TELSTRA CORPORATION LIMITED

Submission to ACCC's Regional Mobile Infrastructure Inquiry

Public Submission

30 August 2022

Public Version

Contents

Public Version

Executive Summary

Improving mobile coverage through infrastructure investment and access in regional Australia

The purpose of this important Inquiry is to inform future government policy decisions that will help regional Australia to reach its full digital potential through improved mobile coverage and service quality.

To ensure lasting and positive outcomes for those living and working in regional communities, in our view, government policy and funding programs concerning the provision of towers and associated infrastructure should be designed with the following seven key considerations in mind:

1. **The higher costs of regional network deployment**: High levels of ongoing investment are needed to establish and maintain a quality mobile network. In regional and remote areas, these costs typically increase substantially, due to higher costs of both establishing and maintaining sites (accessing land, obtaining planning approvals and permits, building towers and equipment huts, ensuring access to adequate power and backhaul and ongoing site maintenance and operation).
2. **The importance of government co-funding:** Because of the challenging economics, there are likely to be few new economically viable sites in regional and remote areas. Continued government co-funding programs to enable extension of mobile coverage in these conditions are both welcomed and essential.
3. **The importance of quality of mobile service**: In order to improve social and economic outcomes for regional and remote communities and businesses, government funding programs must recognise the importance of quality of mobile service alongside basic coverage. Upgrades to 4G capacity and to 5G (and commensurate augmentation of backhaul and mains power) should continue to be a priority. Initiatives to improve indoor coverage and coverage for transport corridors (such as through individual coverage extension devices) should also be a policy priority.
4. **A strategic, holistic approach by government at all levels**: As recommended by the 2021 Regional Telecommunications Inquiry, there should be a collaborative and considered approach to combined federal, state and local government funding. Reforms to charges for access to Crown land could also 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.
5. **Incentivising ongoing regional investment by MNOs**: The importance and effectiveness of mobile network operator (MNO) investment (including co-investment) in improving mobile coverage outcomes in regional and remote areas must be recognised. To create conditions which maximise ongoing investment by MNOs in regional infrastructure and services, Government policy should:
    a. **Recognise the importance of competitive differentiation to MNO regional investment:** At the same time as costs of deployment in regional and remote areas are typically higher, 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 competitive differentiation in the national mobile market.
    b. **Support flexible, commercially driven, shared access arrangements:** Given the economic challenges of regional investment, it is important for MNOs to have the flexibility to use shared infrastructure where this makes practical and economic sense. Integral to the effectiveness of future regulatory and policy settings is that they do not unduly limit the sharing choices available to operators – such as by trying to "pick winners" or manipulate outcomes between different potential active sharing models. There are a range of commercial and practical drivers for MNO

decisions to share infrastructure (or not). 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. This is the mark of healthy competition. Any move towards prescriptive and inflexible mandated sharing arrangements under future government co-funding programs would be antithetical to ongoing private investment incentives and improved outcomes for regional Australia.

c. **Complement private investment:** Government funding programs should be designed to complement and incentivise further private MNO investment. They should not "crowd out" private investment by overbuilding coverage or capability already in place, or by limiting government funding to specified infrastructure delivery models (such as neutral hosting).

6. **Embrace emerging technologies:** It will never be feasible to extend terrestrial mobile coverage everywhere in Australia. In some of the hardest to reach areas, Telstra expects emerging technologies such as Low Earth Orbit (LEO) satellites will be able to complement traditional mobile services. Accordingly, we consider expansion of terrestrial mobile networks to "new ground" in regional and remote areas should no longer be the automatic default policy objective for Government.

7. **Impact of the recent MNO tower divestments:** The recent changes to the structure of the infrastructure businesses of Australia's three MNOs should be expected to flow through to a competitive landscape for access to infrastructure facilitating more efficient use of mobile infrastructure.

Feasibility of temporary roaming during natural disasters

A separate aspect of the Inquiry covers the Minister's direction to the ACCC to investigate the feasibility of providing mobile roaming during natural disasters or other emergencies. Telstra is deeply aware of the importance of access to communications in times of crisis, and we support the objectives behind the concept of limited temporary roaming in such cases.

We welcome the opportunity to work collaboratively with the industry and Government to develop a Temporary Disaster Roaming (TDR) solution. This solution will need to address the risks to network resilience and performance and have regard to considerations including the following:

- **Utility:** TDR will have only limited usefulness in many emergency scenarios. When one network is damaged due to a disaster in an area, then it is likely the same disaster will have damaged all networks in the area. Expectations on what the solution can deliver must be informed by this context.

- **Defined duration and scope:** Appropriate Government controls will need to define the occurrence and geographic extent of a disaster where TDR will be implemented, and these controls need to be aligned to the capabilities and specifics of the solution ultimately adopted.

- **Impact on the surviving network:** TDR poses a risk to the resilience of any surviving network and to connectivity and performance for the customers of that surviving network:

    - Over the medium term, we therefore consider the best TDR solution would be based on the already existing 3GPP standards for 5G, as a standardised approach introduces network/device capabilities specifically to mitigate the risk to the resilience of the surviving network.

- Ahead of 5G reaching wide coverage from every MNO, a purpose-built TDR solution would need to de-risk carriage by earlier mobile generations, potentially including prioritisation, throttling, and/or limitations to traffic types permitted.

- **Implementation costs:** There will be a significant cost to industry to establish the network capabilities, overlay procedures and IT system interfaces required to safely deploy TDR, and Government funding could be used to cover these costs. Commercial terms would also need to be agreed between MNOs to ensure that TDR does not become a disincentive for MNOs to continue to extend and harden their networks.

- **Time to implement:** Given the complexity and risks involved, any introduction of TDR will take time to implement.

Given the time TDR is likely to take to implement, we recommend that the standards-based Cell Broadcast Emergency Alert be fast-tracked as an interim solution. This capability extends on existing SMS Emergency Alert by sending text messages to all mobile phones in an area regardless of their network operator.

1 Introduction

The ACCC's *Regional Mobile Infrastructure Inquiry* (**the Inquiry**) is being conducted following a direction[1] from the Minister under section 496 of the *Telecommunications Act 1997.* The purpose of the Inquiry is to help inform future Government policy decisions concerning the provision of mobile telecommunications in regional Australia, including future initiatives to improve mobile coverage, capacity or competition.

Telstra welcomes the opportunity to provide our views to this important Inquiry. We support the 2021 Regional Telecommunications Independent Review Committee (**RTIRC**) recommendation[2] to develop a long-term investment and planning framework for digital infrastructure including increased coordination and investment between the Australian, state and territory governments and other relevant sectors to address regional connectivity. We also endorse the RTIRC recommendation for continued and enhanced government investment initiatives, given the significant and enduring economic challenges of telecommunications deployment in regional and remote Australia.[3] We anticipate the Inquiry will help inform the Government's future strategic policy and investment framework through "real world" insights from those responding, resulting in considered and holistic initiatives that will maximise coverage and service quality outcomes for Australians living and working in regional communities and help regional Australia to reach its full digital potential.

We note the Inquiry encompasses infrastructure located in regional, rural, remote and peri-urban areas within Australia. Peri-urban areas sit outside those traditionally defined as regional locations, although they may have features similar to regional areas when it comes to connectivity. In this response, we use the term "regional" to collectively refer to regional, rural and remote areas. We separately refer to peri-urban areas. In some cases, we also specifically call out challenges in remote Australia.

Our submission is structured around the eight central themes covered by the Inquiry, as follows:

- **Section 2** highlights the high levels of ongoing investment needed to establish and maintain a quality mobile network and provides an overview of the core components of the passive and active infrastructure Mobile Network Operators (**MNOs**) must establish and maintain in order to supply mobile services in regional and peri-urban areas.
- **Section 3** explains the steps operators need to take to access land to install telecommunications infrastructure and the typical costs involved in these steps, including the up-front planning and permit costs and ongoing rental for private and Crown land. It also covers opportunities to improve these arrangements to enhance mobile coverage outcomes in regional and peri-urban areas.
- **Section 4** examines the different commercial arrangements available to enable access to third party infrastructure, from sharing of passive infrastructure to the range of different active sharing models and provides commentary on them.
- **Section 5** explains why Telstra considers the current commercial and regulatory arrangements enabling third party access to regional mobile infrastructure are broadly effective. It also explains the importance of flexibility in MNO choice of sharing models.

[1] Ministerial direction | ACCC
[2] 2021 Regional Telecommunications Review A step change in demand (infrastructure.gov.au), Recommendation 1.
[3] Ibid, Recommendation 2.

- **Section 6** covers the key factors for Telstra when making decisions regarding our investment in mobile infrastructure in regional Australia, including our choices around whether this is done on a shared or unilateral basis.
- **Section 7** investigates how the provision of infrastructure and third-party access flows on to the provision of different services and competitive offerings to regional and remote communities.
- **Section 8** provides details of Telstra's relationship with Amplitel and explains why we expect the recent divestments by the MNOs to flow through to an increasingly competitive landscape for third party access to mobile infrastructure.
- **Section 9** covers Temporary Disaster Roaming (**TDR**). It identifies limitations and risks associated with TDR and matters that will need to be carefully considered to implement TDR in Australia. It also looks at Cell Broadcast as a communications solution during emergencies.

In response to each aspect of the Inquiry, Telstra has provided information we hope will be helpful in informing the ACCC's report to the Minister on the relevant real-world environment in which Telstra operates and invests in our mobile network in regional Australia. If there is any aspect on which the ACCC would like further information, we would be happy to discuss this further.

This response should also be read in conjunction with the response to the Inquiry being separately provided by Telstra's subsidiary Amplitel, in relation to Amplitel's tower infrastructure.

2 Cost of providing infrastructure

Key points:

- High levels of ongoing investment are needed to establish and maintain a quality mobile network.
- Regional rollout poses unique economic challenges.
- These economic challenges to extending coverage and capacity in regional and remote areas mean there is a need for both continued private MNO investment and government support. They also make it prudent for government and industry to continue to explore the potential for emerging technologies, such as Low Earth Orbit Satellites (LEOs), to improve coverage outcomes in remote areas more cost effectively than traditional mobile solutions.
- Our response includes some confidential information about Telstra's typical costs to provide mobile infrastructure, including the costs of extending our Radio Access Network (RAN) and for backhaul.
- It is clear from this cost information why mobile infrastructure sharing can make economic sense, and why it also makes sense to consider solutions involving the use of technologies such as LEOs.
- It is also clear from this information that the active technology equipment costs form a relatively small proportion of the costs of providing regional mobile infrastructure, limiting the potential efficiencies from sharing such active equipment.
- Importantly, decisions to invest in regional mobile infrastructure are not solely based on direct costs and revenues. Despite the more challenging economics of regional and remote network deployment, Telstra has continued to invest in expanding and improving our network in these areas because we know customers place a high value on having access to Australia's largest mobile network. That is, our investments are justified on the basis of our ability to capture revenue in the national mobile market through a competitive advantage. This is further explained in sections 5 and 6 of our response.

A quality mobile network is required to provide reliable services, regardless of location. The investment required to provide reliable services extends beyond the initial capital cost of the towers and radio antennas that are visible to the public. Connection to power and reliable backhaul to connect a mobile base station to the overall network are also required, and the cost of both backhaul and the power run increases with the distance it is required to span. Costs are also incurred in the ongoing maintenance and operation (e.g., electricity) of each base station, and these costs can run to tens of thousands of dollars per site per year.

In this section, we provide an overview of the core components of the passive and active infrastructure Mobile Network Operators (**MNOs**) need to establish and maintain in regional and peri-urban areas, in order to be able to supply reliable mobile telecommunications services to customers in these locations. Further information on this aspect of the ACCC's Inquiry is contained in Amplitel's separate response.

2.1. The main components of mobile network infrastructure

A mobile network has three major components: the Radio Access Network (**RAN**); the transmission (also called backhaul) network; and the core network. The RAN uses radiofrequency spectrum to connect to mobile phones and other user devices, and the transmission network connects the RAN to the core network which manages all the mobile voice and data users and their connections to other users.

The RAN is the most obvious and visible part of a mobile network. The RAN consists of base stations which are cabled to antennas that transmit and receive signals to and from mobile devices. There are different types of base station infrastructure for different purposes; macro base stations, small cells and in-building coverage (**IBC**) systems.

Macro base stations typically provide the wider area coverage and typically include an equipment hut for the radio equipment at ground level with cables connecting the equipment to an array of antennas mounted on an adjacent tower, pole or roof.

Small cells are miniature low-powered base stations that provide additional localised coverage and capacity. They often combine the radio equipment and antenna/s into a single small unit that can be mounted on towers, poles, rooftops, or utility structures.

IBC systems provide dedicated coverage and capacity inside specific buildings.

The architecture, including components of a macro base station and a small cell, is shown in Figure 1 below.

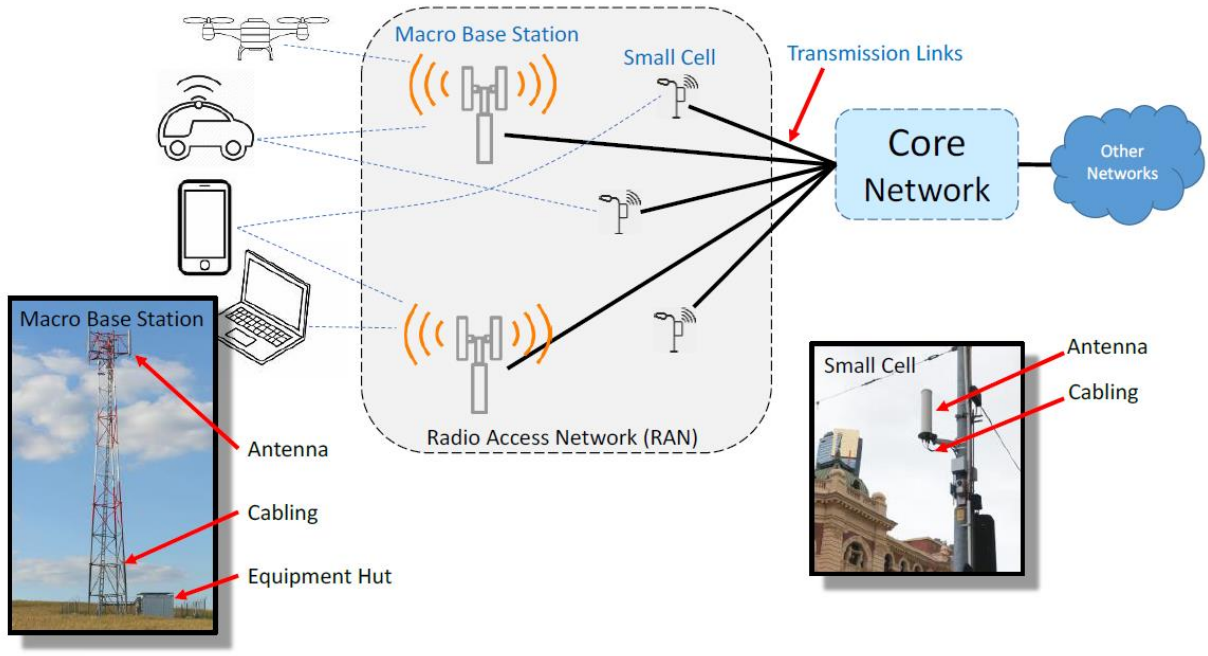

Figure 1 – Simplified Mobile Network Architecture

2.2. High levels of investment are needed to establish and maintain a quality mobile network

High quality telecommunications networks require high levels of ongoing capital investment and mobile network deployment is especially capital intensive. Over the seven years to the end of FY22 Telstra has invested $11 billion in our mobile networks nationally with $4 billion of that invested in our regional mobile network. These networks serve customers in many locations where we are the only non-Government provider to have invested.

