



TELSTRA CORPORATION LIMITED

Submission to Inquiry into Co-investment in Multi-carrier Regional Mobile Infrastructure

Public version

10 November 2022



CONTENTS

| | |
|---|-----------|
| EXECUTIVE SUMMARY | 3 |
| 01 Infrastructure supporting a single mobile carrier | 6 |
| 1.1. Introduction | 6 |
| 1.2. Deployment speed | 6 |
| 1.3. Technical feasibility and cost considerations | 7 |
| 1.3.1. It may not be cost-effective or possible to make a structure shareable | 7 |
| 1.3.2. Location is critical | 8 |
| 1.4. Private investment incentives | 8 |
| 02 Models for infrastructure which supports multiple mobile carriers | 10 |
| 2.1. Introduction | 10 |
| 2.2. Supporting commercially agreed multi-carrier outcomes | 10 |
| 2.3. Improving multi-carrier outcomes through passive infrastructure sharing | 11 |
| 2.4. Active network sharing models | 12 |
| 2.4.1. Additional considerations where there is a non-MNO “neutral host” | 13 |
| 2.4.2. Commercially negotiated roaming arrangements | 15 |
| 2.4.3. Mandated national roaming | 15 |
| 2.5. Temporary roaming during natural disasters and other emergencies | 16 |
| 03 Regional connectivity outcomes that meet community needs | 17 |
| 3.1. Introduction | 17 |
| 3.2. Improving digital inclusion for regional and remote communities | 17 |
| 3.3. Being smart about what is funded | 19 |
| 3.4. A holistic approach with better cross-government coordination | 21 |
| 3.4.1. Improving arrangements for access to land for sites | 21 |
| 3.4.2. Better leveraging the combined power of government | 22 |
| 3.4.3. Consideration of dependences outside of the telecoms industry | 22 |
| 3.5. Embracing emerging technologies such as LEO satellites | 22 |
| 04 Relevant examples of successful multi-carrier outcomes | 24 |
| 4.1. Introduction | 24 |
| 4.2. Examples of multi-carrier outcomes through passive sharing | 24 |
| 4.2.1. Case study - Victorian Rail Connectivity Project | 24 |
| 4.2.2. Case study – Peri-Urban Mobile Program | 24 |
| 4.3. Examples of multi-carrier outcomes through active sharing | 25 |
| 4.3.1. The in-building Distributed Antenna System (DAS) model | 26 |



EXECUTIVE SUMMARY

Telstra welcomes the opportunity to provide our views to the Standing Committee on Communications and the Arts (**Committee**) on this important Inquiry into Co-investment in Multi-carrier Regional Mobile Infrastructure (**the Inquiry**).

Thriving regional communities are important to Australia's success, both socially and economically. In the two Census periods to 2016, we have seen more people moving from capital cities to regions than the other way around, with this movement being further propelled by the recent pandemic. The Regional Australia Institute's (**RAI**) Regionalisation Ambition 2032, launched in September 2022, points to the need for investment in accessible and affordable digital connectivity in regional Australia, and fostering digital literacy and capability, to support this increasing regionalisation of our nation.¹

A thriving regional Australia is also important to Telstra. We are one of its biggest supporters and investors, a major employer, and we supply much of the infrastructure and services that keep regional Australia connected.

The Terms of Reference (**ToR**) for the Inquiry cover matters integral to the future of industry and government co-investment in communications infrastructure in regional, rural and remote Australia². Getting the policy parameters for this right matters. At stake is whether future co-investment programs will be effective in giving regional Australia the much-needed boost required for it to reach its full digitally-enabled potential through improved mobile coverage and service quality.

To ensure lasting and positive outcomes for those living and working in regional communities, government policy and funding programs concerning co-investment in regional infrastructure should be designed with these five considerations in mind:

- Continued recognition of the importance of government co-funding, ensuring that this is focussed on areas where investment would be otherwise uneconomic;
- A co-ordinated and place-based approach by government at all levels;
- Program rules should not be overly restrictive or prescriptive, but should generally support commercially agreed sharing;
- Funding for more than just outdoor black spots; and
- Using the best technology for the job (and ensuring people know about it).

1. Continued recognition of the importance of government co-funding

Extending mobile coverage into Australia's hard to reach places has always been a technological and commercial challenge. High levels of ongoing investment are needed to maintain and expand a quality mobile network. In regional and remote areas, these costs typically increase substantially, due to higher costs of both establishing and maintaining sites. Because of the challenging economics, there are likely to be few new economically viable sites in regional and remote areas, without support from government co-funding. In these conditions, continued and enhanced government co-funding programs to enable extension of mobile coverage which would otherwise be uneconomic are both welcomed and essential.

2. A co-ordinated and place-based approach by government at all levels

Telstra is a firm supporter of the 2021 Regional Telecommunications Independent Review Committee (**RTIRC**) recommendation for the Federal Government to develop a long-term investment and planning framework for digital infrastructure including increased coordination and investment between different levels of government

¹ Source: [Rebalance-the-Nation-Report-2022.pdf \(rebalancethenation.com.au\)](https://www.rebalancethenation.com.au/rebalance-the-nation-report-2022.pdf)

² In this response, we use the term "regional" to collectively refer to regional, rural and remote areas. In some cases, we also specifically call out challenges in remote Australia.



and other relevant sectors to address regional connectivity.³ A national framework which co-ordinates funding investment across all levels of government will deliver greatest overall 'bang for buck' for the collective public purse. Successful initiatives aimed at driving positive social and economic outcomes through extended digital connectivity in regional Australia must also be based on an understanding of, and address, the issues relating to digital connectivity in regional communities, with those communities. This includes genuine partnership with First Nations representatives to improve digital access and literacy for remote First Nations communities.

As recently stated by Minister Catherine King:

"...delivering on the potential of regional Australia requires many actors and agents, across sectors and levels of government, to work together towards this aim...the aims are complex and long-term.

We must also understand the priorities for people living and working in the regions. Empowering regions to have their voices heard and their solutions tailored for local need is critical."⁴

3. Program rules should not be overly restrictive or prescriptive, but should generally support commercially agreed sharing

Industry involvement is essential to the success of regional mobile infrastructure co-funding programs. To be effective in their aims, co-investment programs should be designed to maximise incentives for ongoing investment by mobile network operators (MNOs) in regional infrastructure and services. This won't happen with a "one size fits all" approach.

There are likely to remain instances where co-funding of infrastructure deployments supporting only a single mobile carrier represents the only option, or the most efficient and effective use of public monies. However, we also appreciate the benefits for regional communities where co-funded infrastructure can be used by multiple providers. Telstra believes there is scope for a greater degree of commercially agreed infrastructure sharing between operators than there is today, and we look forward to working with the Committee and other stakeholders to identify options. These include existing and enhanced passive sharing and/or commercially agreed active sharing on future government co-funded sites where costs are shared between participating operators and government. We would also welcome the opportunity to work collaboratively with industry and Government to develop a solution for limited temporary roaming during natural disasters and other emergencies.

To ensure industry investment continues to be incentivised, future co-funded programs should not prescribe or mandate deployment models as between passive and active sharing, nor mandate specific active sharing models. It is important that the nature and terms of any sharing arrangements established in the future are determined commercially and not dictated by the co-funding rules, allowing the bidder to put forward the most suitable deployment model to achieve the desired connectivity outcome.

The reality is deployment costs in regional and remote areas are typically higher than in metropolitan areas, while direct revenues from site coverage are typically lower. What drives continued MNO investment in regional mobile infrastructure and services in these conditions is the opportunity to generate returns on their investments through competition in the national mobile market.

We cannot support programs that mandate roaming, undermining our potential for competitive differentiation. We also do not support other prescriptive forms of active sharing (such as neutral host requirements), which we believe will deliver an inferior experience to MNO-led commercial arrangements both in terms of speed of deployment as well as the quality of customer experience outcomes. Overall, we believe that these type of mandated solutions will be detrimental to the objective of improving regional mobile connectivity over the short, medium and long term.

³ [2021 Regional Telecommunications Review A step change in demand \(infrastructure.gov.au\)](https://www.infrastructure.gov.au), Recommendation 1.

⁴ [Forward, Regional Australia Institute, "Regionalisation Ambition 2032" Rebalance-the-Nation-Report-2022.pdf \(rebalancethenation.com.au\)](https://www.rebalancethenation.com.au)



4. Funding for more than just outdoor blackspots

The Federal Government's Regional Connectivity Program (**RCP**) has been a welcome addition to its Mobile Black Spot Program (**MBSP**) in supporting a holistic "place based" approach to improving connectivity in regional Australia because the program's focus is far broader than mobile black spots alone. RCP provides a degree of flexibility that we support and allows for a wider range of solutions to be considered to meet the needs of regional and remote communities. Some of the benefits of the RCP include support for a broader program of activity that can allow for upstream build (in particular, transmission upgrades), not just downstream coverage. This means carriers can undertake works that improve capacity and end customer experience, as well as basic connectivity.

