goes unused and not having full access to the data they pay for when they need it.

'I ... have ... four school age children living with us. This places additional strain on the internet [Sky Muster] ... and we consistently run out of data ... I have taken to getting up at 0600 ... to check my emails, Facebook ... to ensure I utilise as little as possible of the peak hour allowance.'

Dallas Franklin submission

36 2018 Regional Telecommunications Review, 'Getting it right out there', Commonwealth of Australia, 2018, p 25. <https://www.infrastructure.gov.au/media-centre/publications/2018-regional-telecommunications-review-getting-it-right-out-there>

37 NBN Co, 'nbn™ Sky Muster™ Plus to provide unmetered data for internet essentials', August 2019. <https://www.nbnco.com.au/corporate-information/media-centre/media-statements/nbn-increases-sky-muster-data-allowance>

38 NBN Co, 'nbn increases Sky Muster™ data allowances, enhances Sky Muster™ Plus', March 2020. <https://www.nbnco.com.au/corporate-information/media-centre/media-statements/nbn-increases-sky-muster-data-allowance>

39 ACCC, 'NBN Wholesale Market Indicators Report', September Quarter 2021 Report, November 2021. <https://www.accc.gov.au/regulated-infrastructure/communications/national-broadband-network-nbn/nbn-wholesale-market-indicators-report/september-quarter-2021-report>

The Committee has also heard some frustration around NBN Co's data relief measures for Sky Muster users in response to the pressures of COVID-19. From March to November 2020, NBN Co provided an additional 45GB of download data for each standard Sky Muster service at no additional cost, increasing average wholesale download limits to 90GB. NBN Co also provided RSPs with an additional wholesale capacity of up to 40 per cent, including on Sky Muster, over the same period at no cost.⁴⁰

While these measures assisted Sky Muster users to meet the data demands of working and studying from home, many users in rural and remote areas already used satellite data for these purposes prior to COVID-19. Remote properties often function as a schoolroom, business and home combined, supporting a number of users with different data needs. These homesteads are generally unable to add additional plans or purchase other connections, and will continue to struggle with existing data limitations following the removal of these temporary measures.

Given that NBN Co indicates that average data usage on a Sky Muster Plus plan is approximately two to three times that on the standard Sky Muster service, we argue there is unmet demand for data on the standard Sky Muster network, which continues to inhibit users from fully realising the economic and social benefits of the service. Satellite users have told us that their usage of the service is highly self-moderated due to the number of variables they need to consider, including data limits, 'peak' and 'off-peak' periods, and whether they can purchase additional data blocks or change their plans once they reach their monthly data cap. Even for Sky Muster Plus users, there is some confusion around which types of data are metered, which likely inhibits them from using their connections to the same extent as those on fixed line or fixed wireless services.

Although we acknowledge that the Sky Muster satellites have constraints, we would encourage NBN Co to continue to explore ways to provide additional value to those on the service, such as improved peak and off-peak times and data allocations. As discussed in Finding 13, NBN Co and other trusted providers should also do more to promote the availability of Sky Muster Plus to regional, rural and remote users to combat misinformation around the service.

Even where data limits or unmetered data are sufficient for data-intensive use-cases, the high latency on Sky Muster may also continue to impede users from fully utilising the service. The two satellites that provide the Sky Muster service are in geosynchronous orbit at a distance of approximately 35,700 km above the Earth, which significantly increases the time it takes for data to travel between the end-user and the wider network. Users report that latency on the service can be as high as 800 milliseconds, which is up to 80 times higher than on the NBN fixed-line network.

While latency has limited impacts on certain online activities, like streaming, low latency is important for a number of common activities that download and upload data simultaneously, like using cloud software, videoconferencing and voice calling. Throughout our consultations, attendees reported issues when using these services over Sky Muster, including frequent connection drop-outs, with impacts on activities like operating booking systems for tourism, using cloud applications and VPN services when working from home, participating in distance education, and attending telehealth appointments.

40 NBN Co, 'Corporate Plan 2021', NBN Co Limited, September 2020. <https://www.nbnco.com.au/content/dam/nbnco2/2020/documents/media-centre/corporate-plan-2021/nbnco-corporate-plan-2021.pdf>



Snow, courtesy of Vivienne Russell

We note that concerns about latency may be impacting the take-up of the Sky Muster service. In a number of areas, particularly the semi-rural fringes of urban centres, communities with existing access to legacy ADSL connectivity over the copper network have been assigned to Sky Muster by NBN Co. Although Sky Muster offers significantly improved speeds than those available on ADSL, some residents from these communities continue to use ADSL due to the cheaper costs, unlimited data allowances and vastly reduced latency on the service.

'The lack of data volume has diminished somewhat ... unless the usage involves video-streaming or use of a Virtual Private Network (VPN). VPN use is likely to become increasingly common, particularly for professional workers ... and ... is bringing data demand challenges for the skymuster service.'

AgForce Queensland submission

We appreciate that latency on satellite services is a difficult problem to solve. As Finding 11 indicates, emerging technology options in the satellite space may offer a vastly improved user experience. However, we also encourage NBN Co to re-evaluate opportunities to transition certain Sky Muster mapped areas, particularly those with ADSL connectivity and already adjacent to the fixed line or fixed wireless footprints, to other technologies which better meet their performance expectations and needs.

Finally, as noted under Finding 4, we have also heard of issues around the reliability of the Sky Muster platform. In particular, satellites are sensitive to climatic conditions, including rain and snow, which can cause signal degradation and drop-outs. Participants in the Review have suggested that this may be compounded by incorrect installation and configuration of end-user equipment (such as roof-mounted satellite dishes), or the use of equipment which is not appropriate for local weather conditions. We would encourage NBN Co to consider this feedback and ways to provide improved reliability on the service.

Finding 10: Current minimum broadband speeds are mostly adequate, but will need to increase over time.

As previously outlined under Finding 8, the demand for data is expected to continue to increase significantly over the next decade as more services move online, and new and existing digital services become more bandwidth-intensive. NBN Co, for example, predicts that customer demand on the NBN will grow by 300 per cent over the next 10 years.⁴¹ While the fixed line NBN services available in urban areas and regional centres are likely to accommodate this digital intensification, we are concerned that users outside of the fixed line footprint who currently receive baseline services through satellite and fixed wireless are in danger of being left behind.

Feedback received during consultations and submissions suggests that available download speeds on the fixed wireless and Sky Muster networks are currently sufficient for most purposes, including streaming. However, regional users have identified that maximum available upload speeds, which are generally around 5 to 10 Mbps, are quickly becoming unsuitable for everyday business activities, including the use of cloud applications and videoconferencing tools while working from home.

'One local government area in particular found they were provisioned with a much higher proportion of lower quality satellite and fixed wireless NBN services. Their analysis found that more than 66 per cent of their NBN connections are fixed wireless and satellite. A survey of businesses in their area found that 90 per cent reported slow speeds and 61 per cent experienced dropouts of service.'

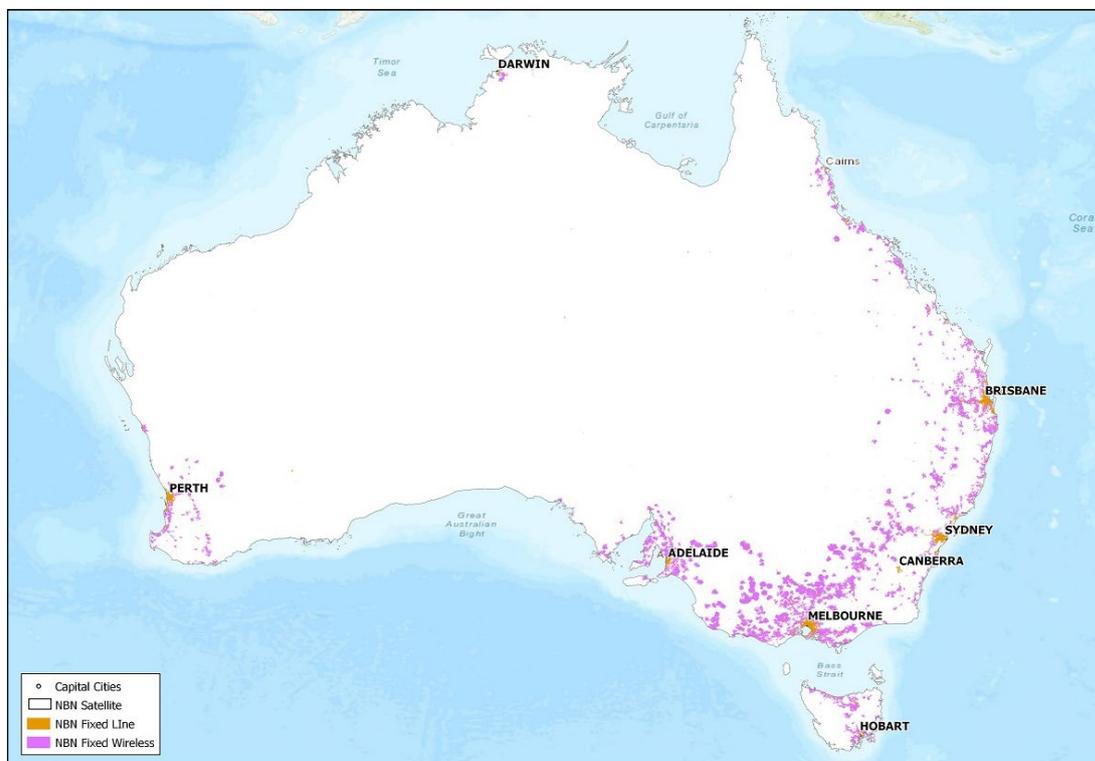
Victorian Government submission

Broadband access is provided to all Australian residences and businesses under the USG, which is underpinned by the SIP regime. The SIP provisions in the Telecommunications Act 1997 (Cth) require NBN Co (as the default SIP), or another wholesale provider designated as the SIP for a particular area, to provide all premises with broadband services that are able to achieve target download and upload speeds of at least 25 Mbps for download and 5 Mbps for upload (25/5 Mbps). Under the SIP regime, NBN Co must also provide at least 90 per cent of premises on its fixed-line networks with access to peak broadband speeds of 50/10 Mbps. There is currently no requirement for a minimum busy hour throughput, which is inconsistent with standard industry practice.

Now that the initial volume NBN rollout has been completed, NBN Co has embarked on an extensive \$4.5 billion investment plan to upgrade the network in anticipation of growing demand. This includes \$3.5 billion in funding to extend fibre deeper into the existing fibre to the node footprint and upgrade capacity on other fixed line technologies, allowing up to 75 per cent of premises and businesses in the fixed line footprint on-demand access to NBN Co's highest wholesale speed plans (up to 1 Gbps) by 2023.

⁴¹ NBN Co, submission, p 19.

Map 4 – NBN fixed line, fixed wireless and satellite footprint



Source: Bureau of Communications, Arts and Regional Research, October 2021

These upgrades are forecast to benefit around 950,000 households and 455,000 businesses in regional Australia on the fixed line network. However, without similar investments across the fixed wireless and Sky Muster networks, the approximately 27 per cent of regional, rural and remote Australians who use these services will be limited to peak download and upload speeds which are far lower than those available to the majority of other users. Increased demand for (particularly upload) bandwidth over time is also likely to cause additional congestion on these networks, leading to a further deterioration in speed and quality.

It should be noted that NBN Co, in collaboration with the Australian, state and territory governments, is making some targeted upgrades in areas outside the fixed line footprint. Through investments such as its \$300 million RCIF and funding awarded through Round 1 of the RCP, NBN Co is undertaking access technology switches in a number of communities across regional, rural and remote Australia (see Case Study 3). These projects are further extending fibre coverage to areas within the existing Sky Muster satellite and fixed wireless footprints, supporting economic and social use-cases and future-proofing against increased data demand.

Case Study 3 – Regional Connectivity Program – NBN technology switches

Under Round 1 of the Regional Connectivity Program, NBN Co was awarded almost \$28 million in Australian Government funding to undertake NBN access technology upgrades in 16 communities spanning all six states and the Northern Territory. NBN Co contributed more than \$23 million in co-funding for these projects, with additional co-funding from local and state governments and other third parties.

Successful projects include:

- Sky Muster to Fibre to the Premises (FTTP) upgrades in the rural Queensland communities of Augathella, Morven, Alpha and Surat
- Fixed Wireless to FTTP upgrades in the six Victorian communities of Birregurra, Hopetoun, Murchison, Rushworth, Teesdale and Timboon, as well as a Sky Muster to FTTP upgrade in Kaniva
- Sky Muster to FTTP upgrades in the Aboriginal communities of Yirrkala (NT) and Halls Creek (WA)
- A Fixed Wireless to FTTP upgrade in the Adelaide Hills community of Lewiston East, and a Sky Muster to FTTP upgrade in Wudinna, South Australia
- A Fixed Wireless to FTTP upgrade in the Huon Valley town of Geeveston, Tasmania
- Sky Muster to FTTP upgrades at two Costa Group hydroponics facilities in Guyra, NSW.

These projects will benefit a number of local industries, including tourism, horticulture, mining, construction, hospitality and the creative industries, as well as providing significantly improved broadband connectivity to an estimated 6,330 premises in regional, rural and remote Australia.

Local communities were heavily involved in applications for RCP funding, supplying information about their digital needs, economic and demographic data, and letters of support from local businesses and residents.

While these co-investment opportunities are welcome, we argue more should be done to ensure existing digital divides between urban, regional, and rural and remote areas are not compounded as both data consumption trends and the NBN itself evolve over time. NBN Co should consider holistic technology upgrades to the fixed wireless network in particular, including exploring methods to make more bandwidth available to users and to extend the reach of the fixed wireless footprint to allow as many Sky Muster users as possible to access faster network speeds.

The Committee also considers that, while the SIP regime provides some certainty around guaranteed speeds for all users, the currently

legislated peak speed requirements cannot be considered a static obligation. We strongly encourage the Australian Government to regularly review the 25/5 Mbps peak speed requirement, as well as the 50/10 Mbps fixed-line target, to ensure that it is fit-for-purpose in line with existing consumer demand and expectations. Where this is not the case, these requirements should be updated to ensure that SIPs are compelled to upgrade their networks.