Telstra's significant network investments in regional and remote Australia include:

- Telstra's contributions to the Federal Government's Mobile Blackspot Program (**MBSP**): 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. In addition, as part of Telstra's contribution to the MBSP, we have deployed in excess of 200 small cells for regional community connectivity at Telstra's sole expense.

- Telstra's contributions to the Commonwealth Government's Regional Connectivity Program (**RCP**): across the two announced rounds of the RCP, Telstra will have invested around $55 million and will have delivered more than 130 projects to improve regional connectivity, many of these intended to extend or improve performance of our mobile network in Regional Australia.

2.3. The economics of regional mobile deployment are especially challenging

Even with Government support, investment economics can be very challenging in parts of regional Australia. This is because deployment costs are typically higher, at the same time as returns are typically lower due to the smaller number of subscribers covered by each site.

Costs can vary significantly between different individual sites. However, 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 significantly higher in regional and remote areas than in metropolitan areas:

- Remoter sites take longer to reach increasing freight/mobilisation costs and for rectification requiring more battery reserve.

- Sites are typically situated further from existing roads necessitating access tracks to be formed over longer distances.

- Structures and foundations typically need to be larger and more robust to deliver greater coverage and to achieve cyclone ratings in north.

- For wide area coverage, sites are typically on elevated land away from towns/roads requiring long extensions of access, power and fibre.

- Backhaul connectivity costs increase where there is no existing infrastructure. Compared with costs in metropolitan areas, backhaul costs increase materially in regional areas and by up to 8 times as much in remote areas where Telstra typically relies upon microwave backhaul connectivity supported over multiple radio hops, compared to an optic fibre or single radio hop solution in less remote areas.

- Delivering the speed and latency benefits of 5G to regional customers has a ripple effect on backhaul costs. While existing backhaul transmission is generally adequate to support 3G and 4G services, upgrades to support 5G can be very costly and prove uneconomic.

- AC Power provision costs tend to increase with remoteness as the proximity to mains supply decreases. The lack of infrastructure increases the need to utilise dedicated power generation solutions such as solar.

In peri-urban areas the above costs vary depending on local conditions. Frequently, the level of these costs is more akin to those experienced for sites in rural and remote areas than those located in metropolitan areas. This is because, despite their close proximity to urban areas, peri-urban areas tend

to be located amongst or on the fringes of national and state parks with rugged heavily treed terrain. This makes access and coverage difficult, with only sparse populations benefitting from the coverage generated by each site.

By contrast to the costs for site build, access, power and backhaul, the costs of the active technology equipment at the site (antenna, baseband technology and batteries) vary less based the location of the site, and form only a relatively small proportion of the overall site establishment costs (**[c-i-c begins] [c-i-c ends]**).

Importantly, the costs of providing mobile infrastructure include not only the costs to establish a site, but also the significant costs of ongoing operation and maintenance. Nationally, Telstra estimates the average ongoing opex costs per site to be around **[c-i-c begins] [c-i-c ends]**. This includes the ongoing lease costs, costs of powering the site, and costs of maintenance[4]. Costs to power and maintain more remote sites can be particularly high due to requirements such as to maintain and upkeep primary solar powered systems, and because of the higher transport costs to deploy maintenance staff to more remote and hard to reach locations.

2.4. Regional investment decisions are not solely based on cost considerations

It is important to keep in mind that cost is just part of the economic challenge to regional mobile network rollout. Return from investment is just as important as cost as a driver for MNO investment in regional Australia. At the same time as regional deployment costs are higher, typically fewer customers benefit from the coverage and hence contribute returns to the MNO for that coverage. So, the direct site economics are poor. However, these poor site economics can be offset by indirect return in the form of higher national market share MNOs can acquire and retain based on the ability to offer more coverage in more places. These considerations are discussed further in sections 5 and 6 of our response.

2.5. The potential of emerging technologies to support cost effective coverage improvements

One of the emerging technologies that will help to support regional and remote connectivity is Low Earth Orbit (**LEO**) satellites. While LEO satellites are still an evolving technology, rapid progress is being made by satellite operators and device manufacturers.

Although satellite will never be a like for like replacement for mobile, this emerging technology will provide greater capacity and more responsive communications (with lower latency) than what is possible from current satellite options. LEO satellites orbit much closer to the earth than current Geo-stationary Earth Orbit (**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 capacity relative to other satellite options.

When considering the costs and benefits of investment in expanding terrestrial based mobile network coverage in regional and remote areas, it will be important that Government and industry keep an eye on the potential for alternative technologies such as LEOs to deliver infill coverage for users in these locations and adjust policy settings accordingly. The potential for these technologies to widen coverage and provide redundancy for existing networks, especially for public safety purposes and regional businesses, looks promising. In Telstra's case, we are continuing to monitor developments with GEO

4 **[c-i-c begins] [c-i-c ends]**

and LEO satellites (and other High-Altitude Platforms) and are engaging to understand the economic and technical viability, commercial models and service capability of these solutions.[5]

2.6. Answers to consultation questions 1, 11 and 14

1.	What are the typical costs incurred in providing telecommunications towers and associated infrastructure? Can you quantify these costs by providing examples?
11.	What costs do providers of towers and associated infrastructure incur in providing active and/or passive mobile infrastructure? Can you quantify these costs?
14.	Are there additional costs specific to rural, regional, remote or peri-urban areas?

Figure 2 below outlines the typical cost relativities between various components of new site buildings by relative remoteness Telstra has historically used internally for our high-level planning and costing (based on our long commercial experience), in the case of sites built directly by Telstra[6].

Figure 2: Relativities Between Site Establishment Costs by Location **[c-i-c begins]**

[c-i-c ends]

5 See for example Telstra's MOU entered into in February 2022 with OneWeb: Telstra & OneWeb sign MOU to explore new connectivity solutions in Australia & Asia Pacific.

6 Note that costs and relativities will differ where Telstra is using a third-party infrastructure provider to establish the site.

3 Cost of accessing land to provide infrastructure

Key points:

- Accessing land is crucial to the supply of mobile telecommunications services. Importantly, it is not simply access to *any* land, but access to the *right* land. In more remote areas, there is often less choice of suitable sites and providers of land, due to the larger size of land holdings.
- The largest cost of accessing land is the initial costs for planning application and approval. On average nationally over the last 7 years, these costs for Telstra amounted to **[c-i-c begins] [c-i-c ends]**. We consider there is scope to reduce these costs through more consistent and streamlined state, territory and local government planning processes.
- Ongoing rental costs in regional areas are reasonably consistent across Australia, with costs to access Crown land typically materially higher than costs to access private land. Telstra has experienced several instances where the proposed charges for access to Crown land have made deployment at a proposed regional location untenable.
- Consistent with the findings of the 2019 NSW IPART inquiry into access to Crown land for communications towers, reforms to charges for access to Crown land could yield very significant costs savings for industry in deploying regional mobile infrastructure. This would help to make it more economic to extend mobile coverage in more regional and peri-urban locations.
- Telstra is also concerned that action by land aggregators to procure land rental contracts through telecom tower buyout schemes are tying up private land and pushing up costs for MNOs to deploy services.
- Telstra sees potential for improvements to current planning permit and approval processes and requirements for access to land to make them less costly and more efficient, especially regarding notification of Interested and Affected Parties, as required under the Mobile Base Station Deployment Code.

Accessing land is crucial to the supply of mobile telecommunications services. Importantly, it is not simply access to *any* land, but access to the *right* land.

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 locate a macro tower on private land rather than on Crown land along a highway, 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.

In more remote areas, there is often less choice of suitable sites and providers of land, due to the larger size of land holdings.

Once an appropriate site is identified, planning permission is sought through the various state, territory and/or local planning processes. This can be a costly exercise, especially where there are complicated planning permission processes, or where community objections are raised resulting in site reselection.

In this section, we explore the two key components of the cost to access land: firstly, the costs associated with the process of applying to access land; and secondly, the typical ongoing cost of

accessing land. We also provide case studies to illustrate these costs. Further information on this aspect of the ACCC's Inquiry is contained in Amplitel's separate response.

3.1. Permits, planning approval, and ancillary costs

Permit and planning costs vary widely between jurisdictions as is shown in Table 1 below. The data in Table 1 is the aggregate for all sites commissioned by Telstra between 2015 and 2021 and includes only regional and remote locations (there are no metropolitan sites contained in the data). During this period, Telstra commissioned **[c-i-c begins] [c-i-c ends]** sites at a total planning approval cost of **[c-i-c begins] [c-i-c ends]**, which averages to **[c-i-c begins] [c-i-c ends]** per site.

As explained below, we consider there is scope to reduce these costs through improved processes and more consistent approaches across states and territories.

Table 1: Permits and Planning Approval costs **[c-i-c begins]**

[c-i-c ends]

The permit and planning approval costs shown above in Table 1 cover three broad activities:

- planning application for a council permit;
- notification and advertising costs to Interested and Affected Parties; and
- ancillary costs such as heritage overlay costs or costs to access Aboriginal land.

The cost for a planning application for a council permit can vary reasonably widely. In metropolitan areas, the planning application cost is around **[c-i-c begins] [c-i-c ends]** per application. However, in regional and remote areas, it can be around **[c-i-c begins] [c-i-c ends]** per application. The reasons for this include added time and labour for travel to consult in person with community stakeholders and Traditional Owners in regional and remote areas.

Costs associated with notification and advertising to Interested and Affected Parties, as required by the *Mobile Base Station Deployment Code*,[7] (the **Deployment Code**) are consistent across jurisdictions and site to site, normally at about **[c-i-c begins] [c-i-c ends]** per site. There is potential for these costs to be reduced, and potentially for the process of notifying to Interested and Affected Parties to be made more effective, if requirements such as to advertise in printed newspapers were reviewed.

The greatest variation in the planning and approval costs Telstra experiences occurs in the ancillary costs relating to community consultation, particularly where there are heritage overlay considerations or requirements to access Aboriginal land. While many sites have no ancillary costs, those sites for which such costs are incurred involve a much more careful and considered approach to deployment. Accordingly, costs incurred are commonly in the order of **[c-i-c begins] [c-i-c ends]** per site, with some sites reaching well over **[c-i-c begins] [c-i-c ends]**. One recent example in **[c-i-c begins] [c-i-c ends]**.

In general, the time and cost needed to access suitable land while ensuring appropriate rules, land rights, regulations and community wishes are followed are a valuable and important part of the deployment process. However, deployment can be very challenging where there are conflicts between interested local community groups and local councils, or between Crown land authorities and Aboriginal Land councils. For example, a local council may approve a planning application, to then have a

7 C564:2020 Mobile Base Station Deployment Code. https://www.commsalliance.com.au/Documents/all/codes/c564

community or other group raise objections or impede site construction. This adds delay and requires additional stakeholder engagement and consultation, which adds to the cost of establishing a site.

For access to Aboriginal Land, we have found that while the Deployment Code contains obligations to notify Interested and Affected Parties, simply sending this notification is not the most effective way of working with First Nations communities and Elders. To help improve our consultation and engagement approach with First Nations communities, Telstra is developing a guideline for base station deployment on Aboriginal Land. This guideline will sit alongside the Deployment Code to guide our deployment teams on how to engage First Nations stakeholders and address any concerns. Telstra's new three-year Reconciliation Action Plan contains further important steps Telstra is taking in our efforts to rebuild trust and engagement with Aboriginal and Torres Strait Islander peoples and communities across Australia.[8]

Additional measures to reduce ancillary costs are covered in section 3.3 below.

3.2. Land leasing costs

Table 2 shows the typical annualised land leasing costs that have historically been paid by Telstra (where we lease the land directly from the land-holder/manager).

Table 2: Typical land lease costs (annual) **[c-i-c begins]**

[c-i-c ends]

The ongoing leasing costs we incur for Crown Land in regional and remote areas is between **[c-i-c begins] [c-i-c ends]** higher than on private land.

By taking out options on private land where mobile base station towers are built, aggregators are also tying up land and pushing up costs to access private land.

We discuss the impact of each of these factors on the costs to access land to supply mobile services in regional and remote areas below.

3.2.1. The impact of land aggregators on land leasing costs

Land aggregators such as AP Wireless[9] and Landmark Dividend[10] are procuring land rental contracts through telecom tower buyout schemes.[11] By taking out options on land where mobile base station towers are built, especially private land, aggregators are tying up land and pushing up costs for both TowerCos (i.e. companies that own and lease communications towers) and mobile network operators. The impact of this behaviour can be higher in regional and rural locations, where land plot size is larger and the choice of alternative providers of land smaller.

Many land aggregators are well supported, with some major pension funds backing their investments. Low interest rates over recent years have resulted in land aggregators speculating on land in regional and rural communities ahead of towers being built. In this scenario, when a site is identified for a future mobile base station, the land aggregator already has a contract in place with the underlying landowner

[8] Our new Reconciliation Action Plan to rebuild trust with First Nations communities (telstra.com.au)

[9] AP Wireless: https://www.apwireless.com.au/

[10] Landmark Dividend: https://www.landmarkdividend.com/lump-sum-payment-benefits/

[11] A telecom tower buyout scheme is where the Land Aggregator pays a lump-sum to the property owner in exchange for the right to receive the ongoing site rent from the carrier moving forward. For more details, see: https://www.apwireless.com.au/what-we-do/what-is-a-telecom-tower-lease-buyout/

enabling the land aggregator to negotiate lease arrangements with the TowerCo or MNO. This has the potential to further increase land rental costs in regional and rural locations in the future.

We do not gain any economies of scale or discount in the lease rate from land aggregators. Generally, land aggregators want to negotiate leasing rates with MNOs on a site-by-site basis, or at most, a few sites at a time.

We do not have a recommendation to overcome the effect land aggregators are having on land leasing costs. We simply flag this activity as a factor pushing up leasing costs.