5. Using the best technology for the job (and ensuring people know about it)

Difficult terrain and low population density means there will always be large parts of Australia's land mass that will not get terrestrial based mobile coverage, even with co-funding initiatives.

Where there is some existing coverage, co-funding programs should look to maximise regional community benefits through funding for mobile coverage extension devices (e.g. authorised repeaters for vehicles, indoor black spots and fringes of existing coverage). Program qualifying criteria could also extend to the provision of public Wi-Fi (or any other mobile network wireless broadband medium) in addition to mobile coverage, providing end users with access to data services outside of mobile coverage from their own MNO.

For resiliency, funding should also be considered for satellite handsets as a safety net for remote working or when terrestrial networks are disrupted (e.g. in areas prone to natural disasters).

Looking to the future, the Government also needs to consider the potential of emerging technologies such as Low Earth Orbit (**LEO**) satellites to provide complementary infill coverage and redundancy for public safety purposes, enabling government co-funding to be targeted at regional community requirements for higher capacity mobile infrastructure in population centres.

We also recommend government linking connectivity literacy and awareness program funding to awarded co-investment locations to support and better leverage the improvements made to connectivity in a specific region. We welcome the recent announcement of extended funding for the Regional Tech Hub.



01 Infrastructure supporting a single mobile carrier

1.1. Introduction

In this section of our submission, we provide information relevant to the Committee's ToR to report on the costs, feasibility and public benefits associated with the deployment of infrastructure supporting a single mobile carrier.⁵

1.2. Deployment speed

It is vital that a focus on co-investment in multi-carrier regional mobile infrastructure does not come at the expense of failing to deliver *any* new regional mobile infrastructure. As Minister Rowland said recently:

"We know unfortunately that there are so many black spots right around Australia, and sometimes they're not black spots in a sea of white; they're black spots in a sea of black...people have a very understandable expectation that they will be able to have at least some mobile coverage no matter where they are... I think what's essential here is to incentivise those private operators to do more to actually deliver for the community".⁶

The feedback we frequently hear from our regional customers and stakeholders is that they urgently need improvements in their access to quality mobile connectivity. For regional communities where connectivity improvements are essential to attract workers or to supplement local access to healthcare and education providers, the speed at which these improvements can be delivered is a significant consideration.

Another powerful example of the need for timely improvements to connectivity in regional and remote areas shared with Telstra by one of our stakeholders is the impact this has on road safety. To cite the final report of the Joint Select Committee on Road Safety⁷:

- 10% of road fatalities occur in remote and very remote Australia; and
- People involved in accidents in those areas are 11 times more likely to die.

The Western Roads Federation and Northern Territory Road Transport Association put a submission into the inquiry⁸, identifying that truck drivers were often first on scene at those accidents and that one issue identified in their research was delays caused by a lack of connectivity in those areas. The public benefits of improved connectivity in these situations are clear. Beyond the human cost, a single road death has an attributed cost of over \$7 million.⁹ Access to back to base messaging would enable truck drivers to send urgent accident alerts which would also identify their location, speeding up response times by professional paramedic services. Connectivity also has a role to play in the mental health of truck drivers travelling through remote and regional areas. Where there is no access to connectivity at rest areas, this can exacerbate loneliness and mental health concerns.

Unilateral deployments can offer deployment speed advantages. Infrastructure supporting a single carrier can be less complex and quicker to deploy than deployments which are subject to multi-carrier or neutral host

⁵ Our response interprets the term "infrastructure supporting a single carrier" as infrastructure built for the initial intended use of a single carrier. However, it may be noted that such infrastructure will still be subject to the *Code of Access to Telecommunications Transmission Towers, Sites of Towers and Underground Facilities (FAC)*, which requires all owners and operators of telecommunications facilities to provide other carriers with access to mobile towers, sites, and eligible underground facilities.

⁶ Transcript, Press conference, Singleton, NSW, natural disaster support, 19.10.2022

⁷

https://parlinfo.aph.gov.au/parlInfo/download/committees/reportjnt/024922/toc_pdf/DrivingReformfinalreportfortheInquiryintoRoadSafety.pdf;fileType=application%2Fpdf

⁸ <file:///C:/Users/d850043/Downloads/Sub020.pdf>

⁹ file:///C:/Users/d850043/Downloads/AddInfo5_Litchfield.pdf



arrangements¹⁰, meaning communities receive coverage faster. By way of an example, in New Zealand the three MNOs (Spark, Vodafone and 2degrees) have entered into joint venture arrangements to improve regional connectivity through the Rural Connectivity Group (**RCG**). Despite commencing in 2017, initial progress by the RCG was slow at least partly as a result of requiring multi-carrier agreement on sites and priorities. By February 2021, RCG reached 200 sites over more than three years of actual build time.¹¹ Over the same time period, MNO-led deployment supporting predominantly single-carrier coverage¹² under Australia's MBSP had delivered conservatively three times as many MBSP sites.

Over rounds 1 to 5A, the MBSP has led to co-funding for over 1,270 mobile base stations across Australia, more than 75 per cent of which were active as of November 2021. Consequently, the MBSP has delivered over 162,000 km² of new and upgraded handheld coverage and 245,000 km² of new external antenna coverage, with this coverage footprint including more than 109,700 premises and 8,600 kilometres of major transportation routes in regional areas.¹³ The MBSP has been highly successful in combining Government and industry funding to materially improve regional mobile coverage, through the deployment of mobile infrastructure currently typically supporting a single mobile carrier.

1.3. Technical feasibility and cost considerations

Both in Australia and internationally, it is uncommon to see multiple MNOs universally sharing the same sites. As we explain below, there are a range of important technical reasons why this is the case. Particularly in hard-to-reach locations in rural and remote areas, deployment through smaller and lower cost sites may be the only feasible option. In practice, there are many instances where co-funding of infrastructure deployments supporting only a single mobile carrier represents the only option, or the most efficient and effective use of public monies.

1.3.1. It may not be cost-effective or possible to make a structure shareable

Some structures cannot physically support the network equipment of more than one or two MNOs. For example:

- Telstra owns a number of radio structures we use to deliver services under Telstra's Universal Service Obligations (**USO**) outside of the nbn fixed line footprint. These are typically incapable of physically supporting shared access (too small, not strong enough etc).
- Small cell structures and slimline poles are not typically sharable and not easily upgraded to be sharable. Quite a few MBSP sites involve small cells, in order to extend coverage in situations where building, operating and maintaining a macro site would not be possible or would be cost prohibitive.¹⁴ Whilst not delivered as part of the MBSP, an example is the five Satellite Small Cell sites Telstra installed in collaboration with the Department of Regional NSW to extend coverage on the Snowy Mountains Highway to key locations along the 90 km of undulating road. This could not have been feasibly done using shareable macro sites.

In general, mobile infrastructure is not designed to support connectivity requirements extending materially beyond those reasonably anticipated at the time of the build. This is for the efficiency reasons explained recently by nbn in its response to the ACCC's Regional Mobile Infrastructure Inquiry:

¹⁰ However, prior commercial agreement on the terms of deployment by a lead MNO can reduce these concerns once up-front terms are agreed. This is why, where there is a policy preference for multi-carrier outcomes, we believe this is best achieved through commercially negotiated carrier led sharing.

¹¹ See <https://www.thercg.co.nz/rural-connectivity-group-liven-their-200th-site/>

¹² As at January 2021, the ACCC has found that approximately 92 per cent of active mobile sites funded under the MBSP supported only a single mobile carrier, in spite of options for co-location on these sites - https://www.accc.gov.au/system/files/RMII%20Consultation%20Paper_0.pdf, p 10.

¹³ <https://www.infrastructure.gov.au/sites/default/files/documents/2021-rtirc-report-a-step-change-in-demand.pdf>, p 44

¹⁴ See the range of funded small cell sites at: [Mobile Black Spot Program | Department of Infrastructure, Transport, Regional Development, Communications and the Arts](#)



“...for a telecommunications network provider building its own tower, there is generally no financial incentive to build a tower that could provide physical capabilities significantly above and beyond that estimated to be required, informed by the network provider’s own existing and planned needs and any anticipated co-location applications. To do otherwise would significantly increase deployment costs with no guaranteed return on investment, making deployment less cost effective (noting that, for nbn, this would mean exacerbating the loss-making nature of our FW network).”¹⁵

These considerations also explain why it wouldn’t be appropriate to retrospectively impose different sharing obligations for existing co-funded sites to the requirements in place at the time the funding was granted. This could fundamentally change the economics supporting the original co-investment decision by the operator involved, as well as being contrary to the funding guidelines and contracts signed under the prior programs. It would also undermine certainty and therefore willingness to participate in future funding programs if the rules of investment can be changed after the event.

1.3.2. Location is critical

Importantly, the location of a particular site may make it unattractive to more than one (or even any) MNO. Site location is critical to its suitability for providing mobile coverage. Precise placement of sites in a mobile network is essential because all sites interact with all surrounding sites to allow call traffic to move seamlessly between the sites without disruption. It is far more complex than a Wi-Fi network, which is simply several individual hotspots that have no interaction with other hotspots in the network and can be installed anywhere convenient.