Finally, we understand the Australian Government has proposed draft standards, rules and benchmarks to enforce the legislative provisions on SIPs and ensure services are connected and repaired in a timely fashion.

The proposed draft includes a requirement for SIPs to ensure peak download transmission speeds reach 25 Mbps at least once per 24 hours. SIPs must also meet a performance benchmark, which requires that 90 per cent of eligible services in each service area meet the speed standard per quarter. There are no requirements for peak upload speed.

We have two major concerns with the proposed standards and benchmarks. Firstly, both the speed standard, as well as connection and fault rectification standards, are benchmarked at the 90 per cent level. This means that, under this regime, it would be acceptable for SIPs to miss these standards for 10 per cent of eligible services per quarter. Our view is that this standard should be set higher, with strong and escalating enforcement in the event of repeat non-compliance. This would help to ensure users have access to reliable services which are appropriate for their needs, and issues are promptly identified and resolved.

Secondly, as noted above, we are concerned that the focus on peak speeds is not consistent with standard industry practice, which focuses on performance during the busiest period of use. Under this framework, SIPs would be meeting their obligations even if peak speeds are reached outside of the periods of highest demand. While, as mentioned under Finding 8, NBN Co has its own minimum 6 Mbps busy hour performance target, this is too low to meet the reasonable expectations of consumers. Any standards imposed on SIPs should mandate a busy hour speed target for both downloads and uploads to ensure services are meeting demand during the periods of heaviest use.

Finding 11: There are emerging technology options to meet the demand for data but their service performance has not yet been validated.

Throughout our consultations, the Committee has heard strong optimism about new technologies and deployment models on the horizon that may help to meet the demand for data in regional, rural, and remote Australia. These include LEO and software defined geosynchronous satellites, 5G cellular services, and LP-WAN.

In particular, many contributors to the Review suggested that LEO satellite services have the potential to significantly transform the regional telecommunications landscape. These satellites orbit much closer to the Earth's surface than geosynchronous satellites like Sky Muster. However, a larger number of satellites is needed to provide consistent connectivity, with LEO satellites operating in constellations often comprising thousands of units. The closer proximity of LEO satellites reduces latency and the sheer number of satellites helps to enable higher capacity and speeds.

The most mature LEO satellite provider is SpaceX, whose Starlink service currently has approximately 1,700 LEO satellites in orbit. Early adopters of the SpaceX Starlink service reporting download speeds of up to 300 Mbps (though this is likely to fall to 150 Mbps as network demand increases), and data is unlimited on the service. Compared to Sky Muster, these stated performance metrics offer improved user experience for data-intensive and real-time applications like videoconferencing, cloud applications, and VPN.

At present, Starlink's beta test program offers broadband services directly to consumers in locations across the southern half of Australia, with other locations expected over the next two years. The Committee understands that Starlink already has a number of active services in Australia, with a substantial number of pre-orders in the pipeline. Internet access to end-users is provided by an antenna terminal which tracks the satellites across the sky. These terminals are designed to support self-install and configuration via a mobile application.

'Starlink is now here in Northern Victoria... So far, the Starlink service is very good, at least five times faster than ... NBN Skymuster.'

Strathbogie Shire Council submission

Other providers, such as OneWeb, Telesat, Omnispace, Echostar and Amazon, are also at varying phases of LEO satellite constellation deployment. In contrast to Starlink, many of these services are intended to provide wholesale backhaul for terrestrial mobile and broadband services. For instance, OneWeb's proposed business model is to provide enterprise services

and backhaul to 'last mile' infrastructure, like fixed wireless and mobile towers, providing comparable backhaul services to fibre but at a reduced cost. This may be beneficial in remote areas where the costs of deploying backhaul are a disincentive for network investment.

LEO satellite technology is promising and could realise a step change in the delivery of services in regional, rural and remote areas. In particular, these services may disrupt existing market paradigms in regional areas by aggregating disparate thin markets into a single global market, challenging incumbent providers.

However, we note that the industry is still in its infancy and services are yet to be deployed at scale. There are also a number of unproven issues around LEO satellite constellations, including service reliability. For instance, the number of satellites in a constellation and the limited anticipated lifespan of each satellite may require providers to constantly deploy new units, increasing costs for providers and end-users. Additionally, end-user terminals remain untested in extreme weather conditions common to the Australian climate, which may impact their reliability. As per other satellites, LEO satellites are also impacted by vegetation, hilly terrain and climatic conditions like heavy rain.

We are also concerned about the significant retail cost of LEO satellite services, without the dedicated end-user support required to assist regional, rural and remote users, as opposed to what is offered by NBN Co on the Sky Muster service. The lack of lower-priced plans may serve to compound digital divides based on socio-economic status, although there may be scope to utilise this technology to support the delivery of 'community-aggregated' services (like community Wi-Fi) in remote communities, especially as data is not metered.

In addition to LEO satellites, there are also ongoing improvements in geosynchronous and mid-earth orbit satellite technologies which also have the potential to deliver increased bandwidth to regional, rural and remote consumers and businesses. Providers like Viasat and Optus have briefed the Committee on the development of new satellites which are

capable of providing ultra-high throughput to support voice and data services. These satellites have higher capacity and are 'software defined', meaning their capacity and power can be remotely configured according to need.

Providers claim that these satellites require reduced capital and operational investment and can operate over a longer term than LEO satellites, though we question this latter claim given that LEO satellite providers plan to regularly refresh individual satellites in the constellation to ensure continuity of service. As raised under Finding 9, the high latency of geosynchronous satellites is also inappropriate for real-time applications, including the reliable delivery of voice services.

Nonetheless, it has been suggested to the Committee a potential future state will involve the complementary and interoperable use of both geosynchronous and LEO satellites based on their respective advantages and the specific usecase. Given the relative lack of maturity in the new satellite technology market, we consider that it is too early to make a definitive call on the role this technology will play in the Australian telecommunications landscape.

Much of the demand for data services in regional, rural and remote areas is being driven by the increasing use of IoT connected devices to assist decision-making and boost productivity in key regional industries like agriculture, manufacturing and mining, as well as to link these sectors into broader supply and value chains. Connected devices like sensors, drones and automated machinery, as well as artificial intelligence and machine-learning, are enabling producers and suppliers to undertake real-time and predictive analytics to improve productivity, manage input costs, comply with industry regulations and improve the traceability of products through supply chains.



© Getty's images

As of June 2020, there were an estimated 4.4 million IoT services in Australia.⁴² The International Data Corporation (IDC) predicts that there will be 55.7 billion connected IoT devices worldwide by 2025, generating almost 80 billion zettabytes of data.⁴³ The Australian Computer Society suggests that by 2050, the average farm will produce 4.1 million data points per day using IoT connected devices.⁴⁴ In order for these smart devices to realise productivity gains and drive growth in regional industries, they require appropriate connectivity options which are able to support the collection, processing and analysis of the data they generate.

LP-WAN are one such emerging connectivity option to support IoT applications. During consultations, the Committee was provided with examples of individual farmers deploying LP-WAN technology, such as Long Range Wide Area Networks (LoRaWAN), across their properties to support use-cases like water tank

monitoring and livestock tracking. The Victorian Government has also deployed LoRaWAN to support trials of on-farm IoT applications.

We also expect 5G cellular technology will play a significant role in meeting the demand for data across Australia, including in regional areas. Compared to 4G LTE, 5G networks offer a number of different capabilities such as Enhanced Mobile Broadband, Ultra Low Latency Communications and Massive Machine Type Communications, as well the flexibility to apply different settings depending on the required circumstances. For example, 5G can be used as a high capacity fixed wireless solution with higher speeds and capacity for residences and businesses, or an IoT solution for agribusiness operations. For consumers in regional and rural areas it will offer applications like streaming and gaming, whereas for businesses it may offer a high performance alternative to wired infrastructure.

42 ACMA, *Communications and media in Australia: Supply and use of services, 2019–20*, p 14.

43 J Hojlo, 'Future of Industry Ecosystems: Shared Data and Insights' IDC Corporate, September 2020. <https://blogs.idc.com/2021/01/06/future-of-industry-ecosystems-shared-data-and-insights/>

44 Australian Computer Society (ACS), 'Australia's IoT Opportunity: Driving Future Growth' PWC Consulting, September 2018. <https://www.pwc.com.au/consulting/assets/publications/acs-pwc-iot-report-web.pdf>

The Australian Government has committed \$20 million to the Australian 5G Innovation Initiative, which is trialling the use of 5G technologies and applications to identify and demonstrate the commercial value of 5G across a number of business sectors, including in regional areas. Funded trials include the deployment of long-range 5G mobile broadband networks across farms, the use of 5G in an underground mine, the use of video streaming and drones by an Indigenous-owned enterprise to care for land and sea country, and the use of video streaming and edge networks to undertake automated livestock counting at a regional exchange.

As mentioned throughout this report, the vast geography of regional, rural and remote Australia makes it challenging to deploy commercial services which meet the increasing demand for data amongst both businesses and individuals. Although many of the emerging technologies and applications highlighted in this finding may deliver improved services for regional users on the fringes of existing coverage or with specific connectivity needs, we note that they also present a degree of financial risk which makes them unlikely to receive funding through existing Australian Government grant initiatives like the RCP.

We consider, however, that there is an opportunity for the Australian Government to explore potential use-cases of new and emerging technologies through a trial initiative, building on the similar initiatives mentioned in this Finding. The trial could explore the application, economic viability and reliability of new technologies, in both retail and wholesale contexts, to identify options for the future delivery of consumer services (including voice), IoT applications, and backhaul for last-mile infrastructure in regional areas. We suggest that these trials should be limited to technologies that have not previously been deployed at scale, and as such, where there is a significant degree of uncertainty about their service performance and overall cost effectiveness.

Connectivity literacy and digital inclusion

Key findings

12. Regional consumers, businesses and local governments experience difficulty in resolving telecommunications issues and providers are not adequately addressing the complex needs of regional users.
Relates to Recommendations: 5, 7
13. Regional consumers, businesses and local government need access to independent advice and improved connectivity literacy to support them in making informed connectivity choices.
Relates to Recommendations: 1, 5
14. Predictive coverage maps and other public information do not accurately reflect on-the-ground telecommunications experience. There is significant misinformation about the availability of telecommunications services.
Relates to Recommendations: 5, 9
15. The cost of telecommunications services remains high for vulnerable groups in remote Australia. This is impacting on their access to essential services.
Relates to Recommendations: 11, 12
16. Continued engagement with Indigenous Australians in regional, rural and remote communities is needed to address ongoing issues of access, affordability and digital ability.
Relates to Recommendations: 5, 11, 12



Courtesy of Regional Tech Hub/Kim Storey Avalind Photography

Connectivity literacy, a concept first developed by BIRRR, refers to the skills and knowledge needed by a consumer to get connected and stay connected to telecommunications services.⁴⁵ It is separate from digital literacy as it is the skills required to navigate through a choice of providers and technologies, understand terminologies, plans and equipment, which are different skills to what are needed to physically use the service for specific activities. For some consumers connectivity literacy is the first step on the path to digital literacy; however, for others, being digitally literate does not necessarily mean that they have the skills to get connected.

Many variables can impact connectivity literacy, particularly for regional, rural and remote users. This includes misinformation and disinformation, inconsistent and complex terminology, and a lack of transparency and support from providers. Additionally, the increasing range of choices in the regional telecommunications market (in terms of both providers and technologies) has

also created a barrier to getting connected, which is exacerbated by a lack of support to empower and upskill regional consumers.

A number of connectivity options, such as NBN, ADSL, mobile broadband and independent fixed wireless, may be available in a particular area. However, these may not be appropriately marketed or understood, and regional consumers may not be aware that they are able to access these services. Additionally, consumers are often not aware of individual factors, such as the physical location, age or type of modems and other devices in the home, which can affect the quality of services.

Digital inclusion encompasses a range of measures which impact on digital participation, including access and use of digital technologies, such as a quality and reliable internet connection and affordable connectivity option relative to other living expenses, as well as the digital literacy skills to confidently navigate the digital world.

⁴⁵ Better Internet for Regional, Rural and Remote Australia, submission, p 8. <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-615-birrr-rtirc-submission-2021-final-app7-redacted-25.10.2021.pdf>

Although there are many highly sophisticated users in regional Australia, levels of digital ability on the whole continue to lag behind metropolitan areas, although this divide is narrowing. Digital ability can be understood as the level of skill and confidence a user has with digital services, as well as the range of activities a user performs online and their attitude towards digital services.

Governments at all levels and community organisations have a range of measures and support for the development of digital literacy skills. However, there has been limited research into or acknowledgement of the role of connectivity literacy. As new technologies and innovation emerge, there is a pressing need for ongoing support to empower people in regional, rural and remote Australia with information and independent advice to make informed decisions about getting connected, staying connected and using their connection.

Finding 12: Regional consumers, businesses and local governments experience difficulty in resolving telecommunications issues and providers are not adequately addressing the complex needs of regional users.

Throughout the public consultation and within submissions, the Committee was made aware that many regional users are dealing with complexities in identifying and resolving service and infrastructure problems. However, the complexity of regional connectivity issues and solutions is not only poorly understood by consumers and regional users, but also by telecommunications providers and customer service staff.

In its submission to the Review, the TIO reports that it received 31,378 complaints from regional and remote Australian consumers in 2020-21, representing 26.3 per cent of total complaints across Australia. This is a small increase compared to 2019-20 levels, but overall

complaints have remained generally stable since 2018-19.⁴⁶ The TIO also identifies that the most common issues reported by regional consumers are 'no or delayed action', 'service and equipment charges', 'no phone or internet service', 'delay establishing a service' and 'intermittent service or drop outs'.⁴⁷

The Committee has heard that customer service staff often do not fully understand problems in a regional context and therefore are unable to provide sufficient support. For instance, the lack of mobile coverage in some areas means that consumers are unable to access SMS messages sent by customer support staff or technicians to arrange appointments or verify account information. Additionally, the vast distances in rural and remote areas can make it difficult and time-consuming for consumers to travel to the nearest IT support or retail store, which is often recommended by support staff.