3.2.2. Charges to access Crown land

The NSW Independent Pricing and Regulatory Tribunal (**IPART**) has recently released its Report on the *Review of rental arrangements for communication towers on Crown land*.[12] While the IPART Report finds that the rates charged to telecommunications users of Crown land in NSW are not discriminatory under clause 44 of Schedule 3 to the *Telecommunications Act*, it does find that the rates charged to telecommunications users "…*need to be updated to reflect recent market prices for sites on private land*."

The IPART Report makes several important recommendations regarding the charges for access to Crown land for the purposes of installing telecommunications infrastructure. These include:

- Co-users within the same footprint of the original site should pay no annual rental fee and only 50% of the original application fee. For co-users who require an increase in the land access, rent should be based only on their additional land footprint and be calculated using the same per metre squared basis and rates as rents for primary users.

- The current low-density category should be disaggregated into three new categories, Low, Remote and Very Remote.

By disaggregating the single low-density category into the three new categories and implementing the recommended changes to co-user charges, IPART estimates the industry would save close to $4.3m per annum in regional areas in NSW alone.[13]

[c-i-c begins] [c-i-c ends]

To minimise the instances of regional consumers missing out on beneficial infrastructure deployments due to the cost of accessing Crown land, Telstra endorses the reform recommendations regarding access to Crown land set out in the Australian Mobile Telecommunications Association (**AMTA**) *State and Territory 5G Infrastructure Readiness Assessment*.[14]

3.3. Moving forward with community support and better procedures

Where there is commitment from the community and local councils to an additional mobile site in a regional, remote or peri-urban location, operators are more likely to bid to service the location under co-

12 NSW IPART Report on the Review of rental arrangements for communication towers on Crown land. Available at https://www.IPART.nsw.gov.au/documents/final-report/final-report-review-rental-arrangements-communication-towers-crown-land-november-2019

13 Ibid, Table on p.7.

14 AMTA 5G Readiness Assessment report. https://amta.org.au/wp-content/uploads/2021/06/AMTA-5G-Readiness-Report-Digital.pdf

funding programs. Additionally, facilitation of permits and community commitment to site locations by local government goes a long way to providing regulatory certainty for operators, reducing the cost to deliver mobile coverage.

However, it is not uncommon for Telstra to encounter situations where there have been clearly identified requests to improve mobile coverage and resilience in local regional communities, such as in natural disaster prone regional and peri-urban areas, but these have been prevented from progressing because local planning permission cannot be obtained to install the required infrastructure.

Table 3 outlines a sample of sites where Telstra had planned to deploy new base stations as part of the MBSP, but in each instance, the site was "frustrated", i.e., unable to proceed. MBSP sites are identified as a response to community requirements for added or improved mobile coverage. The middle column "# Alt" shows the number of alternative locations we explored after reaching an impasse on the original preferred site.

Table 3: "Frustrated" MBSP sites unable to proceed. **[c-i-c begins]**

[c-i-c ends]

Consideration of alternative sites takes time, which adds to our overall cost. In each case where an alternative site would still provide up to two-thirds of the coverage proposed by the original preferred site, the landowner/council is contacted to commence site access negotiations.

Several important recommendations regarding how best to ensure communities throughout Australia can realise the economic, social and environmental advances that can be enabled via existing and emerging mobile networks are set out in the AMTA *State and Territory 5G Infrastructure Readiness Assessment*.[15]

The AMTA report contains several best practice examples where state and territory government planning procedures are effectively and efficiently paving the way for mobile infrastructure deployment through more consistent and streamlined planning processes. An example of good regulation is the Deployment Code. The Deployment Code has served industry and the community well by providing a framework that balances community and local government requirements with appropriate mechanisms to expedite mobile base station deployment.

The AMTA report also highlights many reform opportunities where planning regulations and processes in each state or territory could be improved to facilitate better and more efficient infrastructure deployment.

As detailed in the AMTA report, in NSW and Victoria, many aspects of the regulatory regime have been designed to ensure there is a consistent approach and regulation state-wide, rather than allowing councils to adopt their own varying regulations and policies. This is not, however, the case in states such as Queensland. State based, or better yet a national planning scheme for telecommunications, rather than planning being based on Local Government Areas, would make it much easier for operators to efficiently improve outcomes in regional, remote and peri-urban locations which continue to experience poor mobile coverage. We also support the RTIRC 2021 recommendations for Australian, state and territory governments to provide resources to support councils and other regional stakeholders, such as

[15] AMTA 5G Readiness Assessment report. https://amta.org.au/wp-content/uploads/2021/06/AMTA-5G-Readiness-Report-Digital.pdf

expert advice to assist local governments to undertake digital planning and participate in telecommunications infrastructure programs, to help drive better outcomes for their communities.[16]

The AMTA report also highlights opportunities to remove unnecessary red tape and costs from the Deployment Code, such as the requirement to advertise in printed newspapers.

In addition, we consider there remain significant opportunities to make it easier, faster, and more efficient to install infrastructure with the potential to offer high coverage benefits to regional and peri-urban communities with comparatively low impact. For example, we would like to see other states and territories follow the lead of NSW in introducing exemptions akin to those in Division 21[17] and Schedule 3A[18] of the *NSW State Environmental Planning Policy (Infrastructure) 2007*. The NSW Infrastructure SEPP allows for towers up to 50m to be built in rural areas as a complying deployment. There are strict conditions[19] which must be met to qualify for the planning exemption, however, where a site meets these conditions, it can save several months of planning process leading to timely and cost-effective deployment of regional and rural mobile coverage.

3.4. Answers to consultation questions 3 and 5

3.	What costs are involved in accessing land required for the establishment and operation of telecommunications tower infrastructure? Do these fees differ depending on the owner of the land (for example, public v private ownership)?

The costs involved in accessing land can broadly be categorised into the initial costs such as site surveying, permits and planning approval, and the ongoing rental costs. Both categories vary widely, by state/territory, across different land ownership (private versus Crown land), and with location. We consider the variations to be unjustified in many cases, and we outline our position, along with case studies to illustrate, above.

5.	What role do specialist entities such as land aggregators, both commercial and government, play in acquiring access to land or the sites of towers?

See section 3.2.1 of our response above.

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

17 NSW State Environmental Planning Policy (Infrastructure) 2007. https://legislation.nsw.gov.au/view/html/inforce/current/epi-2007-0641

18 Schedule 3A is available at: http://www6.austlii.edu.au/cgi-bin/viewdoc/au/legis/nsw/consol_reg/sepp2007541/sch3a.html. See Part 2, Clause 5.2.

19 Part 2 Clause 5.2 of Schedule 3A requires: *If the tower is located on land in Zone RU1, RU2, RU3 or RU4 or an equivalent land use zone, the tower must not--*
(a) be located within 100 metres of a Zone R1, R2, R3, R4, R5 or RU5 or equivalent land use zone boundary, and
(b) exceed 25 metres in height (including telecommunications facilities) where located between 100 and 150 metres from a Zone R1, R2, R3, R4, R5 or RU5 or equivalent land use zone boundary, and
(c) exceed 50 metres in height (including telecommunications facilities), where located more than 150 metres from a Zone R1, R2, R3, R4, R5 or RU5 or equivalent land use zone boundary.

4 Commercial arrangements for third party access to infrastructure

Key points:

- MNOs frequently make use of third-party infrastructure in deploying their networks. In Australia, and internationally, there are many different commercial arrangements in use to facilitate this.
- MNO decisions regarding the feasibility and net benefits of sharing infrastructure with third parties under varying potential arrangements for access will be driven by a range of different technical and commercial considerations. Sections 5 and 6 of our response highlight some of the most significant ones for Telstra.
- There is no one size fits all solution that will best meet the needs of all MNOs in all locations. The best outcomes for regional and remote communities will be achieved by allowing MNOs the commercial freedom to choose the most suitable arrangement in each case.

To provide the best quality service to regional consumers, it is essential mobile operators have commercial freedom to choose the most suitable arrangement to obtain access to the infrastructure they need. In this section, we outline the scenarios in which Telstra typically seeks access to third-party sites such as towers and rooftops. We also provide an overview of potential active network sharing arrangements that can be adopted by MNOs.

4.1. MNOs frequently make use of third-party passive infrastructure

Where it is technically feasible and makes economic sense, MNOs often make use of third-party passive infrastructure (including towers, poles, buildings and housings). As part of the process for seeking out new site locations, 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 can also improve the economics of site deployment in certain cases.

Telstra is an access seeker on a range of third-party infrastructure including: **[c-i-c begins] [c-i-c ends]**

Co-location of MNO infrastructure occurs in both regional and metropolitan areas. However, it 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. Both in Australia and internationally, it is uncommon to see multiple MNOs universally sharing the same sites. There are a range of important technical and commercial reasons why this is the case, which we explain in section 5 of our response.

4.2. The costs of supporting shared access to passive infrastructure

There will typically be 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.

These costs 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 collocation and collaborative arrangements between all three MNOs in

regional Australia was the Victorian Regional Rail Connectivity Project.[20] Supported by funding of $18m granted by the Vic Govt 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.

However, there are likely to remain only a few cases where the costs of supporting access for multiple operators at a site makes commercial sense (and often, only in cases where the upfront build cost is partly subsidised by Government). As we explain in sections 5 and 6 below, there are also other important reasons why the sharing of a site may not make practical or commercial sense for an MNO.

4.3. 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 often extend to sharing of active RAN components and spectrum pooling.

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.[21] Another example is the Shared Rural Network (SRN) in the UK, which is a joint venture arrangement between the UK's four MNOs.[22]

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 RAN (**MORAN**) model is a form of "active" infrastructure sharing because electrical components (i.e., radio controller and base station (RAN components such as antennas and baseband units)) in the RAN are shared. Spectrum is typically not shared by the MNOs under MORAN arrangements.

2) In contrast, the Multi Operator Core Network (**MOCN**) model involves sharing of the RAN *and* spectrum.[23]

3) Resale/MVNO services and domestic roaming involve the access provider supplying a service which bundles the full vertical network stack, including its mobile core network. As a result, the access service 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.

---

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

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

22 See details at: https://researchbriefings.files.parliament.uk/documents/SN07069/SN07069.pdf

23 GSMA, 'Infrastructure Sharing: An Overview' (18 June 2019): https://www.gsma.com/futurenetworks/wiki/infrastructure-sharing-an-overview/.

4) "Neutral host" models 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".

Instances of active infrastructure sharing in Australia include:

- Telstra and Hutchison 3G Australia:[24] 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.[25] The arrangement concluded in 2012.[26]

- 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.[27]

- The MOCN arrangements proposed to be entered into between Telstra and TPG, which are currently under separate consideration by the ACCC.[28]

4.4. Active sharing models – cost and other considerations

Active network sharing arrangements are typically more complex than those for sharing passive infrastructure. The steps required to establish the arrangements may include establishment of a MOCN, Operations Support Systems (OSS) integration, Network Operations Centre (NOC) and alarms, performance management, call record exchanges, and other administrative arrangements. The cost of the required upfront integration work will vary considerably depending on the level of integration and the type of active sharing being considered, but it could be range between **[c-i-c begins] [c-i-c ends].**

A lot of the efficiencies from sharing come from the sharing of passive infrastructure, with smaller incremental savings from sharing active network technology. In cases where the scale of the proposed sharing arrangement is small, this can mean that the integration costs and complexities of active sharing arrangements outweigh the efficiencies of sharing the active elements.

In every overseas market in which RAN sharing has been deployed, it has been commercially negotiated between the operators concerned. Decisions about whether the benefits outweigh the costs of a potential active sharing arrangement, and the optimal nature of the sharing arrangement between the operators involved, depend on multiple different considerations which are not feasibly made by policy makers or regulators. They will depend, for example, on the specific strategic, commercial and technical drivers of each of the sharing parties and their independent decisions about how to optimise the various parts of the infrastructure to service customers.

---

24 Hutchison subsequently became 50:50 joint venture owner of Vodafone Hutchison Australia with Vodafone Group Plc. Now, VHA owns 50.1% TPG Telecom Limited, with 49.9% being owned by the pre-existing TPG shareholders: See Chris Duckett, 'Vodafone Australia and TPG merger: Everything you need to know' (ZDNet, 22 May 2020): https://www.zdnet.com/article/vodafone-australia-and-tpg-merger-everything-you-need-to-know/.

25 ZDNet, 'Telstra, Hutchison share 3G network' (4 August 2004): https://www.zdnet.com/article/telstra-hutchison-share-3g-network/

26 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.

27 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

28 Full details of these proposed arrangements are set out at: Telstra Corporation Limited and TPG Telecom Limited proposed spectrum sharing | ACCC

These matters are discussed further in sections 5, 6 and 7 of our response.

4.5. Answers to consultation questions 2, 4, 6, and 14

2.	What costs are involved (for example, in setting up and maintaining) business practices and systems needed to support the provision of access to towers and associated infrastructure?

See sections 4.2 and 4.4 of our response above.

4.	What are the typical commercial arrangements for access to towers and associated infrastructure?

See sections 4.1 and 4.3 of our response above.

6.	Are there any other considerations that contribute to/determine these commercial and other fee arrangements for access to towers and other infrastructure?

Yes, these are many and complex. Further details are provided in section 5 of our response.

5 Effectiveness of current commercial and regulatory access arrangements in enabling third-party access

Key points:

- Broadly, Telstra considers the current commercial and regulatory arrangements enabling third party access (i.e., sharing) in regional Australia are fit for purpose. In our view, there are no material deficiencies in these arrangements acting as a barrier to efficient access.
- The existence of unilateral MNO infrastructure deployments in various 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. This is the mark of healthy competition. Relatedly, as explained further in section 6, there are a range of commercial and practical drivers for MNO decisions to share infrastructure (or not). These factors explain why the nature and level of access to third party infrastructure sought (e.g., the extent of co-location) can differ between ABS zones, and between different MNOs.
- Key to the effectiveness of future regulatory and policy settings is that they do not unduly limit the sharing choices available to operators – such as by trying to "pick winners" or manipulate outcomes between different potential active sharing models. Any move towards prescriptive and inflexible mandated sharing arrangements under future Government co-funding programs risks setting requirements that either technically or commercially do not make sense for MNOs and in turn consumers. Such an approach would be antithetical to ongoing MNO investment incentives and improved outcomes for regional Australia.
- Telstra's recent participation in the NSW Government's Blackspots Active Sharing Partnership trial and Public Sector Mobile Broadband Proof of Concept has been informative. These "neutral host" style active infrastructure sharing arrangements are complex, and they raise a lot of issues which could jeopardise optimal regional coverage outcomes. Many of these complexities and risks can be avoided under MNO led active sharing arrangements – such as commercially negotiated MOCNs.
- Lastly, the importance of deep and tailored community engagement must never be overlooked. Without it, no commercial or regulatory access arrangements will ever be truly effective in achieving positive outcomes for regional Australia.

This section explains why Telstra considers the current commercial and regulatory arrangements enabling third party access to regional mobile infrastructure are broadly effective.