Providing mobile coverage to a community or along a highway requires consideration of land topology, proximity, visual amenity, and safety (electromagnetic energy – EME). Consideration of these factors necessarily occurs before cost considerations, as it is often detrimental to service quality if there are compromises made on location. For example, it may be substantially cheaper (say, 50% cheaper) to move to a different rooftop a few doors down or to co-locate a macro tower with another operator. However, if the move results in the need to establish a second base station (or even a small cell) to provide contiguous coverage, then the cost saving will be lost.

A particular site location may not be technically feasible for use by an MNO for reasons including:

- The location of the other sites in the MNO’s network. New sites will only be technically viable if they complement the MNO’s existing network. There is a large difference in existing coverage between the MNOs in Australia. Telstra’s mobile network covers more than 2.6 million square kilometres, which is 1 million square kilometres more than any other mobile network. A site that will only create an “island of coverage” for an MNO, separated from the edge of its existing coverage, is unlikely to be attractive to that MNO.
- Proximity to where most of the MNO’s users are congregating, as mobile network capacity decreases at the edge of coverage of any site.
- The propagation characteristics of the spectrum the MNO has available to supply services may not work effectively at the distance or with intervening obstructions from a site.

Telstra has chosen to invest more heavily in extending our mobile network further into regional and remote Australia than any other MNO. As the first network operator to deploy coverage in a location, there are normally very few, if any, options to co-locate.

1.4. Private investment incentives

Co-location (i.e. use of the same mobile infrastructure by multiple carriers) is less common in the more remote parts of Australia, where Telstra has historically been the only operator to invest in extending a network presence. This area covers around 1 million square kilometres (very nearly the size of New South Wales and

¹⁵ https://www.accc.gov.au/system/files/NBN%20Co_5.pdf



Victoria combined). But the fact that particular MNOs invest in particular parts of Australia should not be construed as indicating market failure. Quite the opposite. Choices to compete in different ways in the national mobile market (including by investing in different geographic areas) are key to why the coverage profiles of the three MNOs diverge in remote and regional Australia. As noted by the ACCC, this is the mark of healthy competition.¹⁶

In Australia's competitive national mobile market, the three main MNOs invest in infrastructure-based rivalry, so they can offer a differentiated service that their target customers will find most attractive. Historically, Australia's MNO's have taken differing approaches to investing in regional coverage and hence the scale of their coverage footprints is different. As they look to augment their existing coverage, each MNO will have differing priorities, largely driven by their existing regional coverage, their overall strategy and other commercial imperatives. These are important attributes of a healthy, dynamic, and competitive industry.

Consequently, while establishing a site in a particular regional location may be a high commercial priority for one MNO, it may not be commercially attractive for any other MNO, including where the MNO is merely sharing or co-locating at that site. For example, one MNO may have predominantly consumer customers that reside in the area so may be looking for locations in order to maximise coverage of residential premises; another MNO may be focussed on supporting local industrial centres; other MNOs may see the area as not commercially viable at all and wholly outside their target demographic.

MNOs may find it more commercially valuable to invest in deployments supporting their ability to differentiate their coverage from their competitors' coverage in the national mobile market, impacting the ratio of required government and industry co-funding. As a practical matter, this may mean that co-investment sites or projects with requirements mandating multi-carrier coverage outcomes will require a much higher level of government cost subsidisation than those allowing single carrier bids subject to standard third-party access obligations.¹⁷ This means less government funds available to spend on other things – like more sites, capacity upgrades, or improvements to infrastructure resilience.

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.¹⁸ Of these commitments, after all currently announced rounds of the MBSP are completed, Telstra will have invested approximately \$300 million and built around 930 new sites to improve coverage for regional areas around the country – more than two thirds of the total sites co-funded by Government under the MBSP since 2015. As part of our contribution to the MBSP we will also have built over 200 small cells for regional community connectivity at Telstra's sole expense. Under the RCP, we will also deliver more than 130 projects investing around \$55 million to improve regional connectivity, with many of these projects intended to extend or improve performance of our mobile network in regional Australia.

¹⁶ Domestic Roaming Mobile Inquiry Final Report, at p 46

¹⁷ E.g. rights of access under the FAC.

¹⁸ [2021 Regional Telecommunications Review A step change in demand \(infrastructure.gov.au\)](#), p 44.



02 Models for infrastructure which supports multiple mobile carriers

2.1. Introduction

In this section of our submission, we provide information relevant to the Committee's ToR to report on the costs, feasibility and public benefits associated with the various models for infrastructure which supports multiple mobile carriers.

2.2. Supporting commercially agreed multi-carrier outcomes

Recently, we have seen interest in potential active sharing models emerging in Australia, including as they apply in the context of government co-investment programs.

Telstra believes the best outcomes for regional communities are achieved by allowing operators commercial freedom to select the most suitable deployment and sharing arrangement case-by-case. We cannot support programs that mandate roaming. Nor can we support other prescriptive forms of active sharing (such as neutral host requirements), which we believe will deliver an inferior experience both in terms of speed of deployment as well as the quality of customer experience outcomes. Overall, we believe that these type of mandated solutions will be detrimental to the objective of improving regional mobile connectivity over the short, medium and long term.

However, we do believe there is scope for a greater degree of commercially agreed infrastructure sharing between operators than there is today. This includes existing and enhanced passive sharing and/or commercially agreed active sharing on future government co-funded sites where costs are shared between participating operators and government.

Along with continued advances in the technology and standards supporting different forms of active sharing, key factors suggesting there should be a stronger emphasis than historically on multi-carrier outcomes as a viable public interest consideration for government funding of mobile infrastructure in Australia include:

- The increasingly challenging economics of addressing remaining regional coverage gaps; illustrated by Federal Government co-funding in the MBSP increasing from ~29% in Round 1 to ~53% in Round 5A.
- The impacts of climate change, which have put a spotlight on the public interest in communities having access to connectivity during natural disasters.
- The recent changes to the structure of the infrastructure businesses of Australia's three MNOs, creating a competitive landscape in which all tower providers will be keen to maximise the number of access seekers on their infrastructure.

Active infrastructure sharing commonly requires the sharing parties to consider and resolve a range of complex operational and commercial matters. The Telstra-TPG MOCN (currently under review by the ACCC) evidences this complexity. But it also showcases the ability of MNOs to structure arrangements to meet complementary regional network requirements to deliver better services for consumers.¹⁹ Based on our experience, we believe MNO led active sharing arrangements are a superior model for pragmatically and cost-effectively delivering multi-carrier regional coverage than alternatives such as neutral host arrangements. They also better maintain commercial investment incentives.

Telstra is also open to commercially agreed active sharing arrangements to support connectivity during natural disasters and other emergency situations, when access to communications is critical. It is clear that in these kinds of situations there would be public benefit in temporary emergency roaming and also to have a backup for a PSMB network – provided it proves possible to ensure the arrangements are technically and

¹⁹ See [Telstra Corporation Limited and TPG Telecom Limited proposed spectrum sharing | ACCC](#).



commercially feasible and will not inadvertently lead to worse availability of communications services, particularly for customers of the host network, when they are most needed.

2.3. Improving multi-carrier outcomes through passive infrastructure sharing

Where it is technically feasible and makes economic sense, MNOs often make use of third-party passive infrastructure (including towers, poles, buildings and housings). Telstra is frequently asked if base station equipment can be shared by multiple mobile operators, to reduce the visual impacts and electromagnetic energy levels.

Use of shared passive infrastructure (such as co-location on the same site) can also improve the economics of site deployment in certain cases. This is because the active technology equipment the MNO installs on a shared site forms only a relatively small proportion of the overall costs. Deployment costs for mobile infrastructure can vary markedly between different individual sites. However, whereas the active technology equipment costs (antenna, baseband technology and batteries) are reasonably consistent in each case, the costs for site build, site access, tower/foundation as well as the costs of providing power and backhaul and access to the site are typically a lot higher in regional and remote areas than in metropolitan areas. This is due to factors such as high mobilization costs, greater distance for power, backhaul and service tracks to traverse to the nearest existing infrastructure, more limited build windows in wet-season Australia and the higher cost to meet building codes for sites in northern Australia due to the risk of cyclones.