The availability of different service technologies adds complexities for service providers and users. The lack of knowledge regarding, and accountability for, regional issues from providers requires consumers to repeatedly log faults with call centre staff and deal with multiple visits from technicians. Moreover, the onus is often placed on the consumer to extensively fault find and follow up issues, particularly in more remote areas where there may not be readily available skilled technicians to attend premises for troubleshooting.

'I've been having problems with my mobile phone and internet since approx last New Year ... I rang and complained to Telstra and was told they were upgrading in the area. This went on for approx. 6-7 weeks. I rang Telstra again and was told that [it] would be approx. another 2 months. They gave me 2 months credit on my account without being asked for credit.'

Lynda Bower submission

⁴⁶ TIO, submission, pp 4-5.

⁴⁷ TIO submission, p 6.

Regional consumers' difficulties in raising and rectifying poor telecommunications are compounded by a lack of appropriate diagnostic tools to identify specific technical issues. The Committee has heard that consumers on multiple NBN access technologies, including Sky Muster, fixed wireless and some fixed line technologies, do not always have ready access to service performance data through their Network Termination Device (NTD). It is our view that consumers would benefit from greater access to simple, streamlined diagnostic tools (such as a 'traffic light' system) to enable them to identify, escalate and rectify faults with their provider and NBN Co.

An additional complexity is limited coordination and accountability between NBN Co and RSPs to identify and resolve problems. We received reports from regional consumers who had been advised by their RSP that their connectivity problems were network-side issues which NBN Co is responsible for addressing. Conversely, when contacted directly, NBN Co generally advises consumers that network issues are the responsibility of RSPs to address, consistent with its role as a wholesale provider. Consumers have told the Committee that identifying the cause of poor service between NBN Co and RSPs can take months, without clear resolution. We have heard that, instead of endless blame-shifting, regional users just want a reliable and a working internet service, no matter who is responsible for it.

'The problem is the providers pass the issues off saying it is related to NBN and they have to wait for infrastructure improvements ... The providers send you crazy by fobbing you off to overseas call centre staff and waste hours of your ... time ... and ... you can't get through to them [NBN Co] to even lodge a complaint.'

Name withheld submission

We were advised of multiple instances where consumers' difficulties resolving simple issues took excessive time, commitment and persistence. As a last resort regional consumers have been forced into contacting the TIO or their local Member of Parliament for their issue to be fixed. However, even then, timeframes to repair issues can be lengthy and, although consumers are offered compensation, the issues often reoccur and may require repeated escalation. As a result, people are often left fatigued from trying to address their problems, resulting in them giving up on finding a solution and living with less than optimal telecommunications.

'We have spent countless hours on the phone to our internet service providers ... hours to Telstra trying to fix poor mobile phone coverage, have spoken to local MPs, ombudsman and BIRRR Australia. I have pages and pages of speed tests and ping tests ... Things seem to forever go around in circles.'

Karin Stark submission

Given the different needs for regional users, the Committee encourages telecommunications providers to put in place systems that allow people calling from regional, rural and remote areas to directly access customer support services that are appropriately equipped to address regional and remote connectivity issues. This includes having an understanding not only of the technology that services regional Australia, but also of the specific issues that impact people living and working in the regions.

Finding 13: There is significant misinformation about the availability of telecommunications services. Regional consumers, businesses and local governments need access to independent advice and improved connectivity literacy to support them in making informed connectivity choices.

One of the largest challenges faced by consumers is the large number of myths that persist about telecommunications services in regional, rural and remote areas, spread by inaccurate or misleading information. The Committee was made aware during the public consultations of a number of inaccuracies related to the delivery of NBN services in particular. These include users being told that the NBN is not available in their area (despite the ubiquity of Sky Muster), or alternatively, that it is compulsory to move to the NBN in areas served by ADSL. Consumers are not always informed or well-supported enough to challenge inaccurate information, and this impacts on the decisions they make.

Under the Australian Consumer Law, it is unlawful for businesses to make false or misleading claims about products and services.⁴⁸ Similarly, the Telecommunications Consumer Protections Code (TCP Code) sets out an obligation on telecommunications providers to engage in 'open, honest and fair dealings' with consumers and to provide them with 'clear, accurate and relevant information on products and services'.⁴⁹ In individual instances of misleading practices, consumers are able to seek remedy through the TIO and other mechanisms.

However, where consumers are not sufficiently well-informed to challenge inaccurate information, they may not seek such remedies. In some instances, the ACCC has brought court proceedings against providers after investigation into possible misleading or unconscionable practices. The Committee would encourage the ACCC to continue to make enforcement of misleading and deceptive disinformation in the telecommunications industry a priority, particularly in relation to claims around the availability of NBN services.

The regional telecommunications market is highly complicated and consumers need to be educated and empowered on the technologies and packages available to them to meet their telecommunications and affordability needs. This includes knowledge about existing products and how best to use them, an understanding of regional telecommunications infrastructure and ensuring regional consumers, businesses and local governments are able to access independent information on emerging developments and available connectivity options.

'We are expected to navigate through a language of fixed wireless, wireless local loop, latency, bandwidth, low orbit satellites, capacity, frequency, to understand the difference between each alliteration of each new innovation ... to find the best solution for ourselves.'

Sarah Thompson submission

⁴⁸ Australian Consumer Law, 'Avoiding unfair business practices: A guide for business and legal practitioners', Commonwealth of Australia, March 2016. https://consumer.gov.au/sites/consumer/files/2016/05/0553FT_ACL-guides_UnfairPractices_web.pdf

⁴⁹ Communications Alliance, 'Industry Code: Telecommunication Consumer Protections code', July 2019. https://www.commsalliance.com.au/_data/assets/pdf_file/0011/64784/TCP-C628_2019.pdf

Further, the Committee has also heard of the considerable challenges experienced by small businesses in accessing appropriate connectivity options and digitising their business, particularly in response to COVID-19.

The Committee considers regional consumers and businesses are not adequately supported to navigate an increasingly complicated telecommunications market and there is a continued need for independent advice from a trusted and well-resourced source. Regional users often refer to larger and incumbent providers as the main source of information, reflecting their historical position in the market. However, as commercial entities, these providers are not always in a position to provide independent advice. For example, Telstra and Optus are not retail providers of Sky Muster services and therefore do not actively promote this service, which may be the best option for the consumer.

If a consumer is mapped for nbn satellite and enters their address into the Telstra nbn mapping system, they are pushed to a mobile broadband connection (if they have mobile coverage) or a satellite phone (if they have no mobile coverage) ... Likewise, misinformation is equally available from other larger providers who don't sell nbn satellite or nbn fixed wireless products.

BIRRR submission

It is the Committee's view that we could achieve much better outcomes with existing infrastructure if consumers were better informed about the options available to them. There is need for greater education about the diverse telecommunications options available to regional users to reflect different information needs and support.

The 2018 Edwards Review recognised the significant challenges faced by regional consumers in accessing independent factual connectivity information and recommended an independent technology hub be established. This recommendation was accepted by government and the Regional Tech Hub has been in operation since December 2020. The Regional Tech Hub provides independent, free advice about telecommunications services to help regional Australians navigate the complex landscape of getting and staying connected across all technologies.

It is the Committee's view that improving connectivity literacy requires more than improving access to technology and provision of information on how to use it. Consultation participants noted that grassroots engagement with regional consumers, such as that previously provided by BIRRR on a volunteer basis, is still greatly needed.

It is the Committee's view that expanding the work and resourcing of the Regional Tech Hub, including through proactive regional engagement, will help it to become an information hub for regional telecommunications, enabling consumers to get and stay connected. The Regional Tech Hub needs to incorporate a variety of additional activities, skills and experience to support regional connectivity and meaningfully connect with its target audience.

As identified under Finding 2, there may be a role for the Regional Tech Hub in supporting local governments and regional stakeholder organisations to identify and understand the connectivity options available to them and their communities. The governance framework of the Regional Tech Hub should also be updated to include an expert advisory panel with appropriate experience across regional telecommunications, regional development and engagement.

There is also a role for both the telecommunications industry and other industry sectors in supporting connectivity and digital literacy advice at a sector level to address specific industry needs, respond to digital knowledge gaps and build upon sector strengths in key regional industries.

We note some examples of this as provided in submissions from Telstra and NBN Co. For instance, Telstra reports its work with AgriFood Connect, an industry-led collaboration network focused on the commercialisation and adoption of advanced digital technologies like IoT and 5G in the agricultural supply chain. This includes the planned development of an open Advanced Technology Solutions Centre in Toowoomba, as well as the delivery of educational programs to build digital skills within the industry.⁵⁰

NBN Co has also developed and expanded its Regional Development and Engagement (RDE) business unit, including through its NBN Local community engagement team. NBN Local operates in 22 regions across regional, rural and remote Australia, fostering community stakeholder relationships, demonstrating the application of NBN services, and providing community support following natural disasters. The RDE also comprises the NBN Segments team, which develops industry partnerships in regional economic sectors like agriculture, health, education and the arts.⁵¹

We welcome these initiatives, and have seen some evidence of the work of Telstra and NBN Co's regional teams during our online consultations. We would encourage these and other industry participants to continue to build these relationships and programs to develop the connectivity and digital literacy of regional communities and industries.

Finding 14: Predictive coverage maps and other public information do not accurately reflect on-the-ground telecommunications experience.

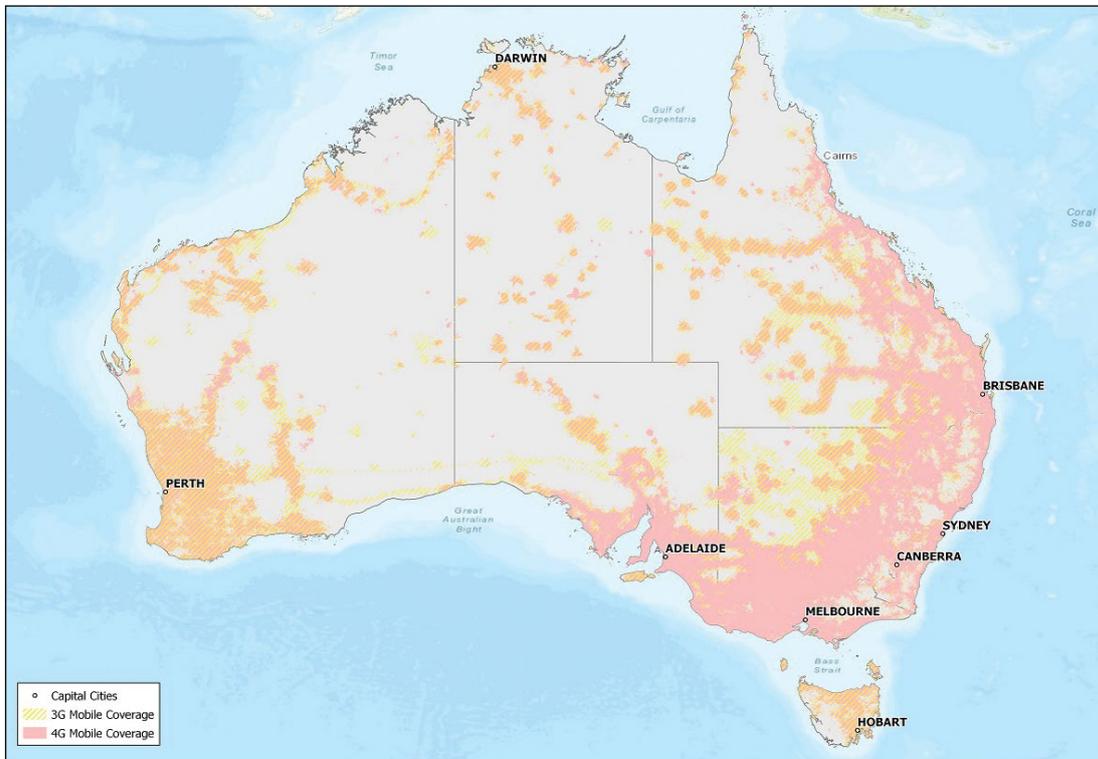
In order to improve the level of connectivity literacy in regional, rural and remote Australia, the Committee considers that there is a need for greater public visibility regarding the 'on-the-ground' availability and performance of voice and data networks. Access to accurate information assists consumers, businesses and other organisations to make informed decisions on appropriate connectivity options for their needs.

The Committee has heard from a number of participants in the Review that the network coverage information provided by mobile network operators in particular remains inaccurate to the 'real world' experience of regional consumers. Many submissions to the Review highlighted instances where a provider's public coverage map indicated that consumers should expect good levels of service on a network, even though mobile reception was limited or non-existent.

⁵⁰ Telstra, submission, p 34.

⁵¹ NBN Co, submission, pp 8-10.

Map 5 – 3G and 4G mobile coverage – all providers



Source: Bureau of Communications, Arts and Regional Research, October 2021

Some organisations, such as the Far North Queensland Regional Organisation of Councils, provided the Committee with data from independent 'on-the-ground' audits of mobile coverage in their respective regions. In many instances, this data was vastly different to the information available on the mobile network operators' websites. This phenomenon was also raised by the Victorian Government, which noted that its Regional Digital Plans frequently identified discrepancies between areas identified on coverage maps as well-served and the unreliable or patchy coverage reported by local users.

We note that coverage data is predictive, meaning it uses a number of technical assumptions to indicate the likely areas to receive coverage from nearby base stations and may not accurately reflect a user's actual coverage experience. As noted earlier in this report, mobile coverage can be influenced by a number of physical and technical factors that impact the ability to obtain and use a mobile signal in a given location.

However, given the importance of mobile coverage and the costs associated with telecommunications services, consumers need to be able to access granular, accurate coverage information. This information is also crucial for government, the telecommunications industry and other stakeholders in developing and implementing measures to substantively improve telecommunications services in regional, rural and remote areas.