We also explain why it is vital that future regulatory and policy settings do not restrict the sharing choices open to MNOs and highlight the importance of active community engagement in delivering effective mobile outcomes in regional and remote areas.

5.1. Effectiveness of current commercial arrangements for enabling access

Telstra would consider the current commercial arrangements for seeking access to third-party mobile towers and associated infrastructure to be *ineffective* if we found ourselves unable to obtain such access through commercial negotiation, in situations where this was an important enabler for our regional network rollout. That has not been our experience. Hence, we consider the current commercial arrangements to be effective.

However, that does not mean that Telstra necessarily can or would want to obtain access to every potential mobile site provided by a third party in regional Australia. Both in Australia and looking at international examples, it is very uncommon to see multiple MNOs sharing all of the same infrastructure. As explained below, there are a range of important technical and commercial reasons why this is so.

5.1.1. Not all structures are shareable

When considering the potential for infrastructure sharing, it must be appreciated that some structures cannot physically support the network equipment of more than one or two MNOs. For example:

- Telstra owns a number of customer access network (CAN) radio structures including a range of guyed masts, triads and spengels 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.
- 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.[29]

5.1.2. Location is critical

Importantly, the location of a particular site may make it unattractive to any, or more than one 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.

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

- The propagation characteristics of the spectrum the MNO is planning to use to supply services;
- The MNO's vendor capabilities (and limitations) and engineering expertise; and
- 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 for the purposes of co-location.

5.1.3. Commercial considerations

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

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

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.

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.

5.1.4. Reasons for limited co-location at MBSP sites

The MBSP has been highly successful in using the combination of Government and industry funding to materially extend regional mobile coverage and it is unsurprising the feedback to RTIRC 2021 regarding the coverage outcomes achieved through the MBSP were generally positive, with broad support from local communities, governments and industry.[30]

One concern raised, however, is the limited extent of co-location at MBSP sites. There are several practical reasons why there has been only limited co-location at MBSP sites despite this option being available through all MBSP rounds. These include:

- Basic challenge of reconciling different MNO competitive preferences – for good reason, it is difficult to find alignment on 'new coverage' investment preferences between different operators. New site selection is a function of many things including historical investments (which themselves are motivated by competitive differentiation), the large number of potential candidate locations, and limits of MNO capital envelopes.

- The benefits from new coverage reduce with each progressive round of the program so MNOs find the economics increasingly challenging. This impacts attractiveness for all potential MNOs and is also reflected in the increasing level of Federal government funding required for MBSP infrastructure (rising from c. 29% in Round 1 to c. 53% in Round 5A).[31]

These challenges are likely to persist regardless of how future MPSP programs are designed. That said, there are some aspects of the MBSP design that Government may consider adjusting to encourage more co-location, including:

- Program guidelines (e.g., for MBSP Round 5A) require co-locating parties to make capital contributions at least equal to the incremental costs incurred to provision co-location. Currently, co-locating parties, while they leverage off the investment already made by the first MNO, nonetheless attract no government funding to help cover the costs of installing active kit. Direct additional government funding for these costs may make co-location more attractive.

30 2021 Regional Telecommunications Review A step change in demand (infrastructure.gov.au), p45.
31 2021 Regional Telecommunications Review A step change in demand (infrastructure.gov.au), p46

- 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. A supplemental improvement to future Government funding initiatives 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 frameworks for this). Where three MNOs have incentives and a desire to invest in a site, this could reduce the funding costs of the physical infrastructure for each operator. However, as noted above, each of the MNOs will nonetheless still have different business drivers for wanting to expand coverage. Hence Government should be cautious about the extent to which such measures will expand the prevalence of co-location.

5.2. Effectiveness of current regulatory arrangements for enabling access

Broadly, we consider that the current regulatory arrangements supporting access to third-party infrastructure in Australia are effective and well suited to achieving optimal mobile coverage outcomes in regional Australia.

The current regulatory and policy settings supporting third-party access generally recognise the importance of creating the right environment for MNO investment and innovation:

- They have typically been set acknowledging that any reduction in returns on invested capital by MNOs inevitably leads to potential reductions in capital investment over the long term, hence will impact the network experience for customers, particularly those in regional areas.

- They have to date also reflected an appreciation that regulatory requirements and policies that would undermine the ability for MNOs to differentiate their services will reduce incentives for network operators to invest. That is, they have recognised improved mobile outcomes for regional customers directly depend on ongoing investment by MNOs in regional mobile infrastructure, enabling the product and service differentiation that underpins a positive investment return.

As the ACCC is aware, the *Code of Access to Telecommunications Transmission Towers, Sites of Towers and Underground Facilities* (**FAC**) is the key regulatory instrument under which owners and operators of telecommunications facilities provide other carriers with access to mobile towers, sites, and eligible underground facilities. Telstra considers the FAC is generally effective in enabling third-party access to facilitate regional mobile network rollouts. The FAC contains provisions for non-discriminatory access, make ready work provisions for access to a facility by a second carrier, application procedures and dispute resolution procedures, all of which have been refined and improved over the years.

The FAC is complemented by industry arrangements providing transparency around planned deployments and opportunities for access to third party infrastructure. In recent years, several improvements have been made to the information available to carriers and the community on the RFNSA website[32]. Access has been opened to allow both mobile and non-mobile carriers registered on the site to download reports for planned new sites, and to seek information on proposed sites on a per postcode basis. These improvements are likely to enhance the ability of carriers to engage in future co-location and co-build activities in regional Australia.

[32] Radio Frequency National Site Archive, available at: https://www.rfnsa.com.au/home

Telstra also expects the amendments to the FAC recommended by the ACCC in 2020 will flow through to improvements in the ability for MNOs to gain efficient access to third-party infrastructure in regional areas where this is helpful to the MNO's deployment plans. For example, the new mandatory 'use it or lose it' timeframe of 24 months for infrastructure owners to use reserved capacity to install equipment or be removed from the queue should ensure that facility owners only reserve capacity where they have plans in the short term for use of the reserved space.

Telstra's views on the expanded facilities access framework under Part 34B of the *Telecommunications Act* have previously been shared with the ACCC.[33] More generally, section 8 of our response below sets out our expectations for intensifying competition between specialised tower companies as a result of the recent changes to the structure of the infrastructure businesses of the three major MNOs.

As noted in section 2 above, backhaul is an essential input to deploying mobile networks and a significant cost of extending networks in regional and rural areas. The ACCC reviews the regulation of the domestic transmission capacity service (DTCS) periodically and sets regulated prices for the service. In the DTCS final access determination inquiry in 2019–20, the ACCC substantially reduced the regulated prices for the DTCS (including mobile backhaul), reflecting the increasing competitiveness of the national transmission market. The ACCC considers this reduction in regulated DTCS prices has likely reduced the cost of deploying mobile services, particularly in regional and remote areas. However, this will not be a universal outcome as many underserviced areas will still require new backhaul infrastructure to be built to create mobile coverage.[34] Telstra has also previously identified opportunities to improve the application and approval process for our provision of backhaul services – such as by deploying drones to reduce the time taken to conduct feasibility studies in remote areas. This remains an area of priority for Telstra to ensure we continually improve outcomes for our customers.

5.3. Mandated requirements for active sharing likely to be ineffective and counterproductive

Given the economic challenges associated with investing in the rural and remoter areas of regional Australia, we anticipate co-investment programs continuing to play an important role in the delivery of new coverage and improved connectivity. We understand that over the next two to three years up to $1 billion in Government funding (at various government levels) could be directed toward regional co-investment programs. We expect these programs to look for opportunities for cost efficiencies to offset the economic challenges of deploying services in those parts of regional Australia that continue to experience poor mobile coverage. We also expect them to seek to promote choice through multi-carrier coverage availability.

As outlined in section 4, there are several different models of infrastructure sharing that can be used to promote multi-carrier coverage outcomes. On the one hand, these may involve more traditional sharing of passive site infrastructure such as tower, hut, compounds, access track, power runs etc (which comprise the most significant site establishment costs). At the other end of the scale, they may involve some forms of active network sharing, which typically means multiple carriers using the same radio equipment and/or antennas on those sites. For the active sharing models, there is also an overarching choice as to the access provider between:

---

33 See https://www.accc.gov.au/regulated-infrastructure/communications/transmission-services-facilities-access/s581zh-review-of-the-corporate-control-percentage/public-consultation

34 ACCC submission to RTIRC, p.9 - 2021 Regional Telecommunications Review | Department of Infrastructure, Transport, Regional Development, Communications and the Arts

- a **Neutral Host**, where a non-MNO entity that is typically also a non-carrier builds and equips site infrastructure and provides coverage that can be shared by MNOs and appear as part of each participating MNO's network – a simpler variation may be that the neutral hosted network appears as a separate network that other MNO's customers simply roam onto; or
- an **MNO**, such as under a MOCN model, where the host MNO's network is shared by both the host MNO and the MNO(s) that are contracted to join the sharing arrangement. As with a neutral hosted network, this shared network appears as a seamless part of all participating MNOs' networks.

For the reasons explained in sections 4 and 6 of our response, there is no one-size-fits-all approach to sharing that will maximise the likely net benefits in all cases. It therefore remains key to achieving optimal mobile coverage outcomes for regional Australia that future regulatory and policy settings do not unduly limit the sharing choices available to operators.

It is also important to bear in mind that cost is just part of the economic challenge to regional mobile network rollout. To maximise the outcomes from these programs for regional Australia, it is critical that all relevant economic drivers for investment are understood and considered, so that the design of these programs does not inadvertently go against the objectives they are trying to achieve. To explain:

- As detailed in section 6 of our response, return from investment is just as important as cost as a driver for MNO investment in regional Australia. While the direct economics of regional and remote sites are often poor, these can be offset by indirect return in the form of higher national market share MNOs can acquire and retain based on their ability to offer more coverage in more places.
- While an expanded choice of carriers is desirable, it does mean more providers are competing for the already minimal returns available in more remote locations. Further, where shared infrastructure is the only option available in a location, or where competitor over-build is subsidised, this also prevents differentiation of coverage that can be used to acquire indirect returns by way of national market share. In combination, these impacts can operate as a powerful disincentive to MNO investment, and this must be taken into consideration when determining what approach to take to future co-funding initiatives, especially where it is being contemplated to dictate a very specific model of infrastructure sharing.

Telstra believes the best outcomes for regional and remote communities are achieved by allowing MNOs the commercial freedom to choose the most suitable deployment and sharing arrangement on a case-by-case basis and by ensuring that MNOs have continued incentives to invest in regional networks and to continue to differentiate their mobile coverage and quality of service in regional areas.

Recently, we have seen interest in potential active sharing models emerging in Australia, including as they apply in the context of local co-investment programs. Any benefit active sharing may offer in this context is critically dependant on the specific model of active sharing being considered, as well as on the nature of the issues it is designed to address. Further, as explained in sections 4 and 6 of our response, decisions about whether the benefits outweigh the costs of a potential active sharing arrangement, and the optimal nature of the sharing arrangement between the parties involved, depend on considerations which are not best made by policy makers or regulators.

Active infrastructure sharing requires the sharing parties to consider and resolve a range of matters including network design, vendor equipment and use of spectrum. The participating MNOs also need to manage the complexity of handover between the active shared network and their neighbouring base stations to avoid call drop out and diminished service levels for their customers. Introducing vendor equipment not already present in each mobile operator's network stack can result in a loss of customer

service features and functions as they 'swap' between their home network and the shared network. The feasibility of resolving these complexities can vary markedly, based on factors such as the level of pre-existing vendor and network alignment between the sharing parties and their pre-existing spectrum holdings. Mandating requirements in this respect would also require the regulator or policy maker to be deeply involved in choices about network design and the commercial and competitive structure between the RAN sharing parties, including on an ongoing basis.

Commercially negotiated active sharing arrangements therefore should be given prominence given their ability to calibrate quite specifically the complementary requirements of multiple MNOs and navigate the above complexities. The Telstra-TPG MOCN (currently under review) evidences this complexity, as well as the ability of MNOs to structure detailed active sharing arrangements that meet to a high degree the specific and complementary requirements of networks in regional Australia to deliver better services for consumers. Further details regarding the benefits of these specific proposed commercial MOCN arrangements are set out in the authorisation application.[35]

Critically, an overly prescriptive policy or regulatory approach to potential active sharing models that attempts to "pick winners" also risks undermining the value that commercially negotiated RAN sharing arrangements could deliver to achieving better coverage and investment. This includes the risk of regional communities missing out on the benefits of superior means of achieving a desired multi-carrier coverage outcome and the risk of government funding being wasted on less effective and less efficient models.

To be effective in achieving their desired aims, future approaches to policy and regulation on mobile infrastructure sharing in regional Australia should treat each potential form of RAN sharing as simply one option to *expand* the range of network investment choices available to each MNO. Preserving space for commercial negotiations and different approaches to sharing will allow for a richer and more flexible ability for MNOs to organise their infrastructure models and deliver specific value for bespoke networks; while sufficiently preserving the ability to dynamically adjust this model over time as technologies change and sharing models mature.

This approach in turn is likely to best harness the power of private and government investment to drive optimal mobile coverage and quality of service outcomes for regional communities. As an illustrative exercise, 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). As shown in Table 4 below, this exercise reveals many benefits to outcomes for regional consumers of adopting a pragmatic MNO led active sharing arrangement to achieve cost-effective multi-carrier coverage (such as a MOCN) over a Neutral Host approach.

Table 4: Illustrative MOCN and Neutral Host model comparison **[c-i-c begins]**

[c-i-c ends]

5.4. Truly effective access arrangements involve the communities they impact

Lastly, it is important to keep in mind that no arrangement for third-party access to infrastructure can operate effectively to achieve optimal outcomes for regional communities in a vacuum. Such arrangements must be based on an understanding of, and address, the issues relating to mobile

[35] See Telstra Corporation Limited and TPG Telecom Limited proposed spectrum sharing | ACCC

coverage and quality of service in regional communities, with those communities. This cannot be done without close and constant community engagement.

Telstra has invested in frameworks to ensure we can do this effectively, including:

- The establishment of Regional Advisory Councils with third parties represented to provide us with direct feedback on community concerns and expectations and ways in which they can be addressed.
- Appointing Regional General Managers and dedicated Regional Network Advisers who live and work in communities and help us understand and address community concerns and expectations.
- Operating 138 stores in regional locations across Australia providing sales and service support.
- Partnering and supporting state and national stakeholder groups that are focussed on delivering better outcomes for regionally based industries or communities.[36]

Telstra also supports the recommendations of RTIRC 2021[37] for a targeted approach to regional telecommunications investment encompassing the Federal Government partnering with state and territory governments to identify shared priority regions or corridors of economic and social growth and involving the relevant local communities in the co-design of the infrastructure projects.

5.5. Answers to consultation questions 8 and 9

8.	Are current commercial arrangements for access to mobile towers and associated infrastructure effective? If not, why and what could be done to improve their effectiveness?