Nevertheless, historic rates of passive infrastructure sharing on government co-funded sites such as those deployed under the MBSP have been low. Some of the reasons for this relate to the design, scope and implementation of the co-funding programs, which could potentially be adjusted to encourage more multi-carrier outcomes. These include:

- Extend funding to cover ongoing operational costs – while the MBSP has recently allowed government contributions to be put toward some ongoing costs such as satellite backhaul, other costs associated with the ongoing operation and maintenance of sites in regional locations are excluded. For more remote sites, these operational costs typically well exceed any revenue that can be expected from the site, which means they would run at a loss regardless of how much Government contributes toward the build. Operational costs that could be opened up to government contributions include the costs to maintain and upkeep primary solar powered systems, and for the costs to deploy maintenance staff to sites in very remote and disaster-prone areas, especially when this requires unusual seasonal costs (e.g. far northern Australia in monsoon areas may require helicopter access during flood season). Government funding for such operational costs (for all carriers located at the co-funded site) could make deployment more economically sustainable for more operators.
- Program guidelines (e.g., for MBSP Round 5A) typically require co-locating parties to make capital contributions at least equal to the incremental costs incurred to provision co-location, meaning co-locating parties attract no government funding towards these costs. In line with our previous recommendations,²⁰ we believe the prospects for multi-carrier outcomes would be enhanced if the government funding covered the cost of structural enhancement to accommodate additional tenant(s), covering both towers and additional compound/hut space to accommodate multiple carriers.
- Under previous MBSP rounds, sites were proposed by operators independently of each other, and successful sites were then chosen by the Government. Successful sites were rarely in areas where all operators had an interest in expanding coverage in the same area. An improvement for future co-investment programs could entail a model where operators are invited to independently identify sites where each is interested in expanding coverage in order for Government to elicit areas of potential multi-carrier interest, *before* the MBSP tender begins (subject to appropriate competition law compliant

²⁰ ACCC Domestic Mobile Roaming Declaration Inquiry 2016. Draft and final decision papers available at <https://www.accc.gov.au/regulated-infrastructure/communications/mobile-services/domestic-mobile-roaming-declaration-inquiry-2016>.



frameworks for this). Where multiple MNOs have incentives and a desire to invest in a site(s), this could reduce the funding costs of the physical infrastructure for each operator. The previous successes of the Victorian Regional Rail Connectivity Project and Peri-Urban Mobile Program (**PUMP**) (see further section 4 of our response below) suggest this could be a fruitful approach for improving rates of passive infrastructure sharing along transport routes and highways and in other defined geographic areas.

- **Reduction in civil works and mains-power costs:** Most of the cost in establishing a multi-tenanted site lie in the civil work and mains-power. Where these costs are high, they will deter multi-carrier outcomes. Future co-investment programs could seek to remove this cost barrier (e.g. by providing funding for power for up to three operators, so additional MNOs would be able to connect without needing a power upgrade).
- **Backhaul transmission:** Where technically feasible, it might be possible for the access provider to provide backhaul transmission to access seekers, with funding provided by government to ensure the backhaul costs of all operators were economic.

By building these considerations into the design of Government funding programs, we believe third-party access rates would increase, along with multi-carrier coverage.

2.4. Active network sharing models

The sharing of network infrastructure between MNOs is an established method of reducing capital costs, allowing operators to expand and improve the quality of their services. Whereas many early sharing arrangements were restricted to passive infrastructure, infrastructure sharing arrangements now seen in the global context, particularly in North America and Europe, often extend to sharing of active RAN components and spectrum pooling.

Active infrastructure sharing arrangements include MOCN, MORAN and neutral host models, as described below. The global trend towards increased use of shared infrastructure by MNOs to reduce costs is at least partly a response to the increasing capital investment challenges facing MNOs. The various forms of active infrastructure sharing that are now used by MNOs around the world include the following four models:

- 1) The Multi Operator Radio Access Network (**MORAN**) model. In this form of “active” infrastructure sharing, electrical components in the Radio Access Network (**RAN**) are shared. Spectrum is typically not shared by the MNOs under MORAN arrangements.
- 2) The Multi Operator Core Network (**MOCN**) model, which involves sharing of the RAN *and* spectrum.²¹ The Telstra-TPG MOCN (currently under review by the ACCC) showcases the potential for this model to meet complementary regional network requirements to deliver better services for consumers.²²
- 3) Resale/Mobile Virtual Network Operator (**MVNO**) services and domestic roaming involving the access provider supplying a service which is a version of the access provider’s own retail service, with the device of the access seeker’s customers usually displaying the access provider’s name.
- 4) “Neutral host” models, which can be a MORAN or a MOCN, or even a roaming style service. The key differentiating feature of this active sharing model is that it is a wholesale only model rather than involving a vertically integrated access provider – making the host provider “neutral”.

Potential active network sharing arrangements are typically more complex than passive infrastructure sharing and involve more considerations regarding the potential costs and benefits. These include the following:

- **Cost benefits:** A lot of the efficiencies derived from sharing come from the sharing of passive infrastructure. The items being shared (towers, buildings, etc) are commoditised in the sense that there is

²¹ GSMA, ‘Infrastructure Sharing: An Overview’ (18 June 2019): <https://www.gsma.com/futurenetworks/wiki/infrastructure-sharing-an-overview/>.

²² See [Telstra Corporation Limited and TPG Telecom Limited proposed spectrum sharing | ACCC](#).



little scope to differentiate, and the legal arrangements and access procedures are straightforward. It can be harder to find economic gains at the next level (active sharing), which is much more complex. The active components of the network also account for a smaller and diminishing proportion of per site costs in regional and remoter areas. Hence, the specific circumstances will determine whether the model is economic or uneconomic relative to sharing of only the passive infrastructure.

- **Commercially negotiated outcomes are important to calibrate for benefits:** Telstra sees significant opportunity for commercially negotiated active network sharing arrangements between MNOs to benefit rural and regional Australia. The Telstra/TPG MOCN arrangement currently under review by the ACCC is an example of how a commercially negotiated agreement can solve complementary needs of networks to the benefit of regional customers. As set out in the authorisation application for the Telstra/TPG MOCN²³, a MOCN offers potential benefits (over and above any cost savings on site establishment) including:
 - o Additional wholesale revenues to the MNO(s) contributing infrastructure to the arrangement. These may contribute towards recovery of the MNO's fixed network costs in the relevant area and thereby lower its average costs of serving its own customers so it can offer its services at a lower price and/or make additional investments in its network or customer offering;
 - o Where the arrangement involves spectrum pooling, such as a MOCN, access to each other's spectrum may enable the participating MNOs to reduce congestion by expanding capacity more rapidly and at lower cost than if they were to invest in additional sites. The value of any spectrum contributed by the MNO to the arrangement can also be reflected in the commercial terms of the transaction – enabling, for example, MNOs to extract additional value from their spare spectrum capacity; and
 - o Efficiencies to the sharing parties in the operation and upgrade of the shared RAN.
- **Upfront costs:** Passive sharing arrangements to co-locate equipment in an equipment hut or building, or to place an antenna on a tower are established in the industry, reasonably straight-forward and repeatable. By contrast, arrangements for sharing active equipment require complex bespoke agreements to be negotiated involving at least one equipment vendor with at least two network operators. This introduces a sizeable fixed-cost component into establishing an active sharing arrangement. As the sharing of active equipment at each site typically offers only relatively small incremental economic benefits (see first point), the fixed upfront costs to establish the arrangement may not be off-set unless the arrangement involves quite a large scale. This can make small scale active sharing arrangements non-viable.
- **Impacts on user experience and competitive differentiation:** The nature and extent of these impacts are highly dependent on the specific details of the proposed active sharing arrangement. Telstra will not compromise on service quality by connecting to networks with insufficient scale, quality, longevity and product support (to Telstra's standards) to support a positive experience for our customers. More generally, we will also consider the extent to which the arrangement will generate value for us by maintaining our ability to differentiate our mobile services from those of our competitors.

2.4.1. Additional considerations where there is a non-MNO “neutral host”

When evaluating the potential costs and benefits of active sharing arrangements involving a non-MNO neutral host, additional operational considerations apply. These include:

- **The risk of losing service features:** This is most likely to occur if the neutral host uses a different network equipment vendor. However, even where the same vendor is used, the configuration chosen by

²³ [Telstra Corporation Limited and TPG Telecom Limited proposed spectrum sharing | ACCC](#)



the neutral host could impact our service offering and customer experience as our customers move between our network and the host network.

- **Technical challenges:** Commonly, these involve issues to be resolved around the use of spectrum to support the supply of services over the neutral host network. This can involve technical challenges on a range of matters including managing interference and network synchronisation. Looking to international examples, it is rare to see the neutral host model used to supply a macro network that has to achieve broad coverage and support high levels of traffic, due to the high associated risks of introducing new architectures and the interface complexities with other mobile networks.

In Table 1 below, Telstra has compared some of the key considerations arising under examples of neutral host and MNO led active sharing models with which we have had recent experience (namely, the NSW Government’s Blackspots Neutral Host trial, and Telstra’s proposed MOCN with TPG). This exercise reveals many benefits of achieving multi-carrier outcomes using commercially agreed MNO led active sharing over a neutral host model.