A separate but similar issue is the level of consistency between the coverage information published by competing providers. The Committee understands that different providers use different technical assumptions, mapping technologies and data standards to generate predictive coverage mapping. This can make it difficult for consumers to accurately compare the coverage provided by one mobile network operator over another and to make informed choices about the best mobile service for their individual circumstances.

In 2018, the ACCC convened a Regional Mobile Issues Forum, which recommended that the mobile network operators improve mobile coverage information for consumers. In response, the major mobile network operators and the Australian Mobile Telecommunications Association committed to improve the comparability of their network coverage data, including by adopting consistent terminology around indoor and outdoor mobile coverage.

However, based on the feedback we have heard during this Review, the Committee considers that more remains to be done to standardise the technical inputs mobile network operators use to generate predictive coverage and determine whether it is 'good'. Promoting public maps that provide a consistent picture of available coverage and consistent terminology to describe coverage outcomes will improve choice and competition for consumers in areas with coverage from multiple providers. This will also encourage providers to invest in their networks to address coverage gaps.

Elsewhere, the Committee has heard that coverage and performance data on other networks is not always available, contributing to perceptions around a 'patchwork quilt' of connectivity and impacting consumers' ability to make informed connectivity choices. While NBN Co provides mapping of its fixed line, fixed wireless and satellite networks on its website, we have heard about instances of addressing issues which can create a barrier to getting connected. Many other fibre and fixed wireless providers do not provide any public coverage data, even where their networks have been subsidised under government funding programs.

While there may be commercial considerations behind such decisions, we consider that these providers should be encouraged to publish coverage information. This will help consumers to more easily identify whether a particular alternative service is available in their area. As raised under Finding 2, the Committee also encourages government and industry to increase the amount of readily accessible public information about the availability and capacity of fibre backbone networks to assist investment decisions and policymaking.

There is a need to increase the transparency and utility of network coverage information by collecting standardised coverage data from providers and collating it into a publicly accessible tool which allows consumers, businesses and policymakers to view and compare the availability and performance of voice and data services in regional areas. The Committee notes the ongoing work undertaken by the United States Federal Communications Commission (FCC) to develop mapping of both fixed broadband and mobile LTE coverage under the *Broadband DATA Act*.⁵² We consider that an approach similar to that undertaken by the FCC should be investigated, and if applicable, funded by the Australian Government to empower consumers and provide governments with data to better inform policy and program decision making.

'[The Australian Government should] develop a national telecommunications map, depicting mobile, broadband and trunk coverage, including network capacity using available data sets.'

Northern Territory Government submission

⁵² FCC, 'Mobile Broadband Maps' August 2021 <https://www.fcc.gov/BroadbandData/MobileMaps>

'It would be useful if the Commonwealth launched an ... online tool to permit end users to explore, investigate and choose services that match their needs ... which permit non-technical users to make informed, neutrally recommended choices.'

WA Department of Primary Industries and Regional Development submission

Where coverage data is made publicly available, it should also be regularly updated as networks are upgraded and contested against 'on-the-ground' performance data. The Committee notes the 'crowd-sourced' mobile network performance data collated by the OpenSignal company via its mobile app and considers that the Australian Government could use a similar methodology and tool to undertake an investigation and audit on mobile network coverage and throughput in regional, rural and remote Australia.

It is the Committee's view that the measures identified above will improve transparency and support consumers to make informed choices, based on coverage and network performance. The Committee is also aware that many regional users feel overwhelmed by this level of information and are seeking a consumer-level comparison of retail packages and providers. As a third step to supporting provision of transparent information, we suggest the Australian Government investigate the benefits of developing an online consumer tool that could compare plan features, prices and other service offerings between RSPs.

Finally, we positively note the role played by the MBA program, overseen by the ACCC, has played in measuring and publishing data on the performance of the NBN fixed line and fixed wireless networks. The MBA has been an important step in improving the availability and comparability of information on broadband performance for consumers, enabling them to make more informed decisions.

Consistent with feedback from regional stakeholders, during the course of this Review, the Committee has raised with the ACCC the possibility of also monitoring Sky Muster satellite performance through the MBA program. In its submission, the ACCC has argued that satellite monitoring is not feasible for a number of reasons, including the data impost on the network required to measure performance, the low user base of the Sky Muster service, and the distortionary impact that individual factors can have on satellite performance. While we consider this option should still be pursued, we accept the ACCC's suggestion that NBN Co be required to provide more transparent reporting of network performance on Sky Muster.

Finding 15: The cost of telecommunications services remains high for vulnerable groups in remote Australia. This is impacting on their access to essential services.

The concentration of low-income households in regional Australia makes the affordability of telecommunications services a key barrier to digital inclusion. The 2021 Australian Digital Inclusion Index (ADII) found that 47 per cent of the regional population are impacted by the affordability of telecommunications services, compared to 35 per cent of the metropolitan population.

Further, regional Australians are paying a higher proportion of their income on telecommunications, with 33 per cent of the regional population paying up to 10 per cent of their household income, compared to 21 per cent of metropolitan population.⁵³

53 J Thomas, J Barraket, S Parkinson, I Holcombe-James, C Wilson, J Kennedy, K Mannell, A Brydon, submission, <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-530-centre-of-excellence-for-automated-decision-rmit.pdf>

'The digital divide in remote Australia is widening. As most Australians are experiencing unprecedented advantages from engagement in an 'online world' remote residents are becoming more and more isolated and disadvantaged by their inability to keep up with the pace of change.'

RDA NT submission

'My yearly outgo for water and sewerage is a little above \$900, council rates around \$700 whilst house insurance stands at \$400 and car insurance ... above \$630. My electricity bill stands at a very modest \$265 ... My annual outgo for telecommunications however amounts to a staggering \$1260 ...'

Rienk van der Woude submission

Affordability issues have been exacerbated by the impacts of COVID-19. The increased delivery of previously face-to-face services such as healthcare and education online required regional users to purchase new or additional devices and plans to facilitate these activities, at additional upfront or ongoing cost. Over half of regional internet users reported new or increased study from home activities, and four in five started or increased their participation in telehealth consultations.

In its submission to the Review, the Good Things Foundation Australia noted that 75 per cent of its community partners reported having learners in their communities without access to devices and data at home during the lockdowns.⁵⁴ While both community organisations and state and territory governments loaned devices to specific cohorts like older Australians and students, the cost of additional devices, as well as the impact of lockdowns on regular income for many Australians, has impacted the ability for regional users in getting and staying connected.

The Committee has heard that affordability remains a key concern for many satellite users in particular. As discussed under Finding 9, many satellite users were already working, educating and running small businesses from home even before COVID-19. Many of these users consider that the standard Sky Muster service is too limited to be an affordable option, particularly due to on- and off-peak data restrictions.

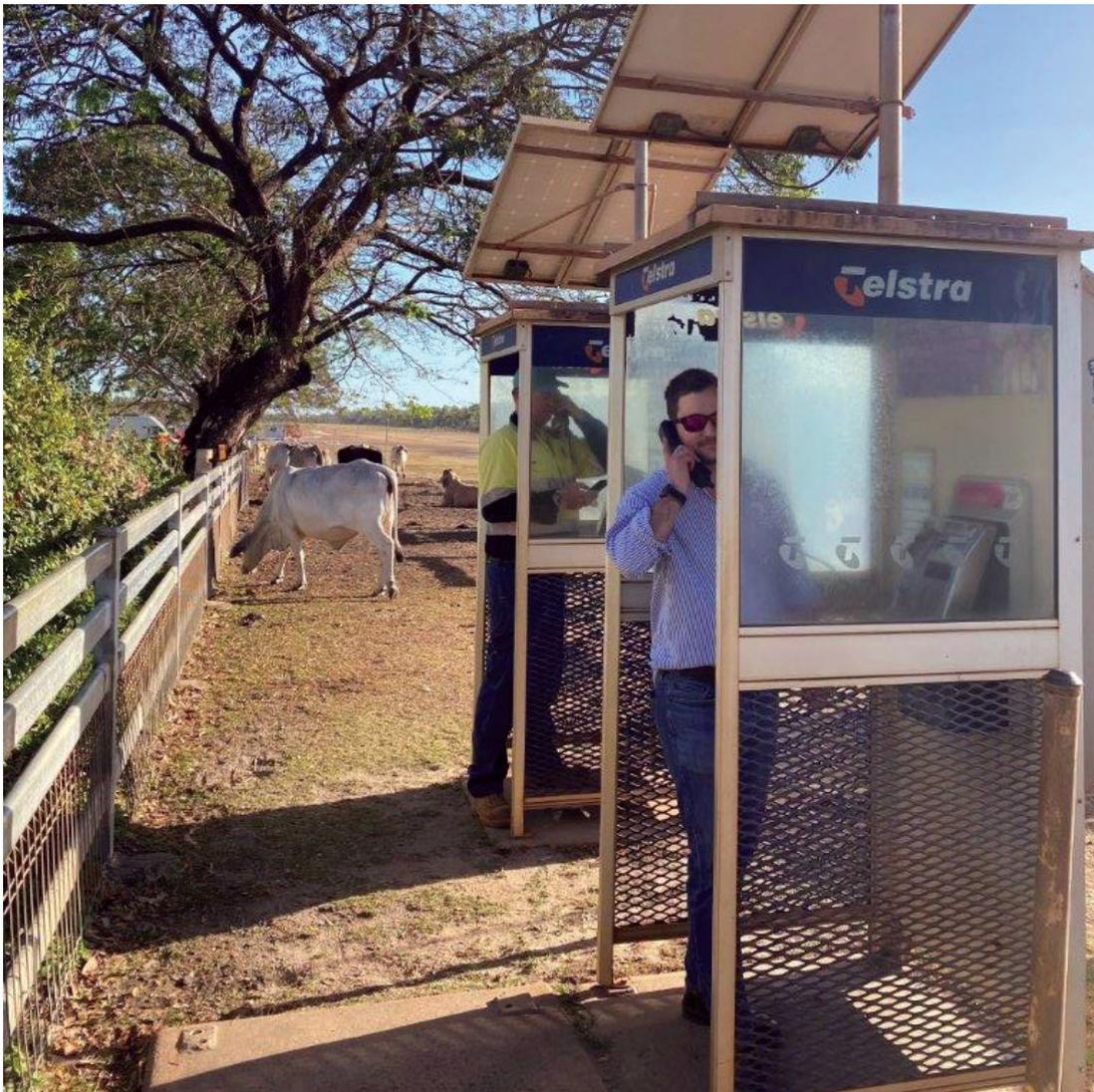
As such, many users in the satellite footprint purchase additional or alternative telecommunications solutions – mainly mobile services (where available) – which add to the total cost of telecommunications and may be less affordable per GB of data. While the introduction of Sky Muster Plus has improved the affordability of broadband data over satellite by providing unmetered access to most online activities (except for streaming and VPN), many users may not be aware of this option. Additionally, not all Sky Muster providers retail the Plus product or mention its availability, which can contribute to confusion and reduce the uptake of the service.

In its submission to the Review, ICPA also raised the need for affordable 'mobility' broadband products for transient families who work across large rural and remote areas and require access to internet services for distance education and business purposes.⁵⁵ We understand that, working with BIRRR and ICPA, NBN Co recently trialled a 'Comms on the Pause' product using the NBN Business Satellite Service platform. We would encourage the Australian Government to monitor this space and to consider the need for subsidies on equipment and plan costs if these prove to be prohibitively expensive for itinerant families.

The Committee also heard that a number of other issues are impacting on the cost of fixed connections, particularly for those experiencing patchy coverage from fixed wireless or mobile networks. In order to optimise their connectivity, many of these users are required to pay for nonstandard infrastructure installations or additional devices such as antennas and boosters at significant upfront cost. This cost may prevent regional users from maintaining

⁵⁴ Good Things Foundation Australia, submission, p 7. <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-576-good-things-foundation-australia-redacted.pdf>

⁵⁵ Isolated Children's Parents' Association (ICPA), submission, p 2. <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-583-icpa.pdf>



Telstra phone at Musgrave (Qld), courtesy of Georgie Somerset

multiple redundant telecommunications services, and many regional users rely on mobile services only.

Mobile coverage will never be ubiquitous, and there is likely to be always a need for mobile extension equipment at the edge of mobile coverage. As such, some stakeholders have suggested to the Committee that the Australian Government could subsidise the costs of network extension devices. However, given the current limitations of mobile coverage tools, we are concerned that we would be encouraging the purchase of equipment in areas where it would not work. Submissions indicate a number of examples of this occurring. In addition, we

would be concerned about a subsidy pushing traffic onto networks that are already congested. The issue could be re-examined in the future if both these issues are resolved.

Where consumers maintain multiple services for redundancy, the complexity of regional communications technologies delivered through multiple services and providers increases costs. For example, a number of major telecommunications providers do not offer Sky Muster satellite services on their networks. This means that Sky Muster users with other services from these providers, such as landlines or mobiles, are unable to 'bundle' services to access discounts like urban consumers can.

In a number of rural and remote areas, users may also not be able to access the full extent of mobile network operators' network coverage when utilising plans from mobile virtual network operators (MVNOs) like Amaysim or ALDI Mobile. These providers resell services using the major network operators' wholesale mobile networks, and their reduced overheads enable them to provide plans which are often more competitively priced than standard plans offered by the major network operators. During the consultations, the Committee observed that many users are also not aware of MVNO services, reflecting the incumbent regional market advantage of major network operators.

With this in mind, the Committee is concerned that the ongoing and ever-increasing digital shift to online services will disadvantage vulnerable cohorts. This disadvantage will increase as a large number of government and non-government services and support measures move to a predominately online format. We are particularly concerned the impact it will have on low-income earners, those in receipt of income support and those in remote locations where alternative face-to-face services are only available hundreds of kilometres away or through occasional outreach services.

The Committee has heard that a number of low-income earners, particularly students and people renting or otherwise transient, rely predominately on prepaid mobile data for connectivity access. While this enables them to manage their digital expenses according to what they can afford, mobile data charges can be more expensive and, especially in remote areas, there are many areas with no coverage, resulting in no digital access. The Committee is aware that one approach to addressing this is greater investment in public Wi-Fi. However, it is not always practical or possible to travel to public Wi-Fi hot spots to undertake digital transactions, particularly in areas outside of larger regional centres, especially remote communities.