Yes, we consider the current commercial arrangements for third-party access are generally effective. See section 5.1**Error! Reference source not found.** for details.

9.	Are current regulatory arrangements for access effective? If not, why and what could be done to improve their effectiveness?

Yes, we consider the current regulatory arrangements for third-party access are generally effective. See section 5.2 for details. For the reasons explained in section 5.3 of our response we would, however, be concerned about the implications for regional coverage outcomes of any move towards a more prescriptive policy or regulatory approach to potential active sharing models.

[36] See details of some of our most recent regional engagement activities in our 2022 Sustainability Report - Telstra-Bigger-Picture-2022-Sustainability-Report.pdf (netdna-ssl.com), p58.
[37] 2021 Regional Telecommunications Review A step change in demand (infrastructure.gov.au), p23.

6 Providing infrastructure and access: key considerations

Key points:

- Telstra has a long history of strong investment in regional mobile infrastructure. We are committed to ongoing investment in new and upgraded infrastructure so that we can continue to improve the coverage and quality of our services in regional and remote areas.
- Once Telstra identifies a need to extend or improve our mobile coverage, we undertake a 'search ring' before selecting a new site according to a range of different technical criteria. We choose sites not only to provide outdoor coverage to premises, but also to improve indoor coverage, cover transport corridors and seasonal travel destinations as well as agricultural areas and other places of community significance.
- Decisions as to whether the benefit to Telstra's customers of investing in establishing or upgrading a site outweighs the cost, and our choices around if and how access may be shared, are each considered in the broader context of how we compete with other mobile providers in Australia's national mobile market.
- In assessing the viability of a potential infrastructure investment, we consider the direct costs to establish, operate and maintain the site and/or provide access, as well as the expected direct returns from local subscribers, and any contribution to costs from Government or third parties. However, even with the help of Government funding, the direct site economics of regional and remote sites are often very challenging. It is therefore most commonly the returns we expect to receive from competing in the national mobile market on our superior network coverage and quality that continues to drive us to invest in regional sites with high costs and low direct revenues.
- It is vital that regulatory and policy settings such as co-funding parameters and conditions, while looking to promote competition, do not undermine MNO incentives to continue investing in mobile infrastructure in regional Australia. Approaches that are too rigid or restrictive carry a high risk of stifling private investment, resulting less availability and choice of mobile infrastructure for regional communities and an even larger regional digital divide for Government to seek to fill than there is today.

A thriving regional Australia is fundamentally important to Australia's success and viability both socially and economically. 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 that keeps regional Australia connected. We remain committed to playing our part in regional Australia.

This section explores the key factors for Telstra when making decisions regarding our investment in mobile infrastructure in regional Australia, including our choices around whether this is done on a shared or unilateral basis.

6.1. Deciding to establish a new regional site: basic foundational considerations

Mobile devices work by transmitting and receiving low-power radio signals. The signals are sent to and received from base station antennas that are attached to radio transmitters and receivers. The base station converts the signals into data which is then transported via the transmission network to other parts of the wider network. A mobile phone base station provides coverage to a geographic area known as a "cell". Cells are aligned next to each other in a similar pattern to a honeycomb. The location of the base station within the cell is determined by various factors, including topography and other physical

constraints such as trees and buildings, the cell 'capacity' (number of calls expected to be made in the cell), the amount of data usage, and the radio frequency used by the base station.

Each base station can only carry a finite amount of phone traffic. In areas of high mobile and data use, more base stations (or additional spectrum) are required to handle the volume of traffic. Small cells and in-building solutions (designed to give quality coverage within a specific building) are also used.

Once Telstra identifies a need to extend or improve our mobile coverage or capacity by establishing a new base station, small cell or IBC system, we undertake a 'search ring' before selecting a new site. This assesses a range of possible candidate sites and ranks them based on a series of criteria (e.g. planning considerations, transmission accessibility, power accessibility, coverage delivered, nature and location of existing network infrastructure). We then select the preferred candidate from that list.

6.2. Deciding to establish a new regional site: cost considerations

Telstra will only choose to invest in establishing a new site (whether unilaterally, through contribution of capex to a government co-investment program or by seeking access to third-party infrastructure) where it is commercially viable to do so.

As explained earlier in our response, the economics of extending coverage in regional and remote Australia are extremely challenging, often requiring a government subsidy to make the initial capital investment viable – and in some cases not even then if the subsidy is insufficient. **[c-i-c begins] [c-i-c ends]**.

Importantly, costs are incurred by MNOs not only to *establish* sites in more remote areas, but also to then keep those sites operational. Ongoing operational and maintenance costs for remote sites can be high in regional and remote areas, due to requirements such as to maintain and upkeep primary solar powered systems, and because the costs to deploy maintenance staff are higher (e.g. far northern Australia in monsoon areas may require helicopter access during flood season). At the same time, the revenues generated from more remote sites are typically lower, making the economics challenging just to cover these ongoing operational expenses.

Finally, for the reasons explained in sections 2 and 7 of our response, the reality is that even with Government support and the sharing of mobile infrastructure in appropriate cases to improve the economics, it is just not feasible to extend mobile coverage everywhere in Australia. In these difficult to reach areas, Telstra's approach to investment will factor in that public money and private investments may be better directed towards alternative coverage solutions (e.g. small cells, repeaters, satellite, WiFi).

6.3. Deciding to establish a new regional site: competitive national market context

Australia has delivered world leading mobile network technology for decades. This is because we have an intensely competitive mobile market, where the latest network capabilities and the customer benefits that flow from them are key differentiators. Decisions as to whether the overall benefit to Telstra's customers of investing in establishing or upgrading a site outweighs the cost and our choices around whether this is done on a shared or unilateral basis are accordingly considered in the broader context of how we compete with other mobile providers in Australia's national mobile market.

This means our decision-making process involves wider considerations than just the potential commercial returns likely to be generated from subscribers located in the area covered by the new site being weighed against the initial investment cost and ongoing operational costs to maintain the site.

Telstra's network differentiation (coverage and quality of our service) is central to how we compete in the mobile market and to Telstra's investment incentives. Accordingly, the indirect revenues we derive through competitive differentiation on the basis of our network coverage and quality drive our investment in expanding and improving our coverage regional and rural areas.

Despite the higher costs to Telstra for building and upgrading mobile infrastructure in regional and rural areas, Telstra has continued to invest in those areas because it knows that customers place a high value on having access to Australia's largest mobile network. That is, Telstra's investments in regional and rural Australia are justified on the basis of it being able to capture revenue in the national mobile market through a competitive advantage.

This is true both for the national retail mobile market, and also for the national wholesale mobile market – where our network investments enable MVNOs on the Telstra network to provide coverage to 98.8 per cent of the Australian population.

It also remains true even when the increment in additional population coverage achieved through the investment is relatively small, due to the corporate 'brand value' of being able, truthfully, to advertise Telstra's national mobile network coverage leadership.

6.4. Deciding to establish a new regional site: benefits for our customers

When Telstra considers what benefits are likely to flow to our customers from investing in extending our coverage in regional areas, we do not just consider the number of people living in the area to be afforded with outdoor coverage. We also consider factors such as:

- The likely traffic on transport corridors such as highways to be covered (from locals, business, holiday makers etc);
- The demands for mobile services at popular seasonal tourist sites;
- The potential to improve in-building coverage (which in our experience Australian consumers value highly and which can be harder to achieve in regional and peri-urban areas where sites are more spread out and where there is commonly more intervening terrain and vegetation);
- The nature of customer feedback on the impact of their current regional coverage. For example, people who live on farms and smaller villages will travel into town and, experiencing better mobile service, may more acutely feel the 'digital divide' they face in living outside town. Or there may be a reason specific to a local community why a particular blackspot causes issues.
- Requirements to support IoT devices, particularly in agricultural and rural applications[38], which are often located in areas where humans are not (e.g., to remotely monitor water levels or track livestock). Sites can deliver much greater IoT service coverage reach than mobile voice and broadband data can on a per site basis, and this amounts to a much larger coverage area per site and overall. While Telstra's combined 3G/4G mobile services cover 2.5M sq. km. of the Australian landmass, our LTE-M (Cat M1) and Narrow band IoT cover 3.5M and 4M sq.km. respectively; and
- The customer benefits of improved coverage resilience through investments in infrastructure like extended or standalone power for mobile sites or in satellite technology.

[38] See e.g., 5G technology on the radar | Wine Australia

Historically, the MBSP has focussed very strongly on extending outdoor coverage to premises in black-spot areas. Going forwards, we recommend Government co-funding programs have more flexible criteria for assessing the consumer benefits of extended coverage (including 5G and IoT) in regional areas, aligned with this wider view.

For example, funding applications could be permitted for groups of sites – to improve both the community benefits of the extended coverage and the economics of investment in the infrastructure – such as permitting applications 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, compared to individual applications for each new site along the route.

The community benefits from government funding to support investment in increased network resilience and access to alternative satellite services during times of natural disasters should also continue to be recognised.

6.5. Decisions to decommission sites

Sometimes, a decision is made to decommission an existing site. As observed in the ACCC's 2021 Mobile Infrastructure Report, this can be for a variety of reasons including that an MNO has added equipment to a new mobile site nearby which provides the same or more depth and/or breadth of coverage which makes the decommissioned site redundant. It may also be costly to maintain or upgrade (for example, from 3G to 4G/5G) a site so an MNO may decommission it and deploy a new site at a lower cost or rely on a nearby site for coverage.

6.6. Potential active sharing arrangements: some relevant considerations

Potential active network sharing arrangements are typically more complex than passive infrastructure sharing and involve more complex 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 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. For example, there are often physical limitations on the maximum bandwidth radio base station equipment can transmit for any given frequency band, which means it may not be possible for any single shared radio to transmit the same bandwidth/capacity as the sum of bandwidth/capacity possible if all operators were transmitting using separate radio equipment. This can be a particular issue in more densely populated areas or where coverage from a specific site encompasses a lot of users. 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 MNOs may find the model economic or uneconomic relative to deploying their own active infrastructure.

- **Commercially negotiated outcomes are important to calibrate for benefits:** Telstra sees a place and significant opportunity for commercially negotiated active network sharing arrangements between MNOs (whether through a partnership arrangement such as a joint venture or more innovative arrangements such as MOCN as a NaaS) to offer significant benefits for rural and regional Australia. The Telstra/TPG MOCN currently under review by the ACCC is an example of how a commercially negotiated agreement can be arrived at to solve complementary needs of

networks and improve efficiency. As set out in more detail in the authorisation application[39] for these arrangements, the Telstra/TPG MOCN delivers benefits over and above any cost savings on site establishment. The potential additional benefits of a MOCN include:

  - 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;

  - 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

  - 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.

- **Arrangements involving a non-MNO "neutral host"**: In addition to the matters mentioned in Table 4 above, key operational considerations 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 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

[39] Telstra Corporation Limited and TPG Telecom Limited proposed spectrum sharing | ACCC

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. Where the solution involves roaming, such as under the NSW Telco Authority Public Safety Mobile Broadband (**PSMB**) proof of concept trial, operational complexities that need to be considered include increased testing requirements; the need to put in place controls to attempt to mitigate risks associated with the potential for signalling storms and the impact of switching between networks and device support on the "clunkiness" of the roaming experience of users.

6.7. The impact of regulatory and policy settings

Telstra agrees with the ACCC that it is vital that regulatory and policy settings, such as co-funding parameters and conditions, while promoting competition, do not undermine MNO incentives to continue investing in the provision of mobile infrastructure in regional Australia. Approaches that are too rigid or restrictive carry a high risk of stifling private investment and wasted government funding, resulting less availability and choice of mobile infrastructure for regional communities and an even larger regional digital divide for Government to seek to fill than there is today.

For the reasons explained in section 5 of our response, co-investment programs where active sharing is a focus should avoid the use of prescriptive models. Access providers should have the flexibility to determine how access is offered, including allowing them to implement it consistently with arrangements that may already be in place. Being prescriptive risks creating a patchwork quilt of different and potentially sub-optimal sharing models – which is likely to be less efficient and functionally, operationally and/or commercially unattractive to both access seekers and providers.

Equally importantly, programs should complement private investment in uneconomic areas and not "crowd out" existing investment by overbuilding coverage or capability already in place. Subsidising competition by "second movers" removes the incentives for first mover investment.

It also remains the case that mandated roaming would unequivocally disincentivise ongoing MNO investment in regional mobile infrastructure. There have been no material changes in this regard since the ACCC's 2017 findings following its Domestic Mobile Roaming Declaration Inquiry.[40]. Understanding how mandated 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.

40 https://www.accc.gov.au/regulated-infrastructure/communications/mobile-services/domestic-mobile-roaming-declaration-inquiry-2016/final-report

- 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.

- 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 rural Australia.

6.8. Answers to consultation questions 7, 12 and 13

7. What other matters do providers of towers and associated infrastructure consider in deciding to provide towers and/or provide access to towers?

See sections 6.1 to 6.5 and 6.7 of our submission above.

12. How does the cost of providing new, or upgrading existing, mobile tower (both active and passive) infrastructure impact the decision to invest in infrastructure that can be used to supply mobile telecommunications and other radiocommunications services?

See sections 6.2 and 6.3 of our submission above. Importantly, this decision-making process goes beyond a simple weighing of potential direct revenues from subscribers covered by the site against the costs of establishing and maintaining the site. It is the indirect revenues we derive in the national mobile market through competitive differentiation on the basis of our network coverage and quality that drive our investment in expanding and improving our coverage in regional and rural areas.

13. How does the cost of access to mobile towers impact the decision to provide access to mobile telecommunications and other radiocommunications services?
14. Are there additional costs specific to rural, regional, remote or peri-urban areas?

See sections 6.6 and 6.7 of our submission, as well as sections 4.4 and 5.

7 How the matters covered by this Inquiry impact regional mobile coverage

Key points:

- Regional Australia will never reach its full digital potential unless investment by industry is complemented and supported by the right policy framework and the right approach to government co-funding. This entails considered, holistic and strategic policy making. It also requires increased coordination between the Australian, state and territory governments, industry and regional stakeholders to harness the power of private and government investment to drive optimal outcomes for regional communities.
- This approach should recognise the importance of quality of mobile service alongside basic coverage. Improving the quality of mobile services through upgrades to capacity and to 5G (and commensurate augmentation of backhaul and mains power) should continue to be a priority. Alongside initiatives to improve indoor coverage and coverage for transport corridors (such as through individual coverage extension devices) such improvements to the quality of mobile services available to those living and working in regional and remote communities has the potential to dramatically improve social and economic outcomes.
- The root of the issue that Government policy, and the ACCC's Inquiry, needs to grapple with is the highly challenging task of extending quality and resilient mobile coverage further into the reaches of this vast country. Recent growth in data volumes and demand in regional Australia alongside the impact of changes to our climate have only increased these challenges.
- Even with the right Government support and the right approach to infrastructure sharing, extending mobile coverage to some of Australia's more remote locations is never likely to be viable. In these areas, alternative technology options such as LEO satellites may more efficiently address coverage and resilience requirements. As such, mobile coverage expansion beyond existing terrestrial mobile footprint may no longer be the right main objective.
- Section 6 of our response discusses some of the challenges and opportunities to increase customer choice by improving the prospects for multi-carrier coverage in regional and remote areas. We believe the best outcomes for regional consumers in this regard will be achieved through a combination of enhanced passive infrastructure sharing arrangements and commercially negotiated active infrastructure sharing where this makes economic sense for the sharing parties.
- It is also important to appreciate that the received user experience of mobile coverage in regional and remote locations is impacted by a range of matters outside of the scope of the ACCC's Inquiry, including the impact of terrain, weather, devices and digital skills. Improving digital inclusion for all Australians continues to be a major priority for Telstra.