Table 1: Comparison of MNO-led active sharing and neutral host models

| Consideration | MNO led-active sharing (assume MOCN) | Neutral Host model (assume NH has no suitable spectrum) |
|--|--|--|
| Speed / complexity to deploy | MNO’s have experienced staff and are continually deploying or upgrading sites. One decision maker makes things faster. | Inexperienced providers struggle with network deployment. Obtaining multi-party agreement (i.e. deployment siting) accentuates overall slowness. |
| Scale / coverage contiguity | Allows for ready scaling and supports coverage contiguity via extension of host MNO’s existing coverage and commercial arrangements with hosted MNOs. | Typically smaller scale and potentially piecemeal infrastructure, which may not justify the integration costs. May create coverage islands when delivering new coverage for all three MNO’s. Alternative is subsidising Neutral Host over-build, penalising prior investment and stifling investment incentives. |
| Multi-carrier coverage | Will support at least two carriers. Potential for additional carriers via commercial arrangements. | Potential to support coverage by all three MNOs but issues regarding coverage contiguity and over build potential diminish participation incentives. |
| Performance / quality of service (QOS) | Leverages experience of host MNO to improve mobile services in regional Australia. Performance is at the same level that the host MNO offers its own customers. | Neutral Host models involve QOS cost/benefit trade-offs, likely resulting in “lowest common denominator” QOS parameters. Updating technology or improving products is complex. |
| Ownership / maintenance | Ownership and maintenance responsibility taken care of. Only marginal/incremental costs benefiting from existing scale and BAU activity need to be covered in commercials. | Unclear what if any regional based field maintenance support will exist. Setting up field team would add large costs. Insufficient regionally based field staff could lead to reduced resilience. |
| Costs | Overall more cost effective as one carrier controls build. Host MNO can also leverage its efficiencies of scale and equipment costs across its network. | Overall more expensive due to less experience and the absence of volume efficiencies that carriers bring to vendors. Lack of access to suitable spectrum will also increase costs. |



| | | |
|---|--|--|
| Access to suitable spectrum | Spectrum is clearly owned and allocated upfront | Neutral Host typically has no / limited spectrum. Leasing low band spectrum would be expensive, while using mid-band spectrum will add costs due to its limited propagation/coverage. |
| Effect on MNO incentives to invest | Maintains incentive to invest and participate in co-investment programs as it avoids over-build. | Limited incentive for MNO co-investment as this will not create competitive differentiation. Over build activity also penalises past investments and reduces participation incentives. |
| Government contribution | May be economically viable with no/ partial government co-contributions. | Limited incentives for MNO co-investment may increase the required government funding contribution to make the arrangement economically viable. |

2.4.2. Commercially negotiated roaming arrangements

Commercially negotiated roaming arrangements are an established form of active network sharing to achieve multi-carrier coverage. Such commercially negotiated arrangements allow the parties to ensure the arrangement preserves their investment incentives and delivers net benefits for their customers. An example is our previous domestic roaming arrangements with Hutchison.²⁴

2.4.3. Mandated national roaming

Telstra cannot support funding that mandates roaming. Quite simply, if mandated roaming had been in place over the years there would be a large number of places that have coverage today that would never have received it. Mandated roaming, as opposed to commercially negotiated roaming arrangements, ultimately harms consumers by killing MNO incentives to invest, innovate and competitively differentiate. MNOs will scale back expansion of coverage and technology upgrades, leaving regional customers worse off. As set out in the ACCC's submission to RTIRC 2021:

"The regulation of a domestic mobile roaming service will not resolve coverage gaps in regional Australia".²⁵

Understanding how mandated national roaming works is key to appreciating the negative implications it would have on investment in regional Australia:

- Mandated roaming *obliges* MNOs to allow customers of their competitors to use their network, giving the competitors' customers access to the other operators' coverage, network performance and capacity.
- Where an operator, say Operator A, has been investing in coverage and network performance as a competitive differentiating factor, clearly when they are then *required* to make this available to their competitors the incentive to further invest is lost for Operator A.
- Operator B has no incentive to invest either because there is no need as its customers can just use Operator A's network in the areas where it has no coverage.
- The situation is further exacerbated because the capacity that Operator A has invested in for its customers is now being used by its competitor's customers leading to congestion on Operator A's network and a deteriorating performance for all customers. Operator A has no incentive to invest in more capacity to only have it used up by its competitors' customers.

²⁴ See details at <https://www.asx.com.au/asxpdf/20080819/pdf/31brwph2vjk0m1.pdf>

²⁵ See <https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-621-accf.pdf>, p 2.



-
- So, what may sound like a straight-forward solution to improve experience and options for regional customers, ultimately has exactly the opposite effect. That is, it would result in disincentives for MNOs to invest in more and better coverage in regional and remote Australia.

The situation is different when a roaming arrangement is *commercially agreed* by Operators A and B. In that case, the operators have the flexibility to tailor their arrangement to ensure that it preserves their investment incentives, delivers a positive network experience and other benefits for their customers, and enables them to continue to competitively differentiate their offerings in the national mobile market.

2.5. Temporary roaming during natural disasters and other emergencies

Telstra is deeply aware of the importance of access to communications in times of crisis, and we support the concept of limited temporary roaming during natural disasters and other emergencies (TDR).

There is a lot of technical detail to work through to make TDR possible and we are open to working with Government and industry to develop a workable TDR. This work would need to be guided by global standard development and have technical solutions in place to manage 'signaling storm' and congestion risks in emergency situations. The technical and commercial arrangements are likely to be best determined via commercial agreement between MNOs. However, we see a role for government in establishing operating rules and funding industry set up costs.

We are also open to making roaming available as backup for a Public Safety Mobile Broadband (PSMB) solution. We support a carrier based PSMB network akin to the solution used in the US and in the UK²⁶. We are open to roaming as a failsafe to the primary carrier of the PSMB service. We consider that the technical and commercial arrangements underpinning the solution should most effectively and efficiently be left to commercial agreement between MNOs.

Telstra has recently provided a detailed submission to the ACCC on the feasibility of establishing TDR arrangements.²⁷ We would be happy to provide any further information on this topic, or on the benefits of an MNO-led PSMB solution, that the Committee may find helpful.

²⁶ See <https://www.gov.uk/government/publications/the-emergency-services-mobile-communications-programme/emergency-services-network>

²⁷ See <https://www.accc.gov.au/regulated-infrastructure/telecommunications-and-internet/regional-mobile-infrastructure-inquiry-2022-23/public-consultation>



03 Regional connectivity outcomes that meet community needs

3.1. Introduction

In this section of our submission, we provide information relevant to the Committee's ToR to report on community views on single carrier vs multi-carrier outcomes.

The information we provide is based on the feedback we have received from our customers and regional stakeholders. This includes insights from our Telstra Connected Communities program, which brings together our regionally based workforce to listen and respond to the needs of the communities they live and work in.²⁸ It also reflects our own extensive practical experience of co-investing with federal, state and local governments to improve regional mobile connectivity.

Improved connectivity plays a key role in enabling regional Australia to reach its full digitally enabled potential. For example, the National Farmers Federation's Talking 2030 roadmap outlines five pillars that will enable the Australian agriculture sector to exceed \$100 billion of farm gate output by 2030. Pillar 3 (entitled unlocking innovation) outlines the productive potential of agricultural technology, where it is stated that the full uptake of digital technologies could add an estimated \$20.3 billion to farm gate output.²⁹

In education, amongst other programs of work, recently we worked with South Australian Education to deliver high-speed fibre optic cable to more than 500 schools, providing internet speeds of up to 1 Gbps and delivering improved connectivity to regional towns across South Australia. Working with an independent third party we were able to demonstrate the economic benefit for South Australia of this investment:

- Prior to COVID-19 impacts, between \$1.8 and \$2.2 billion were forecast to be added to South Australia's Gross State Product (GSP) over the next 10 years as a result of the SWiFT program.
- The potential to add over 14,000 new jobs, many in regional areas, over the next six years in the fields of ICT, construction, finance, education, health and more.

Above all, it is our experience that those living and working in regional communities want government and industry co-investment programs to be *effective* in improving their community's access to quality connectivity. This is critical to drive regional development and integral to reducing the regional/metro digital divide. As recently put by the RAI in their Regionalisation Ambition 2032:

"At the RAI we believe in an Australia where our regions have the infrastructure, services, the investments, and the people that they need to thrive and to take their rightful place in our nation's story".³⁰

3.2. Improving digital inclusion for regional and remote communities

A key pillar in RAI's regionalisation ambition is for regional Australia to be equipped with the amenity, services and lifestyle to sustain regionalisation. A core aspect of that involves increasing regional Australia's Digital Inclusion Index (ADII) score to 73 or above, equal to metropolitan Australia. This is because digital connectivity is a critical enabler for many services and functions essential to a community's liveability. In 2021, the ADII score for regional Australia was 5 points behind metropolitan Australia, reflecting a gap in each of the three elements of digital inclusion - access, affordability, and ability. By 2032, it is RAI's ambition to bridge this metro/regional geographic digital divide through:

²⁸ See details at: [More boots on the ground in regional Australia, and more support for customers \(telstra.com.au\)](https://www.telstra.com.au)

²⁹ Source: Perrett, E., Heath, R., Laurie, A. and Darragh, L. (2017). *Accelerating precision agriculture to decision agriculture – analysis of the economic benefit and strategies for delivery of digital agriculture in Australia*. Australian Farm Institute and Cotton Research and Development Corporation.

³⁰ <https://rebalancethenation.com.au/common/Uploaded%20files/Rebalance-the-Nation/Rebalance-the-Nation-Report-2022.pdf>, p 10.