The main mechanism to access Australian Government digital services is through myGov. Nationally there are over 22 million accounts and 15 member services.⁵⁶ In May 2021, the Government allocated \$200.1 million over two years to design and deliver the Enhanced myGov Program making it quicker and more cost effective for government to deliver services. To support seamless service delivery the Australian Government is working with State and Territory Governments to identify opportunities to link member services with myGov.

A further example of the digitalisation of services, including to the most disadvantaged in the community, is digital delivery of employment services. The new employment services model, commencing on 1 July 2022, will enable job-ready job seekers to self-manage access to employment skills and training opportunities. This will allow for increased investment to be targeted to job seekers most in need, who will be supported by Enhanced Services providers. Stakeholder consultations with representatives from the Department of Education, Skills and Employment indicated that, due to COVID-19, a significant number of job seekers had moved to digital servicing.

It is the Committee's view that platforms like myGov provide regional, rural and remote Australians with equivalent access to services to those living in capital cities and so should be made broadly available to consumers. With this in mind, we consider that data charges incurred when using these digital services should be removed for low-income and income support recipient consumers in regional areas to enable more affordable and equitable access to these services. We also encourage Australian, state and territory governments to maintain their commitment to providing alternative service delivery mechanisms where there is no digital access.

⁵⁶ myGov member services include: Australian JobSearch, Australian Taxation Office, Centrelink, Child Support, Department of Health Applications Portal, Department of Veterans Affairs, Housing Victoria Online Services, Individual Healthcare Identifiers Service, Medicare, My Aged Care, My Health Record, National Cancer Screening Register, National Disability Insurance Scheme, National Redress Scheme, and the State Revenue Office Victoria. (Source: Australian Government, About myGov [website], n.d. <https://my.gov.au/mygov/content/html/about.html>)

'Government should be subsidising data to provide free access to essential services for people living in remote communities who are disadvantaged by distance ... There should be no data charges to access education services, Government services, essential information services such as First Nations media or commerce services.'

First Nations Media Australia submission

Consumer stakeholders like the Australian Communications Consumer Action Network (ACCAN) have also suggested to the Committee the possibility for NBN Co to develop an affordable home broadband product for low-income households on a targeted concessional basis. The absence of such a product has been an issue for a number of years. In its submission, NBN Co notes that it provided a Temporary 5GB+ Plan on its Sky Muster Plus service during the COVID-19 pandemic between April 2020 and January 2021. This involved a 100 per cent discount offer to RSPs to support them to offer affordable broadband services to low-income families, though it was only available for new installations.

The form of a low-income product is reportedly being considered as part of a broader ACCC consideration of access arrangements but should be put into place before the conclusion of that exercise. Given the importance of digital access, especially for low-income users in rural and remote areas, we recommend that NBN Co finalise permanent measures to develop a subsidised high-speed product across all its access technologies as a matter of urgency.

Finding 16: Continued engagement with Indigenous Australians in regional, rural and remote communities is needed to address ongoing issues of access, affordability and digital ability.

The Committee is aware that Indigenous Australians have lower levels of digital participation than the Australian population due to a combination of factors. These include more limited access to infrastructure, the affordability of telecommunications services, and reduced levels of digital skills and confidence. Moreover, in recognition of the importance of digital inclusion to Indigenous Australians' economic, social and cultural wellbeing it has been incorporated into the Closing the Gap Priority Reforms.

Closing the Gap

Priority Reform 4 – Aboriginal and Torres Strait Islander people have access to, and the capability to use, locally-relevant data and information to set and monitor the implementation of efforts to close the gap, their priorities and drive their own development.

Outcome 17 – Aboriginal and Torres Strait Islander people have access to information and services enabling participation in informed decision-making regarding their own lives

Target 17 – By 2026, Aboriginal and Torres Strait Islander people have equal levels of digital inclusion.⁵⁷

Source: Closing the Gap National Partnership Agreement

The ADII identifies the digital gap between Indigenous Australians and the national average has increased by 2.6 points between 2018 (5.2 points) and 2020 (7.8 points).⁵⁸ An estimated 30 per cent of remote and very remote Indigenous people do not have household telephone or internet access.⁵⁹ In some remote Indigenous communities most people do not have the option of home schooling, working from home, or accessing

⁵⁷ Closing the Gap, 'National Agreement of Closing the Gap: Priority Reform' Commonwealth of Australia, July 2020 <https://www.closingthegap.gov.au/national-agreement/priority-reforms>

⁵⁸ J Thomas, J Barraket, CK Wilson, I Holcombe-James, J Kennedy, E Rennie, S Ewing and T MacDonald, 'Measuring Australia's Digital Divide: The Australian Digital Inclusion Index 2020', RMIT and Swinburne University of Technology, Melbourne, for Telstra, October 2021 <https://apo.org.au/sites/default/files/resource-files/2020-10/apo-nid308474.pdf>

⁵⁹ Dr D Featherstone, 'Remote Indigenous Communications Review Telecommunications Programs and Current Needs for Remote Indigenous Communities', ACCAN, October 2020 https://accan.org.au/files/Reports/ACCAN_Remote%20Indigenous%20Communications%20Review_.pdf



Kindy via Sky Muster, courtesy of Kristy Sparrow

basic services online due to cultural and affordability barriers.

'Our communities (Indigenous) are internet-savvy, but because of the failures in the delivery of telecommunications in our region, a smaller number of households have internet access compared to the rest of Queensland.'

Torres Shire Council submission

As noted previously, COVID-19 has accelerated long-standing digital service delivery trends. At the same time, however, it has also restricted alternative delivery options in many remote communities. These include restriction in movement both into and out of community; and, where communities are not self-sufficient, difficulties sourcing external providers and qualified staff. To benefit from digital service delivery, such as through myGov, requires digital access, skills and confidence; awareness of online services; and English literacy.

There are also significant social, cultural and economic factors which limit Indigenous Australians' digital participation, including confidence that information will be appropriately managed.

The public consultations indicated there are significant challenges to achieving greater Indigenous digital inclusion and include provision of telecommunications infrastructure in remote communities. The Committee is aware that in many remote Indigenous communities (and low-income households) the preference is for pre-paid mobile service, followed by community Wi-Fi.⁶⁰

Mobility is an important criteria for many Aboriginal and Torres Strait Islander people. Moreover, many Aboriginal and Torres Strait Islander people are reluctant to invest in household connections, particularly where housing overcrowding is a factor, there are concerns about financial commitment and an inability to control usage and therefore manage costs.

⁶⁰ First Nations Media, submission, p 9. <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-549-first-nations-media-australia.pdf>

The 2018 Edwards Review recognised the significant need to improve Indigenous digital access, affordability and ability in partnership with Indigenous communities. As such, an Indigenous Digital program was recommended. The Australian Government agreed -in-principle with this recommendation, however this has been slow to progress. Through the Closing the Gap National Partnership the Commonwealth will work in partnership with Aboriginal and Torres Strait Islander people and organisations to develop an Indigenous Digital Inclusion Plan. The Australian Government is also working to identify gaps in current efforts, including improved data collection. We consider that the Indigenous digital inclusion plan will play a key part in this measure.

In relation to infrastructure provision and access, some steps have been taken to improving mobile coverage in many remote communities, including through the MBSP. This has included the deployment of mobile micro-cells which resulted in significantly increased mobile use in some communities. The RCP is also expected to benefit remote communities through projects such as fibre backbone being delivered across Arnhem Land, including the upgrading of services in Yirrkala from Sky Muster to NBN Fibre to the Premises, as well as a partnership between Activ8Me and the Western Australian Government to provide community Wi-Fi and VoIP phone services in Kalumburu and Jigalong.

Other initiatives such as the Community Phones Program, and various programs to provide shared Wi-Fi services and access facilities have contributed to improved connectivity in remote Australia. The National Indigenous Australians Agency maintains about 245 payphones in the small communities. NBN Co also supports about 100 Indigenous communities to access services over the Sky Muster satellite through its Public Interest Premise program.⁶¹ The program supports public Wi-Fi through community centres and enables purchase of data by users through a voucher system. There are also a number of initiatives being deployed at the State and Territory level.

The Committee is aware that the increased availability of infrastructure in some remote communities, there are still significant gaps in access and usage due to issues of affordability, lack of 'last-mile' delivery or community access facilities, lack of devices and awareness and confidence in accessing digital services. Together these act as barriers to engagement with online services and economic participation.

There are, however, a number of initiatives to improve digital skills amongst Indigenous people, including inDigiMOB, a partnership between First Nations Media Australia and Telstra which seeks to improve digital inclusion in remote Northern Territory communities. It does this by forming partnerships with communities and local organisations and making available a suite of resources.

61 First Nations Media, *submission*, p 8.

Case study 4 – Northern Territory Government

The Northern Territory is investigating the use of NBN satellite services and other technologies to meet the technical requirements for service delivery in remote communities with an approach that puts end-user needs first. This will require installations in remote communities to be:

- **Wireless** – Services must use access devices that are portable and solves issues of unapproved access to the service resulting in unexpected cost or data use.
- **Pre-paid** – Plans that allow users to be in control and easily manage usage. This resolves debt issues where costs can be incurred that cannot be repaid.
- **Data and Voice capable** – Dual requirements to be delivered from single solution.
- **Transportable** – must also be functional in other communities and prevent a need for dual devices.
- **Price equivalency or better** – Mobile services are nationally priced and voice services in remote areas need to meet the benchmark customer pricing.
- Commercial viability – must be delivered on a long-term basis.
- **Resiliency** – Reliability must be built into the service and repair and maintenance programs.

Source: Northern Territory Government submission

These resources include technical, training and infrastructure support around digital technology and the online world. It aims to establish a network of local digital mentors; improve digital literacy through workshops and training; support connectivity solutions; provide technical advice; and develop appropriate and relevant learning tools. InDigiMOB emphasises informal, peer-to-peer learning that values the experiences and knowledge of Aboriginal and Torres Strait Islander people.

The Committee considers that, when identifying strategies to achieve Closing the Gap Target 17, the Government should consider expanding existing programs such as inDigiMOB and support community lead responses to digital literacy.



Courtesy of Kristen Coggan, Condamine QLD

Appendix 1 – Public Consultation

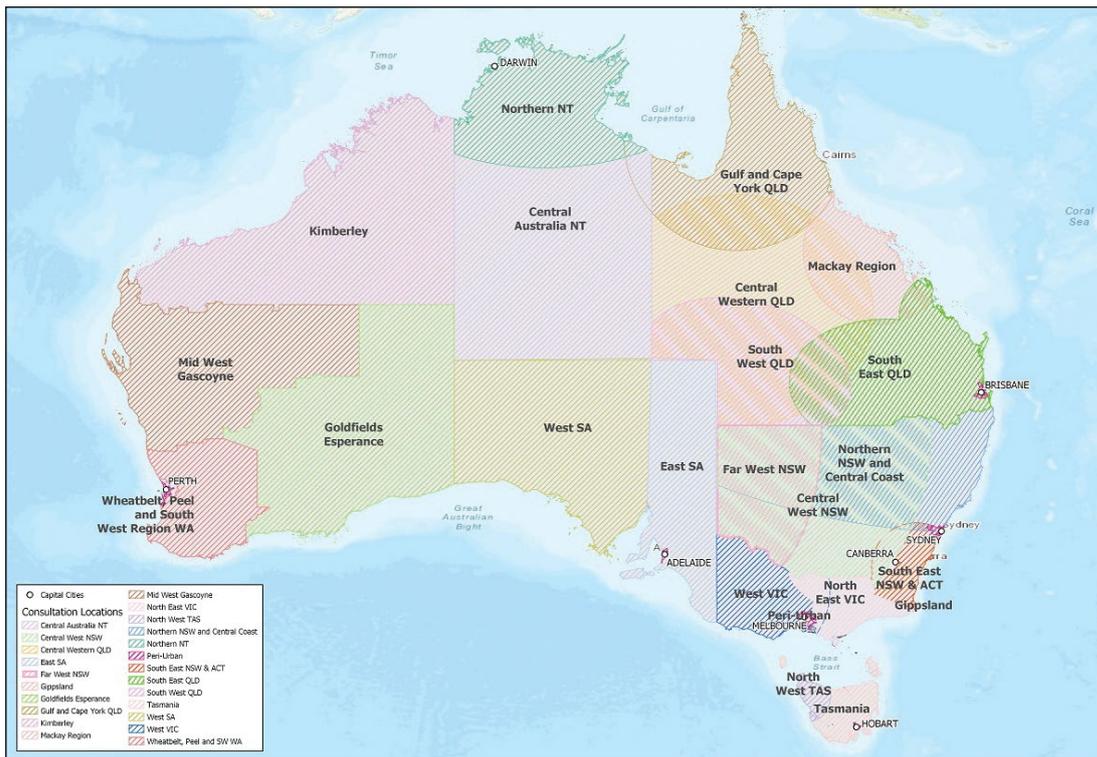
The Review Committee undertook 24 public consultations with over 500 attendees. Due to COVID restrictions, these consultations were held online. Committee members heard from regional consumers, businesses, local and state governments, and community organisations. The 24 consultation sessions covered the breadth of regional Australia from far north Queensland to the Western Australian Wheatbelt, from King Island to Cocos Keeling Island. Two consultation sessions were cancelled due to low registration numbers, and those who had registered were invited to attend alternative sessions.