Following on from the previous sections covering the decision factors to invest in infrastructure and provide access to third parties, this section investigates how the provision of infrastructure and third-party access flows on to the provision of different services and competitive offerings to regional and remote communities.

7.1. The right policy settings to drive coverage improvements

7.1.1. The enduring importance of private investment

The importance and effectiveness of private investment (including co-investment) in improving mobile coverage in regional, rural and remote areas must not be understated. Recent commitments by Telstra alone include:

- $75 million from the partial sale of our towers business to be directed toward enhancing connectivity in regional Australia, guided by the recommendations of the RTIRC 2021 Review.
- $200 million co-investment funds over four years to further extend regional coverage through partnering with Commonwealth, State and Local Governments and local communities. This investment will support our commitments made as part of our recently announced T25 strategy which includes expanding 4G/5G coverage in regional Australia by at least 100,000 km.
- Improving services by expanding our 4G network and to provide coverage to those who can currently only access the 3G network.
- Expanding our 5G network to cover 95 per cent of the population and 80 per cent of all mobile network traffic being on 5G by FY25.
- Trialling ways to deliver better coverage, redundancy and quality, including by 4G fixed wireless technology and introducing a satellite service in FY23.
- Bolstering our national fibre network in the coming years, by adding 20,000 new route kilometres, with major inter-city upgrades which will enable transmission rates over six times higher than today's common rate of 100Gbps.[41]

Any future government policy with the objective to expand access to quality, reliable mobile coverage in regional Australia must create conditions conducive to ongoing MNO investment in regional infrastructure and services. That means it must complement MNO investment through a strategic, collaborative and considered approach to combined government funding and must not crowd out private investment. It must also provide the opportunity for MNO returns on regional investment generated through competitive differentiation in the national mobile market, whilst allowing MNOs the flexibility to pursue efficiencies from using shared infrastructure on commercial terms.

7.1.2. A more coordinated approach to government funding

Telstra supports the 2021 RTIRC recommendation[42] for a long-term investment and planning framework for digital infrastructure to be developed which includes increased coordination and investment between the Australian, state and territory governments and other relevant sectors to address regional connectivity.

It has been our experience to date that overlap between, and misaligned requirements for, funding by different Government initiatives creates added work and complexity for applicants. The current multi-layered approach can 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. Multiple different requirements

41 See We have two new partners to help us build Australia's fibre network of the future (telstra.com.au)

42 2021 Regional Telecommunications Review A step change in demand (infrastructure.gov.au), Recommendation 1.

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.

7.2. Coverage must be understood to mean quality coverage

While the goal to further extend mobile coverage into regional, remote and peri-urban areas is absolutely important, *quality* of the service offering is also extremely important to the digital future of regional Australia, especially as consumer and business use becomes more data hungry. The ability to make voice calls is fundamental. But vital community services such as education and health in regional areas, as well as the ability for regionally based industry sectors to contribute to the growth of Australia's digital economy, also depend on improvements to data speeds and a reduction in the incidence of congestion.

7.2.1. Initiatives to help relieve the impact of congestion on coverage

Congestion, which negatively impacts the user's experience of quality, is a function of data demand. Telstra is seeing data volumes and demand grow dramatically in regional Australia for several reasons, including:

- Digital adoption is increasing. Customers are increasing their use of new data intensive services such as streaming services, and businesses are adopting different ways of operating which increases their demand for data;
- Demographics are changing and we are seeing more people move into regional areas, for example, COVID-19 has increased the number of people working, studying and seeking entertainment from home; and
- Increased levels of domestic tourism in regional areas, again due to the COVID-19 pandemic.

Upgrading mobile network base stations to newer generation technology (e.g., 3G to 4G or 4G to 5G) can have a dramatic effect on data speeds and user experience as each new technology generation improves data throughput per MHz of spectrum. Similarly, upgrading backhaul capacity (for example by replacing point-to-point microwave radio links with optic fibre cables) can be just as important as upgrading base station capabilities to provide increased data speed, alleviate congestion, and provide a better experience for consumers in regional and remote areas.

Government funding for initiatives such as backhaul upgrades which would otherwise be uneconomic, as we have recently seen under the Federal Government's Regional Connectivity Program (**RCP**), can help to hugely improve the quality of mobile coverage in regional communities. This approach should be continued, with upgrades to existing fibre backhaul and core capacity considered eligible for funding where these directly support technology upgrades or expanded mobile coverage in rural and remote areas.

7.2.2. Extending coverage indoors and along transport corridors

We often hear from our customers living in regional and rural areas about their experience of poor indoor coverage, which can be problematic, especially for those living at the outskirts of a town. Coverage can also be poor on lightly travelled highways.

This is because mobile technology depends on radio waves and these are impacted negatively by physical obstructions such as walls and buildings, as well as the surrounding topography and vegetation.

Customers living and working in these areas often perceive the experience they are having to be the result of a wider black spot.

Fortunately, there are technology solutions such as approved[43] external antennae, smart antennae for in-home use, and repeaters for in-vehicle use to improve access to existing coverage. Extension devices repeat the existing signal and boost it within the local area providing additional useable coverage. Telstra has received positive feedback on the use of mobile extension devices from many of our customers experiencing localised blackspots who gained mobile connectivity once these devices were installed.

To illustrate the benefit mobile extension devices can provide, Figure 3 below shows a comparison of Telstra coverage maps with and without a mobile extension device.

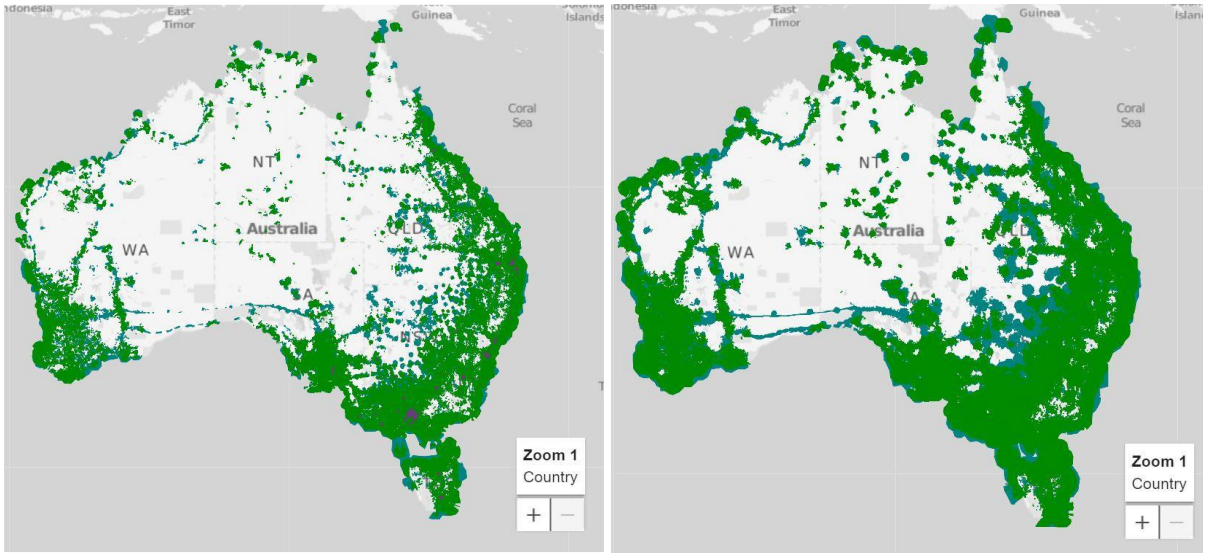

Figure 3: Left: Mobile handset coverage. Right: Mobile coverage with external antenna

Telstra recommends extending the MBSP to include funding for such solutions, aimed at delivering new indoor coverage, or infill coverage, in urban fringe, rural and remote areas. We believe that government funding aimed at improving existing coverage using mobile repeaters could vastly improve service quality and benefit consumers at the outskirts of a town or otherwise on the fringe of reliable mobile coverage.

One approach could be allowing an operator 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).

As recommended above in section 6, funding applications should also be permitted for *groups of sites* – to improve both the community benefits of the extended coverage and the economics of investment in the infrastructure. This would allow applications to cover a stretch of highway, including townships along

[43] "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.

a route, as well as funding for coverage extension devices to extend the range for existing towers, which is likely to lead to improved and more efficient coverage outcomes compared to individual applications for each new site along the route.

7.2.3. Extending 5G coverage in regional Australia

Rollout of a new mobile network generation in Australia takes around a decade. This is because it simply takes a long time to roll out a new generation of mobile technology across more than 10,000 base stations. For example, Telstra is still rolling out 4G coverage to places where only 3G coverage exists after having launched our 4G network over a decade ago in 2011.

Telstra has committed to expanding our 5G network to cover 95 per cent of the Australian population and to 80 per cent of all our mobile network traffic being on 5G by FY25.

However, it is usual for rollout of a new mobile network generation to start in the more densely populated parts of a country (capital cities) and then move out to regional areas. This is because at the beginning of a new mobile generation, vendor equipment is more expensive (per unit) than toward the end of a generation. MNOs often therefore deploy equipment in more populous areas, to maximise revenues from covered subscribers to recover the higher earlier costs.

We expect Government funding to support the extension of 5G coverage in regional Australia to be just as valuable as it has historically been for expansion of mobile coverage in earlier generations into areas which it would otherwise be uneconomic for MNOs to cover. For 5G, this will include support to cover the cost of increases to backhaul transmission, which is needed to provide the quality of service consumers expect to be delivered by 5G.

Improvements to deployment requirements and processes and affordable access to land are also very important enablers for efficient rollout of 5G infrastructure throughout Australia. As detailed in section 3 of this response, these include the recommendations put forward by AMTA in their *State and Territory 5G Infrastructure Readiness Assessment*.[44] Other, broader, key enablers such as access to spectrum and continued EME research and education are set out in Telstra's response to the 5G Inquiry.[45]

7.3. Promoting multi-carrier coverage through enhanced government funding

We consider the prospects for multi-carrier coverage could be improved if future government co-funding programs encompassed funding for enhanced[46] passive sharing arrangements for new sites. This could be done during the initial establishment of a new site to ensure the infrastructure is sufficient for two or three carriers. (e.g., the Government funds the increased capacity of tower, equipment hut and backhaul). Alternatively, it could be done as a program to augment existing sites (towers, equipment huts and backhaul) where those sites are only sufficient for one carrier.

Some aspects we consider pertinent to encouraging shared use of government co-funded sites include:

- **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-

[44] AMTA 5G Readiness Assessment report. https://amta.org.au/wp-content/uploads/2021/06/AMTA-5G-Readiness-Report-Digital.pdf

[45] Submissions – Parliament of Australia (aph.gov.au)

[46] Ordinarily, passive sharing is considered to only be the tower and equipment hut. "*Enhanced*" refers to mains-power and backhaul transmission.

carrier outcomes, and Government policy and / or funding programs could alleviate high costs (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).

- **Funding for capital costs to support multi-party access:** In line with previous recommendations Telstra has made,[47] we believe the Government's MBSP could be enhanced by covering the cost of structural enhancement to accommodate additional tenant(s). We believe that specific additional government funding for such costs, covering both towers and additional compound/hut space to accommodate multiple carriers, could be material in promoting co-location.

- **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.

- **Include ongoing operation and maintenance costs for sites in remote locations**. More remote sites incur higher running costs for aspects such as mains power, backhaul, or transport costs (e.g., helicopters) for staff to carry out maintenance. Often, the revenue from the low number of users does not cover these operational costs, let alone provide a return on the capital invested in establishing the site. Government funding for such operational costs could make deployment more economically sustainable for more operators.

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

7.4. Complementing mobile coverage with other technologies

With over 99% of Australia's population now having access to mobile network coverage, the economics for further expansion of terrestrial mobile coverage are extremely challenging, given Australia's demographics, geography, and topology. While the Inquiry explores issues such as the cost of infrastructure, cost of accessing land and third-party access arrangements to help extend mobile coverage to regional and remote communities, we consider there may be a very finite potential for manipulating these attributes to efficiently drive material improvements in the current terrestrial coverage footprint.

By contrast, technologies are emerging which have the potential to greatly improve the delivery and economics of a base level of connectivity in remote parts of Australia. For example, for large area outdoor coverage, there are emerging solutions based on Low Earth Orbit (LEO) satellite capability, or low speed, terrestrial IoT cellular networks which may be able to efficiently extend connectivity in more remote areas where terrestrial mobile services cannot.

Telstra is therefore continuing to monitor developments with GEO and LEO satellites (and other High-Altitude Platforms) and are engaging to understand the economic and technical viability, commercial models and service capability of these solutions.

[47] 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.

With the imminent arrival of new technologies such as LEO satellite and deteriorating economics for terrestrial expansion, a new mindset is required to expand coverage beyond the footprint of existing mobile networks by embracing the potential of these emerging technologies.

The community benefits from government funding to support access to alternative satellite services during times of natural disasters should also continue to be recognised.

In addition, consideration should be given to extending the qualifying criteria for government co-funding to include public Wi-Fi or public broadband. For example, additional points could be given to carrier deployment proposals that include provision by an operator of public Wi-Fi (or any other mobile network wireless broadband medium) in addition to mobile coverage. This would provide customers of other operators with access to data services outside of their mobile coverage. Calls and texts could be made using voice and SMS over Wi-Fi technology or via over the top (OTT) voice and messaging services through third party applications.

7.5. Extending regional mobile coverage: the why

Successful initiatives aimed at driving positive social and economic outcomes through extended digital connectivity in regional Australia must be based on an understanding of, and address, the issues relating to digital connectivity in regional communities, with those communities. This cannot be done without close community engagement.