- Investment in access and affordability of digital connectivity in regional Australia, improving internet and mobile coverage across Australia's regional communities, and ensuring resilience of critical networks during natural disasters; and
- Fostering digital literacy and capability in line with improved access, ensuring regional Australians and businesses can harness the benefits of digital tools.³¹

This requires government funding, and for it to be used in the right way to fund the right things to drive optimal outcomes.

The effectiveness of place-based connectivity solutions depends on deep engagement with the communities and local governments the initiatives are intended to benefit. But sometimes local councils don't have the knowledge, time or resources to engage in co-funding programs. An important RTRIC recommendation in this respect, which we endorse, is for input at local government level to be supported with resources such as expert advice to assist local governments to undertake digital planning and participate in telecommunications infrastructure programs, to help drive better outcomes for their communities.³²

- A recent example of positive local government involvement was in the Snowy Valleys community of Tooma. Through local initiative the community raised \$235,000 by way of a community co-contribution and their project received additional funding under the RCP to deploy a Telstra 4GX macro cell base station in Tooma. The new base station will enable the uptake of new agricultural and business technologies for livestock and dairy producers and local tourism operators, as well as improving access to telehealth, education and emergency communications.³³
- Another good example is the connectivity improvements that were able to be delivered for far western Queensland in the shires of Barcoo and Diamantina through collaborative work at the local, state and federal government levels.³⁴

There also needs to be focussed funding to improve digital access and literacy for remote First Nations communities. We know that First Nations peoples are the most digitally excluded; the ADII shows that the level of digital inclusion for First Nations peoples is eight points below the national average. The Federal Government has committed to the National Agreement on Closing the Gap Target 17: "by 2026, Aboriginal and Torres Strait Islander people have equal levels of digital inclusion"³⁵. This target has increased significance given the transformation to online service delivery by 2025³⁶.

The key barriers to digital inclusion are access, affordability and digital ability. To understand the full extent of digital exclusion for people living in remote First Nations communities, Telstra is funding Mapping the Digital Gap, a four-year (2021-2024) digital inclusion research project in 12 remote communities. There are around 1,100 discrete remote First Nations communities that are home to around 93,000 First Nations peoples. Since 2016 Telstra has also funded inDigiMOB, a pioneering co-designed digital inclusion program, delivered by First Nations Media Australia. From 2016-2019, inDigiMOB tested a Digital Mentors model to support a transfer of essential digital skills and knowledge to community members. The three-year evaluation³⁷ identified positive outcomes from the program including employability skills, essential access to technology, and basic literacy, as well as maintaining language and culture, which are supported through local organisational

³¹ <https://rebalancethenation.com.au/common/Uploaded%20files/Rebalance-the-Nation/Rebalance-the-Nation-Report-2022.pdf>, pp 17-18.

³² See 2021 Regional Telecommunications Review A step change in demand (infrastructure.gov.au), pp 26-27

³³ <https://www.infrastructure.gov.au/sites/default/files/documents/round1-regional-connectivity-program-funded-projects-february2022.pdf>

³⁴ See Premier marks milestones of western shire telecommunications - Ministerial Media Statements

³⁵ Closing-the-Gap Target 17: By 2026, Aboriginal and Torres Strait Islander people have equal levels of digital inclusion 7B. Table B: Outcome 17 | Closing the Gap

³⁶ Digital government by 2025 Digital government in 2025 | Digital Transformation Agency (dta.gov.au)

³⁷ Guenther, J (2020) Evaluation of inDigiMOB Year 3, final report. Bachelor: Bachelor Institute of Indigenous Tertiary Education. Source: https://indigimob.com.au/wp-content/uploads/2020/11/INDIGIMOB_EVALUATION-REPORT_Y3_V1.5_SM.pdf



structures and relationships. Government co-investment funding for initiatives like these would enable them to be scaled up, bridging the digital inclusion gap for more First Nations communities.

3.3. Being smart about what is funded

Government co-investment programs, such as the MBSP and the RCP, have been critical in supporting industry to successfully improve regional mobile connectivity. However, most remaining black spot candidate locations are increasingly remote and costly to build and operate while also benefiting fewer customers. This makes reductions to enduring blackspots in many regional locations commercially unviable without reform to program guidelines. We have identified several potential improvements to the MBSP, as summarised below:

- Removal of the government \$500,000 funding cap – the declining economics of mobile black spot sites makes it more difficult to find sites that are economic to bid for even with government contributions. Removing the cap while still awarding funding on a value for money basis would help support the delivery of new coverage for areas unserved.
- Extend the MBSP to include new indoor coverage, or infill coverage, in urban fringe, rural and remote areas – for many customers who raise concerns over coverage the issue is patchy, unreliable and/or absent indoor coverage. These customers often perceive the experience they are having to be the result of a wider black spot. Recognising new in-building coverage would address areas where customers find existing coverage does not meet their indoor performance expectations.
- Extend the definition of MBSP eligible solutions to include coverage extension devices such as approved³⁸ external antennae, smart antennae for in-home use, and repeaters for in-vehicle use. Coverage extension devices for vehicles can dramatically increase existing coverage for those who use it and need it most. Extending the coverage of existing mobile towers via coverage extension devices is the most cost-effective means of providing new handheld coverage in areas with poor economics due to sparse populations. Mobile repeaters vastly improve service quality and benefit consumers at the outskirts of a town or otherwise on the fringe of reliable mobile coverage. Subsidy programs for coverage extension devices could be targeted to customers who are likely to benefit from them the most.
 - One approach could be allowing operators to bid for a fixed amount of money to provide discounts on extension devices. Recently, Telstra has entered an arrangement with the South Australian Government to cover the funding of professionally installed coverage devices for residences and small businesses in the Adelaide Hills and Mount Barker Local Government Areas. This program will run from June 2022 to June 2023 and will enable indoor coverage to be received by circa 900 premises at an expected cost to Government of equal to or less than the cost of funding a single base station in the area (which would have afforded coverage for far fewer premises).

³⁸ “Approved” mobile repeaters are those approved by a MNO for use on their network. By default, all repeaters are illegal in Australia, except those specifically exempted by the ACMA on its website: <https://www.acma.gov.au/list-exempt-repeaters>. The ACMA exempts devices the MNOs.



- To illustrate the benefit mobile extension devices can provide, Figure 1 below shows a comparison of Telstra coverage maps with and without a mobile extension device.

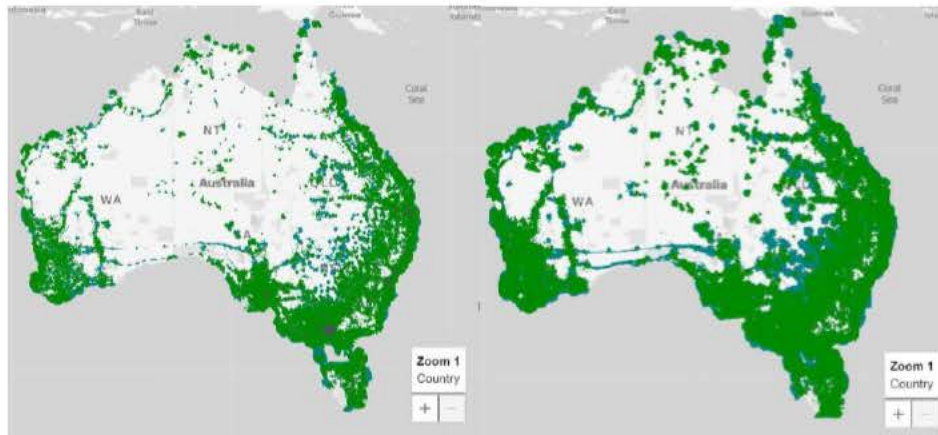


Figure 1: Left: Mobile handset coverage. Right: Mobile coverage with external antenna

- Allow funding to be allocated for new and upgraded capacity backhaul links where these directly support new or improved mobile coverage – upgrades to existing fibre backhaul and core capacity should be considered eligible for funding where these directly support new or improved (e.g. technology upgrades) mobile coverage in regional and remote areas. These areas of investment will maximise the use of existing infrastructure to support new coverage and provide cost effective solutions to the MBSP. It would also help address network congestion concerns as outlined in the 2021 RTIRC report.
- Government linking connectivity literacy and awareness program funding to awarded co-investment locations to support and better leverage the improvements made to connectivity in a specific region. This is to ensure that once the infrastructure is available, regional communities know about it, and know how to make best use of it to deliver on its full potential. In this regard, we welcome the recent announcement³⁹ of extended funding for the Regional Tech Hub.⁴⁰
- Extend the definition of MBSP eligible solutions to include satellite handsets. Satellite handsets can be an effective and resilient way of attaining coverage in areas prone to natural disasters (especially when a natural disaster occurs) and should therefore be candidates for funding. Any subsidy program for satellite handsets could also be targeted, possibly focusing on local government groups and/or organisations involved in disaster assistance activities.
- Extend black spot qualifying criteria to include public Wi-Fi or public broadband – deployment proposals that include the provision of public Wi-Fi (or any other mobile network wireless broadband medium) in addition to mobile coverage could be factored into the MBSP guidelines. This would provide customers of other operators with access to data services outside of their mobile coverage. Calls and texts could also be made using voice and SMS over Wi-Fi technology or via OTT voice and messaging services through third party applications.