The locations are listed below:

State/Territory	Date	Region
Australian Capital Territory	Monday, 9 August 2021	South East NSW and ACT
New South Wales	Monday, 9 August 2021	South East NSW and ACT
	Thursday, 26 August 2021	Northern NSW and Central Coast
	Monday, 30 August 2021	Far West NSW
	Friday, 10 September 2021	Central West NSW
Northern Territory	Friday, 6 August 2021	Central Australia NT
	Tuesday, 24 August 2021	Northern NT
Queensland	Tuesday, 27 July 2021	Central and West QLD
	Friday, 30 July 2021	Gulf of Carpentaria and Cape York QLD
	Tuesday, 10 August 2021	South East QLD
	Friday, 27 August 2021	South West QLD
	Thursday, 2 September 2021	Mackay Region QLD
South Australia	Thursday, 5 August 2021	South East SA
	Thursday, 5 August 2021	Western SA
Tasmania	Thursday, 29 July 2021	North West TAS
	Thursday, 12 August 2021	South & East TAS
	Monday, 6 September 2021	Tasmania
Victoria	Wednesday, 4 August 2021	West VIC
	Friday, 20 August 2021	Gippsland Region VIC
	Monday, 30 August 2021	South West VIC
	Tuesday, 7 September 2021	North East VIC

State/Territory	Date	Region
Western Australia	Monday, 9 August 2021	Kimberley and Pilbara Regions WA
	Friday, 20 August 2021	Mid-West and Gascoyne Regions WA
	Thursday, 26 August 2021	Goldfields and Esperance Regions WA
	Wednesday, 1 September 2021	Wheatbelt, Peel and South-West Regions
Peri-urban Australia	Tuesday, 14 September 2021	Peri-urban Australia
	Friday, 17 September 2021	Peri-urban Australia

Map 6 – Consultation locations over ABS population density



Source: Bureau of Communications, Arts and Regional Research, October 2021

Post consultation survey results

Following the public consultation sessions, the Secretariat sent out a voluntary survey on Microsoft Forms to gather feedback. The survey asked questions about how they found out about the sessions, if there were any technical difficulties in attending, and overall satisfaction.

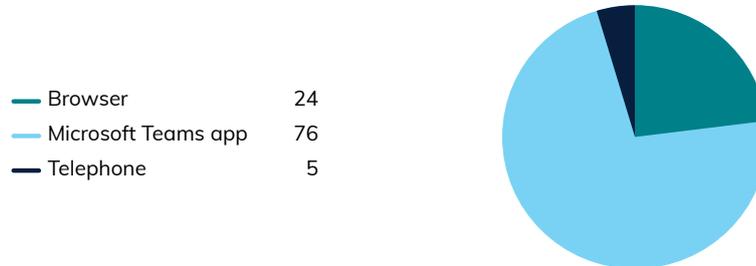
Overall, the online consultations were positively received by attendees, who gave them an average score of 4.15 out of 5. The vast majority of survey respondents (84.8 per cent) agreed that the consultation was well structured, and a similar figure (81.9 per cent) said that the online format effectively allowed them to share their telecommunications experiences. We note that 28 per cent of respondents reported some technical difficulties while participating, including poor audio or video and issues with the Microsoft Teams app.

A number of attendees provided additional constructive feedback on the structure of the meetings, including providing a clearer explanation of the process for making a contribution and enforcing time limits to ensure all participants had an opportunity to speak. While 73.1 per cent agreed that having representatives from NBN Co and Telstra in the meetings was useful, some respondents suggested that this may have led to several issues being 'dismissed' as individual concerns rather than broader problems affecting multiple users.

Other feedback included providing more notice to interested stakeholders well in advance of upcoming meetings. We would agree with this feedback, however, note the challenges of pivoting to the online format on a relatively short turnaround. While the Secretariat undertook a number of advertising activities for the consultations in print, radio and social media, our survey data shows that most attendees heard about the consultation via word of mouth, and more could be done to increase awareness of the Review and consultation sessions amongst a wider audience.

While our survey data is by no means definitive, we note that respondents were somewhat split on whether they would travel a significant distance (defined as 100 kilometres or more) to attend an in-person consultation, with 49.5 per cent agreeing that they would, 24.8 per cent neutral, and 25.7 per cent disagreeing. This may provide food for thought for other committees around the benefits of a hybrid approach to public consultation in regional areas in the future.

3. How did you access the consultation session?

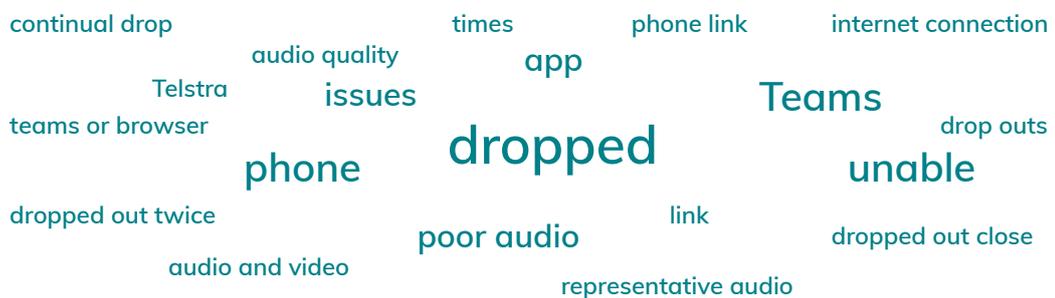


4. Did you experience any technical difficulties when joining or participating in the consultation session?



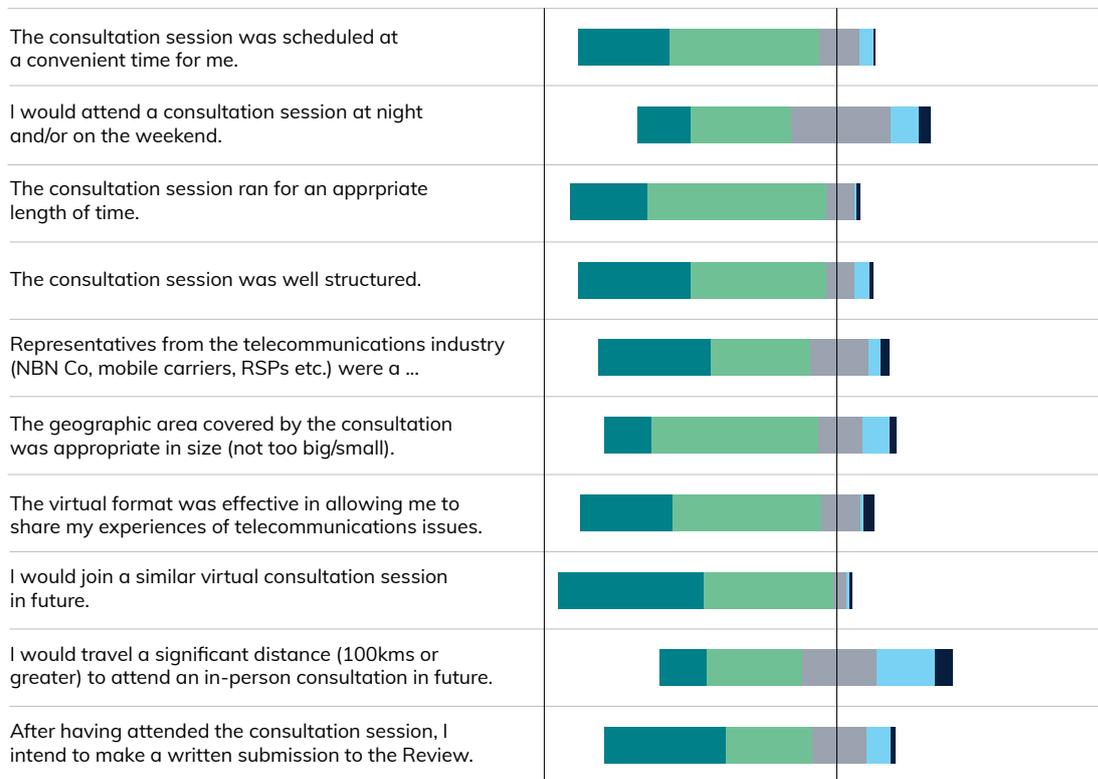
5. Please describe the technical difficulties you experienced (e.g. dropped out of call, poor audio/video quality, etc.). Please indicate how much you agree with the following statements

8 respondents (26%) answered dropped for this question.



6. Please indicate how much you agree with the following statements:

Strongly Agree Agree Neutral Disagree Strongly Disagree



7. Do you have any other comments or feedback about this consultation session, including ways to improve the consultation process or any suggestions for follow-up from the session?

19 respondents (26%) answered people for this question.



8. Overall, how would you rate the virtual public consultation session?

108
Responses

4.15
Average number

Consultation with stakeholders

The Committee met with the following stakeholders to discuss the Review.

Non-government	Government
AARNet	Australian Broadband Advisory Council
Australian Communications Consumer Action Network	Australian Communications and Media Authority
Australian Digital Inclusion Index	Australian Competition & Consumer Commission
Australian Mobile Telecommunications Association	Australian Local Government Association
Australian Agritech Association	Department of Education, Skills and Employment
Coalition of the Peaks	Digital Transformation Agency
Commissioner Shane Fitzsimmons, Head of Resilience NSW	NT Government
Comms Alliance	Office of Northern Australia
Connected Farms	Regional Development Australia Team
Field Solutions Group	SA Government
HyperOne	Services Australia
Isolated Children's Parents' Association	Victorian Government
Infrastructure Australia	
Leading Edge Data Centre	
NBN Co	
National Farmers Federation	
Optus	
Pivotel	
QCN Fibre	
Rural, Regional and Remote Communications Coalition	
Starlink	
Telstra	
Viasat	
Vocus	

Appendix 2 – List of submissions

The Committee received a record number of submissions, with 658 being submitted. Input came from members of the public, community organisations, businesses, and local, state and territory governments. A total of 371 submissions, or 57 per cent, are from individuals.

Submissions not marked as confidential or private were published on the Department of Infrastructure, Transport, Regional Development, and Communications website on 8 November 2021. This included 94 submitters who requested to have their name withheld. Of the 658 submissions received, 104 were not published due to being classified as private or confidential.

The list of published submissions is available below:

Submission	State	Submission	State
Achieve Best Practice	QLD	Australian Healthcare and Hospitals Association	ACT
Adelaide Hills Council	SA	Australian Library and Information Association	National
AgForce Queensland	QLD	Australian Mobile Telecommunications Association (AMTA)	NSW
Aichinger, R	NSW	Australian National Internship Program (ANIP) Research Report by Sana Ahmad	NSW
AJ and PA McBride	SA	Australian Small Business and Family Enterprise Ombudsman	National
Albury City Council	NSW	Barrett, J	QLD
Alexander, T	NT	Bebbington, B	WA
Alice Springs Film and Television (ASFTV)	NT	Bellingen Chamber of Commerce	NSW
Allan, A	VIC	Bennett, N	NSW
Andy and Helen Strang	NSW	Berrigan Shire Council	NSW
Arnold, G	QLD	Better Internet for Rural, Regional and Remote Australia (BIRRR)	National
Associate Professor, Mark A Gregory	VIC	Beveridge, H	NSW
Atkinson, B.F.A	NSW	Bevis, C	VIC
Australasian Panel Marketing	QLD	Big Ampy Pastoral	NSW
Australian Bluegrass	QLD	Binks, D	VIC
Australian Communications Consumer Action Network (ACCAN)	NSW	Bird, D	WA
Australian Competition and Consumer Commission (ACCC)	National	Bischoff, M	QLD
Australian Country Choice Group of Companies	QLD	Bisoglio, C	NSW
Australian Digital and Telecommunications Industry Association (ADTIA)	National		

Submission	State	Submission	State
Bland Shire Council	NSW	Chamber of Commerce Northern Territory	NT
Blinky - William Meani	ACT	City of Armadale	WA
Bothe, C	SA	City of Greater Bendigo	VIC
Bower, L	QLD	City of Greater Geraldton	WA
Brain, T	VIC	City of Logan	QLD
Breen, S	VIC	Claire Lyte-Mason	NSW
Brown, S	NSW	Clark, D & V	NSW
Bundaberg Regional Council	QLD	Clarke, B	VIC
Bushfire Recovery Victoria	VIC	Clegg, D	QLD
Business New South Wales	NSW	Clemson, L	NSW
Cameron Pastoral Company	QLD	Commpeete	National
Cameron, M	NSW	Communications Alliance	National
Camilleri, D	NSW	Community Coordinator for St James	VIC
Campbell, J	NSW	Community of St Patricks River District (Tas) Inc.	TAS
Capricorn Space	VIC	Consumer Action Law Centre and Victorian Aboriginal Legal Service	VIC
Caravan Industry Association of Australia	National	Consumer Policy Research Centre	National
Caravan Parks Association of Queensland	QLD	Coolamon Shire Council	NSW
Carnahan, A	NSW	Coombe, E	VIC
Carpentaria Shire Council	QLD	Cooper, G	SA
Carter, D	n/a	Coorey, R & J	NSW
Cassidy, R	TAS	Cosgrave, M	n/a
Central Australian Youth Link-Up Service	NT	Coulton, B	NSW
Central Darling Shire Council	NSW	Country Women's Association of Victoria	VIC
Central Land Council	NT	Cradle Coast Authority	TAS
Centre for Disaster Management and Public Safety (CDMPS)	VIC	Craig, K	QLD
Centre of Excellence for Automated Decision-Making, Royal Melbourne Institute of Technology	VIC	Cranney, W	QLD
Chamber of Commerce and Industry Queensland	QLD	Craven, S	VIC
		Cruickshank, A	NT

Submission	State	Submission	State
Dale Design Group	NSW	Field Solutions Group	NSW
Dale Last MP, Member for Burdekin	QLD	Finch Hattin Progress Association	QLD
Daly, R	QLD	Finlayson, K	NSW
Dartnall, M	VIC	First Nations Media Australia	NT
Davies, Dr J	NSW	Flint, S & J	TAS
Davies, J	QLD	Foundation for Rural and Regional Renewal	VIC
Dempsey, M	NT	Franklin, D	NSW
Dennis, J	NSW	Fraser Coast Regional Council	QLD
Domus Nursery	WA	Frazier, D & B	NSW
Donatti, D	WA	Fulton, J & M	NSW
Dorigo Consulting	NSW	G21 - Geelong Region Alliance	VIC
Dowie, D	VIC	Gamble, J & G	VIC
Dubbo Regional Council	NSW	Garing, T	NSW
Dudley, D	NSW	Geary, P	NSW
Dulaney, M	WA	Gibson, W	VIC
Dundee Progress Association	NT	Gidgegannup Progress Association Inc.	WA
Dynamic Spectrum Alliance	National	Glen Innes Severn Council	NSW
East Gippsland Shire Council	VIC	Godsell, B	NSW
East Kimberley Chamber of Commerce and Industry	WA	Goldfields Voluntary Regional Organisation of Councils (GVROC)	WA
Eckermann, R	ACT	Good Things Foundation Australia	NSW
Edward River Council	NSW	Goodrich, L	QLD
Eke, R and Mahoney, S	NSW	Goodrich, R	QLD
Elder, A	QLD	Goomalling Community Resource Centre	WA
Elder, J	QLD	Goondiwindi Regional Council	QLD
Elder, K	QLD	Gorbal, T	VIC
Electronic Frontiers Australia	National	Gordon, R	NSW
EMR Australia	NSW	Gough, R	TAS
Etherton, R	VIC	Govett, I	NSW
Ettridge, G	VIC		
Far North Queensland Regional Organisation of Councils	QLD		