The overall success of the initiative must also take into consideration that mobile coverage is of no good to those living in regional communities who cannot afford to access it, or who lack the digital skills to do so. As set out in Telstra's response to the 2021 RTIRC inquiry[48] and in our 2022 Sustainability Report[49], Telstra has invested heavily in our continuing efforts to improve digital literacy and service affordability for regional Australians, including for elderly customers and indigenous communities. We look forward to continuing to work with Government and with local communities on such measures, so as to maximise the community benefits from future private and government network investment. This includes the steps we intend to take in our efforts to rebuild trust and engagement with First Nations Communities set out in our Reconciliation Action Plan.[50]

7.6. Answers to consultation questions 17, 18, 19, 20 and 21

17. How does the cost of providing mobile towers and associated infrastructure affect the provision of greater mobile coverage?

The cost of accessing land (including planning application and permit costs), building infrastructure (towers, equipment huts), provision of mains power and backhaul, all increase substantially in regional and remote areas and the same time as direct revenues from site coverage are typically more limited, to the point where there are likely to be few new economically viable sites. Alongside commercial flexibility for MNOs to used shared infrastructure where this makes practical and economic sense, government co-funding programs to enable extension of mobile coverage in these conditions are both welcomed and essential.

[48] 2021 Regional Telecommunications Review | Department of Infrastructure, Transport, Regional Development, Communications and the Arts

[49] Telstra-Bigger-Picture-2022-Sustainability-Report.pdf (netdna-ssl.com)

[50] Our new Reconciliation Action Plan to rebuild trust with First Nations communities (telstra.com.au)

However, emerging technologies such as LEO satellites are expected to be able to complement traditional mobile services in these areas in the non-too-distant future. Accordingly, we consider expansion of terrestrial mobile networks to "new ground" in regional and remote areas should no longer be the automatic default policy objective for Government.

18. What kinds of measures would promote improved mobile coverage?

See our full response in section 7 above, and our answer to question 17.

19. To what extent will the matters raised in the consultation paper impact, or be impacted by, the extension of 5G coverage?

See section 7.2.3 for details.

20. How are consumers impacted by a lack of mobile coverage? What are the impacts for indigenous people in regional and remote areas?

See section 7.5 for a brief overview of Telstra's perspective. Further relevant details are set out in our recent response to the 2021 RTIRC.[51]

21. In what areas could mobile coverage be improved?

In the body of this response, we have provided a range of suggestions as to how future Government funding programs may improve mobile regional coverage (where investment in terrestrial mobile coverage rather than in an alternative technology is the optimal solution).

Significantly, we believe these initiatives must recognise that while the goal to further extend mobile coverage into regional, remote and peri-urban areas is absolutely important, the *quality* of the service offering is also extremely important to the digital future of regional Australia.

We therefore recommend funding for initiatives such as coverage extension devices, to improve access to existing macro coverage indoors; in localised blackspots and along lightly travelled highways. We also support a continuation of the approach under the Federal Government's RCP to provide funding for network capacity and technology upgrades and for backhaul and mains-power augmentation.

51 2021 Regional Telecommunications Review | Department of Infrastructure, Transport, Regional Development, Communications and the Arts

8 Impact on access of recent infrastructure divestments

Key points:

- We expect the recent changes to the structure of the infrastructure businesses of Australia's three MNOs to result in intensifying competition between specialised, non-vertically integrated tower companies including Amplitel, ATN and OMERS, increasing the options available to MNOs to upgrade and expand their networks in the most efficient way.
- We see this as flowing through to a competitive landscape for access to infrastructure, in which all tower providers will be keen to maximise the number of access seekers on their infrastructure. This is reflected in Telstra's ambition and key strategic objectives for Amplitel.
- Already, improvements for access seekers can be seen in the form of Amplitel's post-divestment investment in new, innovative and efficient services and solutions such as its new asset management system and digital twins of the network.

Over the past year, the three major MNOs have all divested their passive mobile infrastructure businesses to specialised, non-vertically integrated tower companies. This infrastructure is now managed in Telstra's case by our subsidiary Amplitel, in Optus' case by Australian Tower Network (**ATN**) and in the case of TPG by OMERS Infrastructure Management (**OMERS**).[52]

There also remains continued market interest in telecommunications facilities, hence the potential for further restructuring activities which could alter current ownership structures in the Australian market.

Overall, we expect these changes to the market to result in increased optionality for MNOs in deciding how to upgrade and expand their networks by the most efficient and competitive means available. We also expect them to facilitate an increased opportunity for MNO use of shared infrastructure.

In this section of our submission, we provide details of Telstra's relationship with our subsidiary Amplitel. More broadly, we explain why we expect the divestments by all three of the major MNOs to flow through to an increasingly competitive landscape for third party access to mobile infrastructure. Further information on this aspect of the ACCC's Inquiry is contained in Amplitel's separate response.

8.1. Telstra's divestment to Amplitel

On 30 June 2021, Telstra announced that a consortium had agreed to acquire a 49% non-controlling interest and become a strategic partner in Telstra's mobile towers business.

Amplitel was established on 1 September 2021 following the transfer of the towers business from Telstra to Amplitel and sale of a 49% interest in that business to a consortium of investors. This consortium comprises the Future Fund, Australian Retirement Trust, Commonwealth Superannuation Company and H.R.L. Morrison & Co and is managed by H.R.L Morrison & Co.

[52] We understand that OMERS has recently rebranded its towers business as WaveConn, following completion of its acquisition of the Stilmark towers business.

Amplitel manages over 8,000 physical towers, mast, large pole and antenna mount structures.[53] Amplitel's separate response to the ACCC's consultation will provide further detail regarding this infrastructure. Post divestment, **[c-i-c begins] [c-i-c ends]**.

For the infrastructure that Telstra has transferred to Amplitel, the general split of responsibilities is:

- Amplitel is responsible for **[c-i-c begins] [c-i-c ends]**; and
- Telstra continues to be responsible for **[c-i-c begins] [c-i-c ends]**.

Amplitel's strategic objectives are to:

- invest in new passive tower infrastructure to support its customers' mobile and non-mobile networks;
- increase utilisation of its infrastructure by providing better access;
- provide competitive market offerings;
- improve asset health;
- pursue growth and drive asset efficiency; and
- be the home of tower infrastructure expertise.

[c-i-c begins] [c-i-c ends]. Amplitel's separate response to the ACCC's consultation will provide further details of those arrangements.

8.2. A competitive landscape for infrastructure access

Overall, we expect the recent changes in the market structure at the passive infrastructure level to increase the opportunities available to MNOs to negotiate efficient and competitive arrangements for third-party access to support them in expanding and upgrading their networks in regional Australia.

[c-i-c begins] [c-i-c ends]. As an access seeker, Telstra would not wish to be disadvantaged when seeking access to infrastructure controlled by another carrier company group. To date, it has been our experience that commercial access is usually granted without the need to resort to regulatory rights. However, we support the ongoing availability of recourse to regulatory rights of third-party access in the case of infrastructure controlled by a carrier company group.

In the case of Telstra's subsidiary Amplitel, Amplitel has a clear commercial incentive to maximise value from its assets for shareholders by maximising tower access to a range of customers. Amplitel's focus on delivering efficiencies and developing new assets has already resulted in tangible outcomes for access seekers. For example, Amplitel has invested in a number of new, innovative services and solutions, including implementing a new asset management system for asset inventory, workflows and order tracking. Amplitel is also creating digital twins of its infrastructure to enable available space to be visually shared for more cost-effective planning by access seekers.

Further details will be set out in Amplitel's separate response to the ACCC's consultation.

[53] Introducing Amplitel, the largest mobile infrastructure provider in Australia (telstra.com.au)

8.3. Answers to consultation questions 10, 15 and 16

10. Has the recent divestiture of tower infrastructure by MNOs impacted on the effectiveness of current commercial and regulatory arrangements? Please provide details and examples.

Telstra has seen no direct impact to date.

However, it may be that the potential for the new infrastructure businesses to offer new, innovative services and solutions to access seekers could be supported by refinements to the Facilities Access Code, such as to provide greater flexibility to allow consolidation of process steps.

Given the relative novelty of the divested businesses, the way in which they interact with existing industry arrangements designed to support MNO co-ordination in deployment and network operations and liaison with Government and other stakeholders, such as the Mobile Carriers Forum[54], is also something industry will need to work through in further detail.

15. What are the implications of MNOs divesting their tower assets on the current commercial and other fee arrangements for access to towers? How have these changed as a result of the divestment of tower assets by MNOs? Do you expect these to further change in the future and why?

[c-i-c begins] [c-i-c ends].

Amplitel's separate response to the ACCC's consultation will provide details of Amplitel's commercial arrangements for access.

16. How has the recent divestment of tower infrastructure by MNOs impacted:
    (i) the scope of access offered
    (ii) the terms and conditions of access, and
    (iii) the commercial and other fee arrangements for access.

[c-i-c begins] [c-i-c ends].

Amplitel provides services to an increasing range of carriers and other customers. Amplitel's separate response to the ACCC's consultation will provide details of Amplitel's arrangements for access.

[54] What is the MCF? - AMTA | The Voice of the Australian Mobile Telecommunications Industry

9 Temporary roaming in disasters and other emergencies

Key points:

- Telstra is deeply aware of the importance of access to communications in times of crisis, and we support the objectives behind the concept of limited temporary roaming in such cases.
- However, we consider Temporary Disaster Roaming (TDR) will only have limited usefulness in many emergency scenarios. When one network is damaged due to a disaster in an area, then it is likely the same disaster will have damaged all networks in the area. Loss of mains power is also common during a disaster, which will likely affect all networks.
- More importantly, we are concerned about the risk TDR poses to resilience of the surviving network and the connectivity and performance for the customers of that surviving network. An "avalanche" of users all simultaneously attempting to authenticate on the surviving network creates the risks of a "signalling storm" which can overload the network bringing it down for all users. Once authenticated, the users also add additional load on the surviving network which it will be unable to accommodate without some level of traffic control (throttling). The absence of traffic control will lead to congestion, accelerate battery depletion, and in a worst-case scenario, risks the resilience of the surviving network.
- Nevertheless, we would welcome the opportunity to work collaboratively with industry and Government to develop a TDR solution which addresses the risks to network resilience and performance.
- Over the medium term, the best TDR solution would be based on 3GPP standards, as the standardised approach introduces network/device capabilities specifically to mitigate the risk to the resilience of the surviving network. However, we recognise the current 3GPP Disaster Roaming standard only applies to 5G. Until such time 5G coverage becomes sufficiently extensive and 5G device take-up more universal any TDR solution would need to be supplemented with purpose-built approaches to de-risk carriage of earlier mobile generations, potentially including prioritisation, throttling, and/or limitations to traffic types permitted. This may mean user experience is not to the same level as under normal operation but will ensure users can continue to communicate and access and share essential information.
- Beyond the technical solution requirements, appropriate Government controls will also need to define the occurrence and geographic extent of a disaster where TDR will be implemented and the conditions for return to normal and these controls will need to be aligned to the capabilities and specifics of the solution ultimately adopted.
- There will be a significant cost to industry to establish the network capabilities, overlay procedures and IT system interfaces required to safely deploy TDR, and Government funding could be used to cover these costs. Commercial terms would also need to be agreed between MNOs to ensure that TDR does not become a disincentive for MNOs to continue to extend and harden their networks.
- Given the complexity and risks involved any introduction of TDR will take time to implement. In the interim we recommend that standards-based *Cell Broadcast* Emergency Alert be fast-tracked. This capability extends on existing SMS Emergency Alert by sending text messages to all mobile phones in an area regardless of their network operator. Cell Broadcast resolves the 'non-roaming' limitation of the current Government Emergency Alert solution by sending text messages to all devices such that users will receive the message so long as at least one mobile network is operational.

This section of our submission explores the feasibility of providing temporary mobile roaming services during natural disasters and other such emergencies (**TDR**). It is important to emphasise at the outset that TDR can only be of benefit in a very limited set of scenarios and with very real risk to the resilience of the surviving network. When one network is damaged due to a disaster in an area, then it is likely the same disaster has damaged all networks in the area. Loss of mains power is also common during a disaster, which will likely affect all networks.

However, because there will be benefit to the community should the appropriate set of circumstances arise, we welcome the opportunity to develop a TDR solution for Australia, in collaboration with industry and Government, provided the risks to resilience and network performance can be adequately managed. Government funding could be used to cover these costs. We also recommend **Cell Broadcast Emergency Alert** is introduced.

Introducing TDR will not be straightforward. There are inherent limitations in developing a solution based on ordinary roaming functionality (i.e., as used for international or domestic roaming) as this cannot address the risks to resilience and user experience that emerge from roaming in a temporary, localised arrangement during an emergency. This section of our submission covers concepts such as "signalling storms", and network congestion arising from user traffic (calls, SMS, data) that is normally spread across multiple networks all appearing on one network. The international standards body 3GPP[55] has developed a technical standard for TDR that overcomes the inherent limitations of ordinary roaming, however, this solution has only recently (June 2022) been ratified. As such, it is some years away before it becomes available in network equipment and user devices. Even then, the 3GPP standard only works on 5G, not 4G or 3G. However, with the ongoing threat of more natural disasters in Australia, we would welcome the opportunity to work collaboratively with industry and Government to develop supplementary solutions now, that can be implemented on all mobile network generations ahead of or at least in parallel with the flow through of the new 3GPP standard.

Introducing TDR will not be cheap or quick. Developing a technical solution that is outside international (3GPP) standards and that operates on earlier network generations is likely to require modifications to network equipment configurations that are bespoke to Australia and will require implementation of traffic management approaches to ensure users can communicate freely and access and share essential information despite the additional load. IT solutions and inter-party agreements to coordinate mobile networks for the activation and subsequent deactivation will need to be developed through which one network operator will advise surviving network operators of the need to activate TDR. Procedures and policies will also have to be developed, such that a central coordination entity (presumably, an emergency management centre) can advise locations where the disaster is occurring and its movement, or where power grids are being proactively shut down (as is often the case during bushfires and high winds to prevent further fires). Processes and learnings from the existing SMS Emergency Alert system may be applicable here.

As a final introductory note to this section, we wish to make a correction to the perception that the ability to make Triple Zero calls on any network is a form of roaming. The ACCC's consultation references[56] AMTA's website[57] to observe "*there are special **roaming** arrangements in place to ensure that when a customer is outside their service provider's coverage but in another carrier's mobile phone network coverage area an emergency call to triple zero will be carried on the other carrier's network*." [emphasis

---

55 Third Generation Partnership Project – 3GPP. https://www.3gpp.org/

56 RMII Consultation, section 5.6, bottom of p.23.

57 AMTA – Calling Triple Zero from your mobile. https://amta.org.au/calling-triple-zero-from-your-mobile/

added]. Unfortunately, this was an incorrect characterisation by AMTA of how **Emergency Sessions** operate on mobile networks, and we have worked with AMTA to correct the information on its website. It is unfortunate in the sense that it creates the impression that there is already a domestic roaming solution in place that "kicks in" when a user calls Triple Zero. This is not the case. The ability for a mobile phone to use any network to make an emergency call on any network is a special Emergency Session capability on the phone that sits outside the normal voice calling capability. It is a standards-based[58] feature built into all mobile devices with a voice call capability. It also explains why it is possible to make a call to Triple Zero even when the phone is locked, does not have a SIM card in the phone, or without any credit (funds) on the phone's account.