RCP is a welcome addition to the MBSP in supporting a holistic “place based” approach to improving connectivity in regional Australia because the program’s focus is far broader than mobile black spots alone. RCP provides a degree of flexibility that we support and allows for a wider range of connectivity solutions to be considered to meet the needs of regional and remote communities. Some of the benefits of the RCP include:

³⁹ [Albanese Government to better connect, inform and empower Australians | Ministers for the Department of Infrastructure](#)

⁴⁰ See details of the support offered by the Regional Tech Hub at <https://regionaltechhub.org.au/>



-
- Support for a broader program of activity that can allow for upstream build (in particular, transmission upgrades), not just downstream coverage. This means enables works that improve capacity and end customer performance as well as basic connectivity.
 - For mobile projects it is less prescriptive as it allows for improvement in coverage depth not just new outdoor coverage, so we are able to better address black spots in indoor coverage.
 - It is not focused on narrow specified prediction thresholds or metrics such as the area of new outdoor coverage, rather allows a more holistic consideration of social and economic community benefits to be considered.
 - More flexibility to combine different projects, without firm single solution funding caps. Funding applications for groups of sites – for example for a stretch of highway including townships along a route, as well as funding for coverage extension devices to extend the range for existing towers, can improve both the community benefits of the extended coverage and the economics of investment in the infrastructure, compared to individual applications for each new site along the route

Last but not least, program design also needs to give prospective program participants (i.e. industry co-investors) sufficient *time* to develop true value adding response proposals. Commonly co-investment programs stipulate short response times of 6-8 weeks, sometimes over holiday periods when staff availability is limited. Providing more time to respond, for example 12-16 weeks, would enable proposals to be developed with greater community input and/or involving integrated solutions (e.g. multi-site clusters), delivering greater regional benefits.

3.4. A holistic approach with better cross-government coordination

A collaborative approach to combined government regional communications funding is no simple endeavour. However, more powerful and lasting improvements will be achieved where time and effort are invested in:

- Establishing clear, holistic and forward-looking priorities and desired connectivity outcomes.
- Engaging deeply with the communities and local governments the initiatives are intended to benefit.
- Planning and co-ordination between different levels of government to achieve an overall optimal outcome.

3.4.1. Improving arrangements for access to land for sites

When we are looking for options to improve connectivity in regional and remote areas a range of challenges is frequently encountered around site acquisition and associated approvals, which can cause us to be unable to proceed.

Local and state/territory governments can play a role in supporting site acquisition and associated approvals to reduce the challenges in the deployment of solutions. Government landowners are in a unique position to reduce the cost of providing new telecommunications infrastructure in regional and remote regions by reducing rents on government lands, and reforms to charges for access to Crown land could yield significant costs savings for industry in deploying regional mobile infrastructure. In addition, improvements to current planning permit and approval processes and requirements for access to land could help make regional deployment less costly and more efficient.

These matters are covered in detail in Telstra and Amptel's responses to the ACCC's Regional Mobile Infrastructure Inquiry⁴¹, which we encourage the Committee to read in conjunction with this submission. Further details are also included in Amptel's separate response to this Inquiry.

⁴¹ See <https://www.accc.gov.au/regulated-infrastructure/telecommunications-and-internet/regional-mobile-infrastructure-inquiry-2022-23/public-consultation>



3.4.2. Better leveraging the combined power of government

There also needs to be a more coordinated approach to government funding across federal, state and territory and local governments.

It has been our experience to date that overlap between, and differing requirements for, funding by different government initiatives creates added work and complexity for applicants. Multiple different requirements for different federal and state funding programs can also create a resource barrier to potential applications, even for more well-resourced applicants such as Telstra. In the event of prescriptive sharing requirements being introduced for different programs, this situation would be worsened by the potential for conflict in these requirements.

The current multi-layered approach of funding at different federal and state/territory levels can also make it harder to establish the case for government support for an individual site than if the government funding was being obtained from a single source.

3.4.3. Consideration of dependences outside of the telecoms industry

A co-ordinated approach to access to regional connectivity also needs to consider dependencies on those outside of the telecommunications industry. This is particularly true when it comes to power resilience. Many service interruptions during and following natural disasters are due to loss of mains power.⁴² Unreliable mains power can also significantly interrupt access to communications in regional and remote areas during normal times.

Our mobile sites have site-specific back-up power arrangements (typically batteries, and permanent generators at some critical sites) to provide power resilience during mains power outages. But mains power outages during times of natural disasters can have broad geographical impacts which take out not just mobile sites, but supporting transmission infrastructure which also requires power.

Power utility companies are responsible for mains power resilience and for restoring mains power where outages arise. Via our peak industry body (the Communications Alliance) we're working with the electricity industry to improve collaboration and information sharing so there is better visibility of overall priorities, and by extension, service restoration times. Additionally, in some locations power companies are working with us to install Stand Alone Power Systems (SAPS) to improve the reliability of electricity supply to our infrastructure.

3.5. Embracing emerging technologies such as LEO satellites

Looking to the future, it is also important that Government and industry keep an eye on the potential for alternative technologies to deliver infill coverage for users in these locations and adjust policy settings accordingly. For example, in areas where emerging technologies such as Low Earth Orbit (LEO) satellites can provide complementary infill coverage and redundancy for public safety purposes, this will enable government funding for mobile infrastructure to be targeted at regional community requirements for higher capacity mobile services in population centres.

The potential for LEO satellites to help support regional and remote connectivity in Australia, and globally, is an area of intensifying innovation. Table 2 below contains a comparison of the three main types of satellite technology. There is currently one LEO satellite operator, Starlink, offering consumer internet services (fixed broadband to homes and businesses). LEO satellite services direct to traditional mobile handsets in Australia are still expected to be some years away.

⁴² <https://www.acma.gov.au/publications/2020-04/report/impacts-2019-20-bushfires-telecommunications-network>



| | Geostationary | Mid-earth Orbit | Low Earth Orbit (LEO) |
|---------------------------------------|---|------------------------------|---|
| Orbital Altitude | 36,000km | 2,000-36,000km | 400-600km |
| Latency | 700-800ms | From 150ms | 20-150ms |
| Number to cover Earth | 3 | Dozens | Hundreds to thousands |
| Bandwidth Density⁴³ | 10s of kbps/km ² 100s of kbps/km ² (HTS/VHST) | 100s of kbps/km ² | 100s – 1,000s kbps/km ² |
| Typical use case(s) | Broadband internet. Broadcast TV. | Broadband internet. | Voice and DTH. Broadband internet. IoT. |

Table 2: Comparison of Satellite Capabilities

We see satellite technology playing a complementary role in meeting some of the connectivity needs of regional communities. In some instances, satellite is the only option available, and will likely remain the only option where connectivity via a terrestrial network (fixed or mobile) is not available or not viable (either technically or commercially). Satellites can also play a role during disaster situations (bushfire, flood, cyclone) where terrestrial mobile services are disrupted.

Telstra currently uses a Geo-stationary Earth Orbit (**GEO**) satellite to deliver telephony services as part of our USO obligation to some customers in remote areas. A GEO satellite is suitable for this use case as it relies on established technology, is stable over time, and can provide a large coverage footprint with a single satellite.

LEO satellites are expected to be capable of providing greater capacity and more responsive communications (with lower latency) than what is possible via GEO satellite technology. LEO satellites orbit much closer to the earth than GEO satellites, which means it takes far less time for signals to travel to and from the satellite. This is important for real-time communications like voice and video conferencing. Additionally, as LEO satellites involve large satellite fleets, they can offer greater aggregate capacity relative to other satellite options, with each individual satellite targeting only a small footprint on the earth's surface.

However, the capacity of LEO satellites is typically much smaller than that offered by a terrestrial mobile network, because they are hundreds of kilometres away from the surface of the Earth and each satellite spotbeam covers an area far greater than the size of most terrestrial mobile cells. This means that the speeds an individual may experience are highly contingent on the number of active users within the spotbeam.

Today in Australia, there are no LEO services capable of operating directly to a traditional mobile handset. This is because the power output of a mobile is too low for the current generation of LEO satellites to detect. However, in August 2022, Starlink announced⁴⁴ a partnership with US based T-Mobile to commence developing a second generation of Starlink satellites that would be capable of providing some services to a traditional mobile handset. The latest generation iPhone 14 has also been released with a limited direct handset facility to contact emergency services via text using an app, initially only on the US and Canada. While direct handset capability for voice and data is likely still several years away and will take time to become supported in Australia, such solutions could offer connectivity to traditional mobile devices outside current terrestrial mobile coverage, or during disaster situations such as bushfires, floods or cyclones.

⁴³ By way of comparison, Telstra's terrestrial mobile network delivers over 1,000,000 kbps/km².