Submission	State	Submission	State
GrainGrowers	National	Indi Telecommunications Advisory Group	VIC
Greater Hume Council	NSW	Inmarsat	National
Grieve, R	QLD	Innovative Synergies	NSW
Groote Eylandt and Bickerton Island Enterprises Aboriginal Corporation (GEBIE)	NT	Interactive Games and Entertainment Association (IGEA)	NSW
Grower Group Alliance	National	Internet Association of Australia	National
Hallett, R	TAS	Internet Australia	National
Harrierville Telecommunications	VIC	IoT Alliance Australia (IoTAA)	NSW
Hart, C	VIC	Isolated Children's Parents' Association (ICPA)	National
Hart, N	WA	Isolated Children's Parents' Association (ICPA) Queensland	QLD
Havyatt, D	NSW	Isolated Children's Parents' Association (ICPA) Western Australia	WA
Hawkesbury City Council	NSW	Jarman, M & C	NT
Helen Dalton MP, Member for Murray	NSW	Johnston, J	VIC
Helman, M and Connal, W	QLD	Jonathan Elder	NSW
Henderson, C	QLD	Jonathon Gaul	NSW
Henderson, N	NSW	Jones, C	NSW
Hickey, M	NSW	Jones, N	NSW
Hill, G	SA	Joy Window	NSW
Hinterland Healing	QLD	Jude Beattie	WA
Hobbs, R	NT	Plant, J	QLD
Hoppe, U	NSW	Julia Hardy	NSW
Hornsby Ku-ring-gai District of the NSW Rural Fire Service	NSW	Julian Lesser MP, Member for Berowra	NSW
Hornsby Shire Council	NSW	Kangaroo Valley Broadband Network	NSW
Horrell, M	NSW	Katzen, H	NSW
Howe, T	WA	Keane, L & G	n/a
Hunter Valley Wine and Tourism Association	NSW	Kempsey Shire Council	NSW
Hyde, M	VIC	Kernich, B	NT
HyperOne	QLD		
Iles, M	QLD		

Submission	State	Submission	State
Kimberley Pilbara Cattlemen's Association	WA	McArthur, I	NSW
Kitson, V	NSW	McCarthy, M	QLD
Kotvojs, Dr F	NSW	McCarthy, T	QLD
Kriel, R	ACT	McDougall, I	NSW
Lake-Gow, A	WA	McEntee, G	QLD
Lee, C	NSW	McGreevy, S	NT
Lehikoinen, M	ACT	McKinnon, M	SA
Lenehan, T & J	NSW	McLaren, S	QLD
Litchfield Council	NT	McLean, M	NT
Loats, A	VIC	McLean, R	NSW
Local Government Association of Queensland (LGAQ)	QLD	McLean, W & C	QLD
Local Government Association of Tasmania	TAS	McIlheney-Albert, D	VIC
Local Government New South Wales (LGNSW)	NSW	McMaster, E	NSW
Lukins, T & L	n/a	Menogue, T	QLD
Lundh, C	TAS	Mid-West Chamber of Commerce and industry	WA
Lynk Global	National	Miles, K and Gillies, J	NSW
MacDonald Valley Associations	NSW	Mill, C	VIC
Macedon Ranges Shire Council	VIC	Minns, P	VIC
Mackay, A	VIC	Mitchell-Clark, N	NSW
Mackie, I	WA	Mollett, N	WA
Mair, L	NSW	Moore, P	VIC
Malcolm Ritter	NSW	Moreton Bay Regional Council	QLD
Maranoa Regional Council	QLD	Mott, D	NSW
Mark Coulton MP and Parkes residents	NSW	Mount Irvine Progress Association	NSW
Marriott, A	NSW	Mount Wilson Progress Association	NSW
Martin, D	QLD	Mt Wilson/ Mt Irvine Rural Fire Brigade	NSW
Mason, B	QLD	Mums of the Hills Inc	VIC
Mason, S	NSW	Mundt, N	QLD
May, D	VIC	Munro, R	NSW
		Murchison, D	NSW

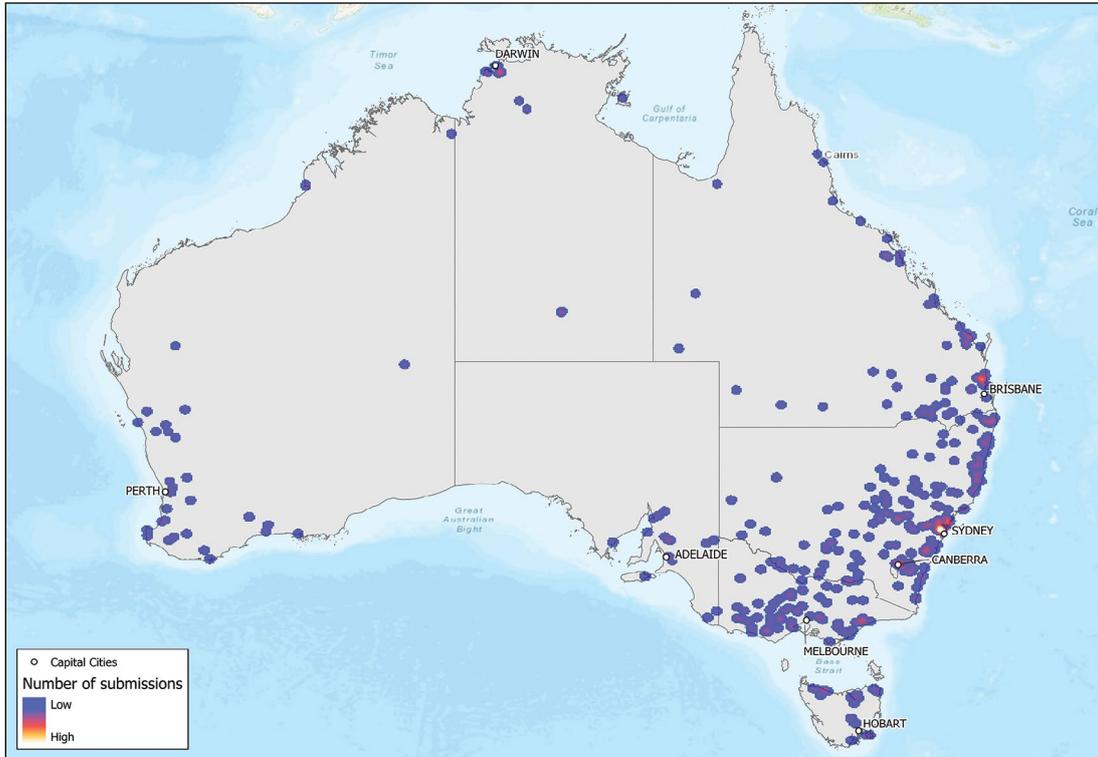
Submission	State	Submission	State
Murray Irrigation	NSW	Organic Beef Exporter Organic	QLD
Murray River Council	NSW	O'Shea, G	NSW
Murray, R	NSW	O'Sullivan, B	NSW
Murrumbidgee Council	NSW	Outback Highway Development Council Inc.	QLD
Nadine Williamson	NSW	Pacific Aerotech	NSW
Nagel, K	NT	Palm Lake Residents Association	QLD
Nambucca Valley Council	NSW	Parker, A & S	VIC
Narrabri Shire Council	NSW	Parkes Shire Council	NSW
Narromine Shire Council	NSW	Paroo Shire Council	QLD
National Broadband Network (NBN) Co	National	Pastoralist's Association of West Darling	NSW
National Farmers' Federation (NFF)	National	Paterson, J	n/a
National Rural Health Alliance	National	Pengilly, M	NSW
NEC Australia	National	Pepper, R	NSW
New South Wales Farmers	NSW	Perrin, R	QLD
New South Wales Government	NSW	Perry, V	QLD
New South Wales Small Business Commissioner, Chris Lamont	NSW	Petkova, S	VIC
Newinga AG	QLD	Phillips, A	NSW
Newton, B	NSW	Piedl, R & A	QLD
Nicholls, C	VIC	Pike, G & C	NSW
Nicholls, S	NSW	Pivotel Mobile	QLD
Nieukerk, Dr K	WA	Police Federation of Australia	ACT
Norman, F. I	VIC	President Eungella Community Development Association	QLD
Northern Territory Government	NT	Prior, S	QLD
O'Connor, L	NSW	Quandialla Progress Association	NSW
O'Grady, P	NSW	Queensland Country Womens Association	QLD
Okeeffe, D	NT	Queensland Government	QLD
Omnispace	National	Queensland University of Technology (QUT) Digital Media Research Centre and James Cook University (JCU) Cairns Institute	QLD
One Gippsland	VIC		
OneWeb	NSW		
Optus	NSW		

Submission	State	Submission	State
Ramsay, B	QLD	Rookyard, J	NSW
Randell-Moon, Dr H	n/a	Rosemary and Walter van Hilst	NSW
Rattigan, K	NSW	Roy Butler, Member for Barwon	NSW
Reece, P	VIC	Royal Flying Doctor Service (RFDS)	National
Regional Australia Institute	ACT	Rugby and District Progress Association	NSW
Regional Cities Victoria	VIC	Russell, L	n/a
Regional Development Australia (RDA) Australia Mid North Coast	NSW	Sasse, B	WA
Regional Development Australia (RDA) Central West	NSW	Saywell, A	NSW
Regional Development Australia (RDA) Great Southern WA Inc.	WA	Schelling, M	NSW
Regional Development Australia (RDA) Kimberley	WA	Searl, T	NSW
Regional Development Australia (RDA) Northern Territory	NT	Shemish-Lahey, M. S	QLD
Regional Development Australia (RDA) Southern Inland	NSW	Shire of Chapman Valley	WA
Regional Development Australia (RDA) Victoria	VIC	Shire of Chittering	WA
Regional Development Australia (RDA) Whitsunday Alliance	QLD	Shire of Mingenew	WA
Regional Development Australia (RDA) Yorke and Mid North South Australia	SA	Shire of Morawa	WA
Regional Development Australia Mid North Coast (RDAMNC)	NSW	Shire of Ngaanyatjarraku	WA
Regional Rural and Remote Communications Coalition (RRRCC)	National	Shire of Perenjori	WA
Reid, J	NSW	Shire of Upper Gascoyne	WA
Rhynie Improvement Scheme	SA	Shire of Wyndham East Kimberley	WA
Riverina Joint Organisation	NSW	Shire of Yalgoo	WA
Roberts, J	NSW	Simons, B	NT
Robertson, S	NSW	Slade Point Community	QLD
Rockhampton Regional Council	QLD	Smallman, J	VIC
Rodgers, B	WA	Smedley, A	NSW
		Smith, A	QLD
		Smith, G	NSW
		Smith, J	NSW
		Softwoods Working Group	NSW
		Solly, P	VIC
		Somerset Regional Council	QLD

Submission	State	Submission	State
South Australia Parks - Caravan Parks Association of South Australia	SA	The Hills Shire	NSW
South Ward Disaster Recovery Committee	VIC	The Maleny and Districts NBN Working Group	QLD
Southport Community Centre	TAS	The Pines Pastoral	NSW
Spencer, B.T	WA	The Royal Historical Society of Queensland	QLD
St James Fire Brigade	VIC	Thompson, G	NSW
St James Hall Committee	VIC	Thompson, S	NSW
St James Silo Art Committee	VIC	Tickle, R	NSW
Stapleton, B	NT	Tink, B & E	NSW
Stark, K	NSW	Torres Cape Indigenous Council Alliance	QLD
State Emergency Service (SES) Deputy Unit Commander	NSW	TPG Telecom	NSW
Stead, D	WA	Treasurer North East Art Trail	VIC
Steer, J & L	NSW	Ulmarra Village Inc	NSW
Strathbogie Shire Council	VIC	Unicomb, N	NSW
Sunshine Coast Council	QLD	Van de Ven, H	NSW
Susan Templeman MP	NSW	Van Der Woude, R	TAS
Swingler, B	NSW	Van Opynen, S	NSW
Tamplin, J	NSW	Victorian Government	VIC
Tant, G	NSW	Vocus	NSW
Tasmanian Council of Social Service (TasCOSS)	TAS	Vrolyks, K	NT
Tasmanian State Government	TAS	Waid, K	NSW
Taylor, F	n/a	Walkerville Ratepayers and Residents Association	VIC
Tech Solutions	NSW	Wall, B	WA
Telecommunication Industry Ombudsman	National	Waratah Wynyard Council	TAS
Telesat	National	Warren Shire Council	NSW
Telsoc	National	Warren, J.P	ACT
Telstra	National	Wasiukiewicz, A	VIC
Tesch, M	QLD	Watts, G	VIC
Teuben, A & T	NSW	Watts, N	WA
		Waugh, A	QLD
		Western Australia Government	WA

Submission	State
Western Australian Local Government Association (WALGA)	WA
Western Downs Regional Council	QLD
Western Queensland Alliance of Councils	QLD
Wheeler, E.J	SA
White, R	QLD
Whiting, V	WA
Williams, D.S	NSW
Williams, E	NSW
Willing, L	NSW
Wilson, B	NSW
Wilson, C	NSW
Wilson, S	NSW
Wilson, S	VIC
Wittittrin Progress Association	NSW
Wollondilly Shire Council	NSW
Wolter, D	NSW
Women's Health Goulburn North East	NSW
Woodlands Nulla Vale	VIC
Woodyatt, A	NSW
Wynn, G	NSW
Yanada	NSW
Yarra Ranges Council	SA
Yarralong Communication Action Group	NSW
Yeo, A.M	QLD
Zsidi, A	NSW

Map 7 – Distribution of submissions



Source: Bureau of Communications, Arts and Regional Research, November 2021



Source: AusGov Media & Tech Facebook page, August 2021

Social media feedback

The Department advertised the Review and the public consultation sessions on Facebook and LinkedIn, in posts similar to the one pictured. There were many comments left on these posts. Although these are not treated as formal submissions to the Review, they do show public sentiment around telecommunications. Most of the concerns raised were also brought up in public consultation sessions and written submissions.

Topics raised include:

- Poor coverage and speed on both mobile and broadband
 - ‘My internet is so slow sometimes I can’t even load a webpage! And sometimes I need to go outside to get phone reception. (Alice Springs)’
 - ‘mobile internet reception is abysmal, at my home and in many other parts of the so called ‘coverage’ area of Telstra 4G; and NBN copper to the node service is epic fail in terms of my expectations for reasonably fast Internet, and it’s getting worse, and neither NBN nor my service provider is responsive’
 - ‘My brother who lives in Northern NSW has no mobile reception at his house and he’s with Telstra. To make a call he has to run around outside on the hill till he gets some service.’
- Landline failure and desire to keep landline service
 - ‘Why can we not keep our landlines even with the coming of NBN - in rural areas if the power goes out which happens there is NO way to communicate, and does not NBN rely on needing power. I don’t mind when it is available in my area having it but would like the option of keeping my landline...’
- 2019-20 Bushfires – congested mobile coverage and loss of telecommunications during power outages
 - ‘Just out of Batemans Bay is a little place called Durras, the mobile coverage is rubbish, and through the 2019-20 bushfires, it was congested, and then died when the power went out.... But then again, the coverage is often so bad, we almost didn’t notice!’
- The impact of weather events and rain
 - ‘Any time there is a slight wind, or cloudy we lose coverage...and all we get told is “it must be your phones/modem”. Ridiculous when we are just 8km from Yankalilla (SA) and in the middle of a major tourist area.’
- Dissatisfaction with the NBN available to them
 - ‘Going from fibre optics back to copper lines is a ridiculous joke for NBN.’
- Data usage on Sky Muster
 - ‘Kununurra service is shocking. Plus don’t get me started on NBN satellite. So expensive and can’t use it like unlimited NBN plans because it chews up the data so quickly’
- Congestion during tourism season
 - ‘Berry is awful especially in summer holidays or when there’s heaps of tourists.’
- Dissatisfaction with telcos and charges
 - ‘We have been charged for over a year, for a service speed that can’t be obtained where we live, and after we complained to the provider, they offered us a credit of \$2.47!!! we are 1800metres away from the service box, double the max distance of 900 metres. Not at all happy’

Appendix 3 – Committee Membership Biographies



Luke Hartsuyker (NSW) – Chair

Mr Luke Hartsuyker is a former member of the House of Representatives representing the Division of Cowper from 2001 to 2019. He served as a Government minister in the Turnbull Government and an Assistant Minister in the Abbott Government. He was Deputy Leader of the House of Representatives and was Shadow Minister for Regional Communications from 2010-2013. Luke was highly influential in the development of the original Mobile Black Spots Program. He retired from Parliament at the 2019 federal election and is a Board Member of the Mid North Coast Local Health District and Chair of the Finance and Performance Committee. He is a Fellow of CPA Australia and a Member of Australian Institute of Company Directors.



Sue Middleton, Board Member, Foundation for Rural and Regional Renewal (WA)

Ms Sue Middleton has worked for three decades holding successive and extensive Board and leadership roles across all levels of industry and government. Sue has extensive experience in managing diversified farming enterprises in the WA Wheatbelt for over two decades. Sue is currently a Director of Moora Citrus, and Agdots, a regional development consulting business.



Kristy Sparrow, co-founder, Better Internet for Rural, Regional & Remote Australia (QLD)

Ms Kristy Sparrow is a grazier and co-founder of Better Internet for Regional, Rural and Remote Australia (BIRRR), a Facebook group established in 2014 to address telecommunication issues faced by people who live and work in rural and remote Australia. Kristy grew up on a sheep and cropping property in the NSW Riverina before attending university in Melbourne and then teaching in a small dairy community in regional Victoria. This was followed by a long stint as a Remote Area Families Services (RAFS) officer in regional Queensland. Mother of twins, ex-distance education home tutor and preschool teacher and strong regional advocate, Kristy also volunteers in her community in various roles. Kristy was nominated by the NFF, being a body representing regional, rural and remote Australia.



Hugh Bradlow, President, Australian Academy of Technology and Engineering (VIC)

Professor Hugh Bradlow has extensive telecommunications experience and knowledge and is currently the President of the Australian Academy of Technology and Engineering. Hugh worked for Telstra from 1995 to 2017 in various senior management roles including Chief Scientist, Chief Technology Officer and Head of Innovation. Prior to this, Hugh worked as Professor of Computer Engineering at the University of Wollongong.



Michael Cosgrave, Advisor and Regulatory Expert, (VIC)

Mr Michael Cosgrave held senior managerial positions, principally in infrastructure regulation, with the Australian Competition and Consumer Commission (ACCC) for 25 years until August 2021. He was the most senior official on telecommunications regulation for 20 years. He has been closely involved with a broad range of regulatory and policy issues in the telecommunications sector over that period. He was responsible for fostering competitive, efficient and informed markets in critical sectors and industries including communications, water and transport markets, including in regional Australia. His most recent roles were as Executive General Manager, Infrastructure Regulation Division and Chief Infrastructure Advisor.

Appendix 4 – Glossary

Term	Definition
3G, 4G, 5G mobile service	Progressive generations of mobile services
Asymmetric Digital Subscriber Line (ADSL)	A technology for delivering high-speed data transmission over a copper phone line using a signal splitter.
backhaul	The connection between an access node and a core network. For instance, a fibre cable running from neighbourhood exchange to the core network.
bandwidth	The maximum rate of data transfer between two points, typically given in bits per second, i.e., 1 Gbps.
Closing The Gap	An Australian Government strategy that aims to reduce disadvantage among Aboriginal and Torres Strait Islander people, based on seven targets.
cloud services	A catchall term encompassing cloud data storage, processing, and software as a service. Offsite networked machines work in collaboration to complete computing tasks for the user.
co-location	Where carriers install communications equipment on the same piece of physical infrastructure such as a pole or tower.
copper network	A copper-based customer access network used to deliver standard voice telephony and ADSL services.
COVID-19	The term used colloquially to refer to the 2019-2021 SARS-CoV-2 pandemic and government responses to it.
exchange	A node in a network where local consumer connections are aggregated and connected to the core network backhaul.
exchange service areas	Geographic areas defined by the particular communications exchanges through which consumer communications services are aggregated and connected to the core network.
fibre	Refers to the glass cored fibre-optic cables used to transfer data between points in the form of pulses of light.
fibre 'off-ramps'	Pre-installed junctions within a fibre backbone network where additional network nodes can be connected.
fibre backbone	Optical fibre transmission links which carry internet traffic over vast distances between cities and countries.
fixed line	Network design in which voice, data or broadband services are delivered over a physical line.
fixed wireless	Network design in which network connections are provided through radio signals between fixed antennas.
geosynchronous satellite	A satellite in an elliptical orbit at an altitude of 35,786km, following the Earth's rotation.

Term	Definition
gigabits per second (gbps)	A measure of network transmission speed, equivalent to one billion bits per second.
gigabyte (gb)	A unit of information used to quantify computer memory or storage capacity, equivalent to one billion bytes.
High Capacity Radio Concentrator (HCRC)	A point to point radio network that provides voice services to some rural and remote premises.
Internet of Things (IoT)	A concept that refers to devices such as sensors and machines which are connected to each other and the internet so that they are able to collect and exchange data.
landline	A telephone service that uses copper or fibre cable for voice communications.
last-mile	The portion of a network between a core network backhaul and the consumer's interface equipment (such as a mobile phone or home router).
latency	The time it takes a data packet to be transmitted from one point in a network to another, expressed in milliseconds (ms).
Layer 3	Refers to the 'network' layer of a telecommunications system under the Open Systems Interconnection framework.
Long Range Wide Area Network (LoRaWAN)	A proprietary low-power wide-area network (LP-WAN) modulation technique. Power is conserved by keeping components powered down as much as possible.
Low Earth Orbit (LEO)	Satellite systems used in telecommunications which orbit between 200 and 2,000 km above the earth's surface and do not stay fixed relative to a position on the surface.
Low Power Wide Area Network (LP-WAN)	A type of wireless communication network designed to transit long distance data using a low bit rate to conserve power. Relevant to IoT applications.
Long Term Evolution (LTE)	A standard for wireless broadband communication for mobile devices and data terminals which increases the capacity and speed using a different radio interface together with core network improvements.
megabits per second (mbps)	A measure of network transmission speed, equivalent to one million bits per second.
mobile base station	A piece of infrastructure including a tower or mast, power supply, controllers and antenna which deliver mobile services
mobile roaming	The ability for a consumer device to connect to base stations which are not owned or operated by their mobile network provider (e.g., Telstra, Optus).
Mobile Virtual Network Operator (MVNO)	Mobile providers that resell services using the major network operators' wholesale mobile networks. Their reduced overheads enable them to provide plans which are often more competitively priced than standard plans offered by the major network operators.

Term	Definition
MyGov	A website operated by Services Australia which aggregates Australian Government services like Centrelink and Medicare.
narrowband	A wireless communication technology where a narrower portion of the radio spectrum is used to transmit data over long distances. Typically used for low data-intensity services.
NBN Co Limited (NBN Co)	An Australian Government Business Enterprise established to build and operate the NBN.
network congestion	Where a network unit is carrying more data throughput than it can handle and service quality is impacted as a result. Congestion results in increased data transfer times, data packet loss and blocking of new connections.
Network Termination Device (NTD)	Used by NBN Co to connect a consumer premises to the network. Defines a network boundary, where the NBN is terminated and the consumer's private network begins.
neutral host model	A network sharing model where a third party carrier owns and operates mobile network assets, but offers other carriers wholesale access to these assets to deliver mobile services.
NextG Wireless Local Loop (NGWL)	A Telstra wireless service provided as a fixed line alternative over the 850MHz band (also used for 3G) that allows access to the internet and voice telephony.
pair gains system	Equipment that separates out distinct signals from a copper transmission cable. Has the effect of creating an additional subscriber line. Used to separate voice service from internet connectivity for ADSL before VOIP became widespread.
peak / off-peak data	Internet plan data which is split into two or more periods of the day by a provider to manage network use. Peak periods typically fall on the working day through to the evening.
petabyte	A unit of digital data that is equal to 1000 TB (see terabyte).
Radio Access Network (RAN)	The component of the mobile network that relies on radio signals. The network consists of cells serviced by one or more antenna which connect mobile devices to the core network.
radiofrequency spectrum	The portion of the electromagnetic spectrum with waves in the frequency range 30hertz to 300GHz which can be used to facilitate radio communications. Higher frequency waves enter the infrared, visible and ultraviolet light spectrum.
rain fade	The phenomenon of propagation loss in rain or atmospheric particles. Rain fade causes signal degradation which can result in data packet loss, bandwidth reduction and complete interruption of a connection. Higher frequency radio waves are more prone to rain fade.
Regional Co-Investment Fund (RCIF)	An NBN Co fund designed to uplift digital capability in regional and remote areas by increasing the number of premises that can access technologies that support higher speeds.

Term	Definition
Regional Tech Hub	An Australian Government initiative, delivered by the National Farmers' Federation in collaboration with ACCAN, to provide regional Australians with independent advice and support on phone and internet options and technical issues.
Retail Service Provider (RSPs)	A provider of retail broadband services to consumers.
Sky Muster	A satellite internet service provided by NBN Co through the use of two geosynchronous satellites. Provides broadband internet outside of the Fibre network footprint.
Sky Muster Plus	A type of Sky Muster plan which provides unmetered internet for all activities except video streaming and VPN traffic.
small and medium-sized enterprise (SME)	Enterprises or businesses whose personnel numbers are less than 20 (small) or between 20 and less than 200 (medium).
small cell	A type of mobile base station which delivers coverage to a small area (typically from 50m-1km), providing increased depth of mobile coverage.
Statutory Infrastructure Provider (SIP)	Carriers that must provide basic wholesale broadband services in the areas they service. This includes voice services if they operate fixed-line or fixed-wireless networks.
Telecommunications Industry Ombudsman (TIO)	A not for profit organisation that provides a free and independent dispute resolution service for small business and residential consumers who have an unresolved complaint about their telephone or internet service.
Telstra USO Performance Agreement (TUSOPA)	The Agreement which sets out the scope of services to be performed by Telstra in delivering standard telephone services and payphone services under the USO.
terabyte (TB)	A unit of digital data that is equal to 1000 GB (see Gigabyte).
Universal Service Guarantee (USG)	An Australian Government policy which guarantees all people in Australia with access to broadband and voice services, regardless of their location.
Virtual Private Network (VPN)	A software defined network that operates over the internet but can behave like a local network.
Voice Over Internet Protocol (VOIP)	A method for delivering voice communications over the internet.
Wholesale Broadband Agreement (WBA)	The contractual vehicle NBN uses to supply wholesale products and services to Retail Service Providers.
Wi-Fi	A wireless local network protocol that operates using unlicensed spectrum in the 2.4 GHz and 5 GHz bands.
Wi-Fi hot spot	A publically available local Wi-Fi connection that allows access to the internet.
Wireless Local Loop (WLL)	Access system that connects users to the local telephone company's switch via wireless links.
Zettabyte	A unit of digital data that is equal to 1 million PB (see petabyte).

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