⁴⁴ "So, it's really quite a difficult technical challenge." <https://arstechnica.com/science/2022/08/forget-5g-wireless-spacex-and-t-mobile-want-to-offer-zero-q-coverage/>



04 Relevant examples of successful multi-carrier outcomes

4.1. Introduction

In this section of our submission, we provide information relevant to the Committee's ToR to report on examples of successful multi-carrier outcomes and their applicability in the Australian context.

4.2. Examples of multi-carrier outcomes through passive sharing

There are typically costs involved in providing access to passive infrastructure to one or more additional MNOs or other third parties. These can include the costs of reinforcing a mobile tower for the required added strength; enlarging the concrete foundations for a tower to carry the added weight; expanding the size of the neighbouring hut to accommodate multiple operators and/or meeting the additional power requirements of multiple operators. Nevertheless, co-location of the active equipment of multiple MNOs at the same site is a proven successful way to reduce the cost of site deployment and support multi-carrier outcomes in Australia.

While there are limits to the ability and incentives for Telstra to share passive infrastructure discussed earlier in this submission – particularly in regional and remote areas where we are the only operator to have invested in extending our network - overall more than a third of our sites (35%) are co-located, and this percentage is even higher for our competitors.⁴⁵

4.2.1. Case study - Victorian Rail Connectivity Project

The costs of ensuring passive infrastructure can support multiple carriers can sometimes be reduced where interest in sharing a proposed new site is expressed early, enabling co-design and planning to support access for multiple MNOs on the initial build. A good recent example of successful co-location and collaborative arrangements between all three MNOs in regional Australia was the Victorian Regional Rail Connectivity Project.⁴⁶ Supported by funding of \$18 million granted by the Victorian Government in 2018, all three MNOs worked together to improve coverage along some of Victoria's busiest regional train lines. This was done through co-building of infrastructure for the project (35 new mobile towers plus mobile signal boosters on about 25% of V/Line's Vlocity trains), including headframe sharing across MNOs, sub-leasing of towers, sharing of designs, simultaneous consideration of fibre builds and alignment of rigging crew.

4.2.2. Case study – Peri-Urban Mobile Program

The Peri-Urban Mobile Program (**PUMP**) is another example of a good approach to co-investment program design by the government, resulting in successful multi-carrier coverage through passive infrastructure sharing.

Rather than just issue draft program guidelines and then have a single round of written submission feedback, as had been done in some of the previous MBSP rounds, the Federal Government took a co-design approach for PUMP. They met with industry participants in person, and actively took on feedback related to the program structure. This was run as an iterative process, with multiple points of discussion and consultation.

The Government also looked to address two key issues Telstra had flagged as blockers to successful co-location in past MBSP programs: (i) that third parties were not aware of any bid for locations until the announcement of successful projects and (ii) that government co-funding money was not available to cover the costs of parties looking to co-locate post the awarding of projects.

⁴⁵ See <https://www.accc.gov.au/system/files/Mobile%20Infrastructure%20Report%202022.pdf>, pp 15-16

⁴⁶ See VicTrack - Regional Rail Connectivity. <https://www.victrack.com.au/projects/past-projects/regional-rail-connectivity>



The key design changes for PUMP were:

- PUMP ran in a two-stage process. First all participants nominated their sites of interest, and the full site list was subsequently published.
- In the second 'project submission' round, participants could only bid for locations that had been nominated and could not bring any new sites into play (all demand had to be exposed in the first round)
- Parties intending to co-locate were able to nominate and bid for co-funding.

It was also helpful that PUMP targeted coverage improvements in clearly defined geographical areas – with the Urban Fringe Area defined as a “corridor located either side of the ‘Major Urban’ boundary of the Major Cities – the corridor extends to a distance of two kilometres (2 km) inside the Major Urban boundary, and 15 kilometres (15 km) outside the Major Urban boundary” and shape files provided for the relevant areas. Further, concerned MPs were asked to nominate three priority locations within their electorates, with extra points awarded to MNO bids covering these locations (while still allowing flexibility for bids covering other locations). This geographic targeting reduced the number of potential candidate locations, relative to much broader programs such as the MBSP, increasing the prospects for MNOs to be interested in establishing coverage at the same sites.

Telstra was awarded 16 successful projects under PUMP of which 14 were new greenfield builds, where Amplitel will be building a new structure. The Amplitel team has informed us that there is interest in co-location for 4 of these sites. A combination of the geographical areas targeted under PUMP and the program design are expected to result in a 36% uptake of co-location, whereas past programs have been below 5%. The success of the expected outcome can also be credited to the establishment of Amplitel, and its operation as a wholesale-only tower provider, which overcomes and mitigates some of the perceived and actual risks of MNOs collaborating with each other in competitive bid programs.

4.3. Examples of multi-carrier outcomes through active sharing

There are many examples of commercially agreed MNO led active sharing arrangements having been successfully used to deliver multi-carrier outcomes, both overseas and here in Australia.

Overseas, active infrastructure sharing arrangements are currently being used in New Zealand (managed by Rural Connectivity Group through a joint venture of all three MNOs), Canada (between Bell and TELUS) and numerous European countries.⁴⁷ Another example is the Shared Rural Network (SRN) in the UK, which is a joint venture arrangement between the UK’s four MNOs.⁴⁸ An important point to bear in mind when considering these examples is that the circumstances in other countries, both in terms of market structure and especially geography, can be markedly different from the Australian context and the reaching of a given arrangement elsewhere does not necessarily mean such arrangements are suitable for adoption. However, what is consistent is that in all cases where active RAN sharing has been deployed internationally, it has been commercially negotiated between the operators concerned.

Instances of active infrastructure sharing in Australia include:

- In 2004, Telstra and Hutchison entered into an agreement for Telstra to access Hutchison’s existing 3G RAN. The existing spectrum allocations of each Applicant were also shared.⁴⁹ The arrangement concluded in 2012.⁵⁰

⁴⁷ See Coleago Consulting, Network sharing & managed services: <https://www.coleago.com/services/network-sharing-managed-services/>.

⁴⁸ See details at: <https://researchbriefings.files.parliament.uk/documents/SN07069/SN07069.pdf>

⁴⁹ ZDNet, ‘Telstra, Hutchison share 3G network’ (4 August 2004): <https://www.zdnet.com/article/telstra-hutchison-share-3g-network/>

⁵⁰ Lucy Battersby, ‘Final countdown for ‘3’ as Telstra-Hutchison sharing deal ends’ (Sydney Morning Herald, 5 July 2012) <https://www.smh.com.au/business/final-countdown-for-3-as-telstra-hutchison-sharing-deal-ends-20120704-21hil.html>.



-
- Optus and Vodafone 3G MORAN Agreement: In 2004, Optus and Vodafone entered into an agreement to share 3G network sites and radio infrastructure nationally, comprising more than 2000 base stations.⁵¹
 - The MOCN arrangements proposed to be entered into between Telstra and TPG, which are currently under consideration by the ACCC.⁵²

4.3.1. The in-building Distributed Antenna System (DAS) model

In-building coverage (IBC) systems provide dedicated coverage and capacity inside specific buildings. It is very common for MNOs to share the DAS component of IBC systems, as often it is not technically feasible to install multiple sets of active equipment in the same building.

Infrastructure sharing for IBC DAS's is managed in Australia under a long and well-established Memorandum of Understanding (MOU) in-place between the three MNOs, which guides how shared infrastructure is designed and built to suit the different needs of all three MNO's; allocates responsibility for deployment and ongoing operation and maintenance; and establishes process and principles for the sharing of costs among the participating MNO's.

There are many hundreds of examples of where the DAS MOU has been successfully used to share infrastructure and costs between the MNOs to deliver multi-carrier indoor coverage. These include in shopping centres, airports, tunnels, high rise office blocks and even in Parliament House.

The guidance, principles and processes, and commercial constructs contained in the DAS MOU, however, may also be relevant and effective for addressing challenges that MNOs could face under co-funding programs that involve active sharing on macro mobile sites. For MNOs that don't have an existing active sharing contract, prospective access seekers could pay a proportion of the costs of the site in line with their usage of the site, similar to current industry arrangements for DAS that are installed inside buildings, where three MNOs all accessing a DAS, as an example, would each pay 1/3rd of the cost.

In short, an adaption of the DAS MOU model could be useful and effective as the basis for active or enhanced passive sharing between multiple MNOs for macro co-investment sites. This would of course, require the relevant government co-investment program to provide time for providers to reach such an inter-carrier agreement, and for tender rules to allow this model to be used as the method of deployment.

⁵¹ Optus: Optus and Vodafone Australia Finalise Agreement to Roll Out Shared 3g Network (Media release, 19 November 2004) <https://www.optus.com.au/about/media-centre/media-releases/2004/11/optus-and-vodafone-australia-finalise-agreement-to-roll-out-shared-3g-network>

⁵² Full details of these proposed arrangements are set out at: [Telstra Corporation Limited and TPG Telecom Limited proposed spectrum sharing | ACCC](#)