We raise this correction to dispel any perception of an "emergency roaming" capability already built into mobile networks in Australia. The ability to make emergency calls over any network, including while the handset is locked, is not roaming functionality, but rather is the specific Emergency Session capability as defined by 3GPP in Technical Standard TS 23.167. Roaming functionality is not used.

9.1. A definition for TDR

It is prudent to start this section of our submission by developing a definition for TDR. Consideration must be given to the services (e.g., voice, text, and data) that should be permitted to roam during a disaster. Within these service types, consideration should be given to sub-categories within the service types, especially data. Should all data traffic types be accommodated, for example, should streaming video (e.g., Netflix, Disney+ or ABC iView) be accommodated or barred? Should some of these streaming services be permitted (e.g., iView if it can be used to get news updates) while other are barred? Consideration also needs to be given to device categories such as Internet of Things (IoT, also called machine-to-machine or M2M) devices. Should these be permitted to roam onto the surviving mobile network when TDR is activated?

As we discuss below, activating TDR will suddenly present the surviving network(s) with all the users of the disrupted network(s) at a single point in time. This creates a very real risk of what is known as a "signalling storm" where the sheer coincident volume of devices trying to connect and register on the network simultaneously brings the network down for all. Assuming the influx of roaming users can be authenticated without disrupting the surviving network, obtaining all the users and the traffic they generate is a further ongoing risk of overloading the network. Notably, the traffic levels may be substantially increased, as people who would otherwise be doing their normal daily activities are suddenly trying to connect to family and friends or obtain information about the disaster as it unfolds. The result is greatly increased levels of traffic (compared to normal levels) all directed at the one surviving network.

Thus, when TDR is activated, it will be essential that the geographic region for which it is activated is kept reasonably small, notionally to the affected area. Expanding beyond the immediate area of the disaster will add extra users to the surviving network, increasing the likelihood of the "signalling storm" and increased ongoing traffic, both of which, the core of the mobile network must contend with (this is not just a network edge problem).

Including IoT devices massively increases the risk of the "signalling storm" as there could potentially be thousands or tens of thousands of devices all attempting to simultaneously authenticate onto the surviving network, especially if IoT sensors are being used heavily in an agricultural setting. While the

[58] See 3GPP IP Multimedia Subsystem (IMS) Emergency Sessions, Technical Specification TS 23.167. Available at https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=799

data traffic from such devices is likely to be lower than traffic from human users (voice, images, etc), each device, regardless of whether it is used by a human or an IoT device, requires the same roaming authentication. Therefore, we propose that IoT devices are expressly excluded from TDR, as during an emergency, the most important priority is human-to-human communication.

Finally, it may be necessary to limit or throttle certain traffic types. Allowing people to watch Netflix at an evacuation centre might be helpful to occupy children, but it's extra load on the network. In the same vein, it may be prudent to block, or at least throttle back, posts to social media, especially images and video posts which consume far more data than a text update to say you've safely reached an evacuation centre.

Therefore, we propose the following definition for TDR:

> **Temporary Disaster Roaming (TDR)** is a time-limited, geographically limited arrangement where only devices directly used by humans on a disrupted mobile network are serviced by a surviving mobile network that is not their own carrier's network, with limits applied to traffic types and throughput, and potentially to the duration of usage.

9.2. TDR can only provide benefit in certain limited scenarios

There are two limited scenarios where TDR will be of benefit. The first is where two or more mobile networks have overlapping coverage and at least one network survives while one or more of the other networks are disrupted. The second scenario is where there is ordinarily only one network providing coverage and customers of other network operator (who normally don't have coverage) gain service during an emergency while TDR is turned on.

In both scenarios, end users who wouldn't have coverage gain the ability to make PMTS voice calls (to numbers other than 000), send SMS/text messages, and access the internet. Accessing the internet enables people to access information and updates about the disaster, as well as accessing applications which may have embedded voice/video calling capabilities (Facetime, Messenger, WhatsApp, Signal, etc).

TDR provides no additional benefit in terms of emergency calling, as Emergency Session capability is already enabled on all mobile networks, and hence is available to all users regardless of carrier subscription.

In both scenarios, it is important to consider the limited probability of one network surviving when the other networks are disrupted. Situations such as extended loss of mains power (beyond battery backup capability), or inability to get fuel onsite to generators, or where infrastructure is physically damaged or destroyed, (water ingress during a flood, bushfire razes buildings/towers, etc) are likely to affect all network operators equally.

22. What are the benefits to the general public from the provision of temporary mobile roaming during emergencies? Are there any potential detriments?

Benefits:

The benefit of TDR is provision of service to users when their MNO experiences a disruption to their network or does not have coverage, but other network(s) operating in the same area are not affected. However, the likelihood that one network is not impacted by a disaster or emergency that disrupts other network(s), or that the sole network survives where it is the only operator with coverage, is likely to be very low.

Potential detriments:

Allowing IoT devices massively increases the risk of a "signalling storm", especially if the sheer volume of devices attempting to authenticate onto the surviving network overwhelms it. Therefore, when developing a TDR solution for Australia, consideration must be given to IoT devices. It may be necessary to restrict the volume of IoT devices attempting to authenticate onto the surviving network, or possibly even block devices that are large in number and not used for direct human to human communication, especially if those devices would impede the ability of handsets used by humans from quickly making it through the authentication process.

We are also concerned that the volume of traffic could cause congestion, or possibly overwhelm the surviving network. Even if the network can contend with increased traffic, the extra load on the network will hasten depletion of battery reserves in the surviving network. Consideration will need to be given to certain traffic types such as streaming video. It may be necessary to permit some streaming sources (e.g., ABC iView) while others are blocked (for example, uploading video content to social media). Note that the ability to restrict certain traffic categories (e.g., streaming content) or the ability to restrict subdomains within a category (e.g., Netflix but not iView) is not addressed as part of the 3GPP Release 17 standardised version of TDR.

23. What are the benefits to emergency service personnel and organisations from the provision of temporary mobile roaming during emergencies?

Emergency service personnel usage:

The increase in traffic from additional users could cause congestion on the surviving network, even with blocking and throttling of traffic types, as discussed in our answer to Q22. However, while this congestion would affect 'regular' users, it would not affect emergency services on Telstra's LANES™ product where Telstra's network is the surviving network. LANES™ provides guaranteed bandwidth and throughput by prioritising the traffic from devices with LANES™ SIM cards, and regular users are restricted to the remaining capacity of the network without consuming the bandwidth reserved for emergency services.

Where emergency service organisations are using a traffic prioritisation mechanism on any given network (including Telstra's LANES™ product on our network but also including any traffic prioritisation product that may operate on Optus' or TPG's networks), and that network is disrupted and TDR is activated, the emergency service devices will roam to the surviving network, and the emergency service personnel will retain service (now provided by the surviving network). However, the traffic prioritisation mechanism will not be invoked, regardless of which network is disrupted and which surviving network gains the users. Traffic prioritisation mechanisms are not maintained through the roaming solution, and while roaming on the surviving network, emergency traffic will simply be 'mixed in' with all other regular user traffic.

9.3. TDR presents significant risk to the resilience of the surviving network

If one or more networks are disrupted in an area and TDR is activated, an ordinary roaming solution would abruptly push all customers of the disrupted network(s) onto the surviving network at the same time. This creates a very real risk of what is known as a "signalling storm", where the sheer coincident volume of devices trying to connect and register on the network simultaneously overloads the surviving network, bringing it down as well (i.e., disrupting the surviving network).

Beyond the initial influx of new users, there will still be more users wanting to use more data than usual with the finite resources available on the surviving sites. Traffic levels may be substantially increased with people attempting to connect to family and friends or obtain information about the disaster as it

unfolds. This is likely to result in congestion, difficulty in accessing websites and slow data speeds degrading user experience for all, regardless of whether they are a customer of the surviving network operator or a roamer.

The higher load from the combination of home and roaming users will also accelerate the exhaustion of the available site backup power capacity (batteries) which bring forward loss of service for all that would not have occurred in the absence of TDR.

Unlike domestic roaming which would typically operate only a vast area and with long and consistent borders, TDR will typically setup "islands" of temporary roaming which need to be managed within the network. Roaming customers will return to their home network when TDR is deactivated, and this needs to be managed so the newly recovered cells are not overwhelmed by the influx of returning devices. Normal domestic roaming is not designed to be activated and deactivated on a temporary basis, so mechanisms will need to be developed to manage the temporary and granular deployment to avoid customers experiencing a temporary loss of service when TDR is deactivated, or they return to intact coverage from their regular service provider.

In our submission[59] to the 2021 Regional Telecommunications Review, the first of our eight recommendations was for better education on mobile congestion. If a TDR solution is developed for Australia, we consider it very important to educate the public not only on how and when TDR may be used and its limitations (as per section 9.2), but also that the public is educated on the likelihood of congestion and the steps they can take to minimise network congestion, such as avoiding unnecessary activity.

9.3.1. Answers to questions 25 and 26

25. Are there limitations (e.g., capacity) to current technology and business processes that would impact the ability for MNOs to provide mobile roaming during natural disasters and emergencies?

Yes, there are limitations in the *ordinary* 3G/4G/5G roaming functionality that cannot easily address the risks we have outlined in this section (section 9.3). However, we are conscious the 3GPP TDR solution which can address these risks only applies to 5G, and so despite our preference for a 3GPP solution, another way must be found. We discuss standardised/non-standardised approaches in section 9.4

In addition to the limitations of the ordinary roaming functionality, capacity will be a limitation. Capacity, especially in regional and rural areas, is planned based on steady-state population/user base. This likely to be exceeded when TDR is activated. Here, we include "capacity" to mean both the capacity of the base station and the backhaul capacity. In rural and remote areas, backhaul is often provided on microwave radio backhaul, which has far less capacity than optic fibre, and hence, could be overwhelmed leading to congestion. Capacity issues could also be more accentuated on networks dimensioned for a lower market share. For example, if one MNO dimensions their network based on 25% market share and they are the only surviving network (where all MNOs would ordinarily have coverage), they could see a 300% increase in traffic by going from 25% of users to 100% in that area.

Records of usage will also likely need to be kept by the surviving network for transfer to each end user's own network operator after the disaster has passed. We expect the surviving (gaining) network will:

[59] Telstra submission to the 2021 Regional Telecommunications Review, available at https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-613-telstra-public.pdf

1) provide individual end user usage/call/SMS records to each disrupted network operator so they can update their customers' usage during the emergency roaming period; and

2) invoice the outage network in aggregate for all the traffic (not attributable to individual users).

26. Are there any likely impacts on quality of service if mobile roaming during emergency situations was enabled? What level of service should be enabled – voice, SMS, data?

During a disaster or emergency, the priority must be human-to-human communication. Network operators will need the capability to take the traffic management actions to prioritise both the authentication of devices used by humans, and to prioritise the traffic types that enable communication between people. Voice and SMS will need to be enabled, and at some level, data will need to be enabled to some extent to allow people to access the internet to obtain updates on the emergency. However, consider certain traffic types may have to be blocked or at least throttled, such as high-volume traffic that is unlikely to be relevant to the protection of lives, infrastructure or property. See section 9.2 and our answer to Q22 for details on the types of traffic we recommend are blocked or throttled.

We also strongly recommend the public is educated on the likelihood of congestion and the steps they can take to minimise network congestion, such as avoiding unnecessary activity.

9.4. Our preference is for TDR based on international standards

There are a significant number of complex technical challenges that need to be solved for a temporary roaming capability. This complexity ranges through devices, RAN and core network, and inter-carrier coordination, and is designed to mitigate the risks identified in section 9.3. Global standards bodies have already taken the time to address these issues and it is our position that temporary roaming in an emergency should be based on these standards to mitigate the risk to the surviving network(s).

The 3GPP standard that introduces TDR is contained in Release 17. In 3GPP parlance, TDR is called "*Minimisation of Service Interruption*". The scope of TDR is explored in Technical Report TR 24.811[60] where several use cases that require close management are identified. It includes procedures to activate and deactivate it, how to enable devices to use it, the ability to mitigate the risk of a "signalling storm" and manage users in and out of roaming as they move in and out of the TDR "island". As noted above, it may be necessary to restrict the volume of IoT devices attempting to authenticate onto the surviving network, or possibly even block devices that are large in number and not used for direct human to human communication, especially if those devices would impede the ability of handsets used by humans from quickly making it through the authentication process. The 3GPP standard allows for network operators to activate TDR such that it would not be available to IoT or Cat-M devices.

Release 17 was completed by Technical Specification Group #96 (TSG#96) in June 2022. It is expected that vendors will take 18-24 months to implement the TDR function in their equipment (i.e., start – mid 2024). From there, functionality needs to be rolled out into the network, which will take further time.

It is also important to note that the 3GPP standardised implementation of TDR requires functionality in both network equipment and in user equipment (UE). We anticipate that in many cases, UE should be upgradable by an over-the-air (OTA) firmware upgrade, alleviating the need for consumers to upgrade their devices manually, or replace their device, to take advantage of TDR. This too will take some time,

[60] 3GPP Technical Specification TS 24.811, Version 17.1.0, available at https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3840

and realistically, it is likely to be 2025 before TDR capabilities can be deployed into both network equipment and user devices.

However, the 3GPP TDR solution is only available for 5G networks and devices; the standardised TDR solution is not available for earlier mobile generations. This presents a challenge, as without an international standardised solution, simply using ordinary roaming creates the risks we described in section 9.3, which is unacceptable. If the "signalling storms" or traffic loads we are concerned about arise, not only will it lead to accelerated depletion of precious battery reserves, but it risks "crashing" the one surviving network that users, including emergency service personnel, may desperately be using.

Acknowledging the limitation that the 3GPP TDR standardised solution only applies to 5G, and that implementation is some way off (likely not until at least 2025), we would welcome the opportunity to work collaboratively with industry and Government to develop a TDR solution for Australia. It will be important to identify the risks and challenges arising from using ordinary roaming functionality in a TDR context, and to design and cost possible solution options that overcome the risks.

9.4.1. Answer to question 24

24. What are the technical requirements to enable temporary mobile roaming during natural disasters and other emergencies?

There is no single 3GPP Disaster Roaming specification. This is because of the way 3GPP standards are structured. 3GPP standards are orientated around the overall architecture of a mobile network; core, RAN, service architecture, etc.

The overarching TDR concept, which 3GPP calls "*Minimisation of Service Interruption*", is scoped in Technical Report TR 24.811. This Technical Report describes several use cases (akin to "user stories") outlining activation, deactivation and various scenarios likely to occur as users move in and out of TDR geographies.

Beyond TR 24.811, the following specifications would be a reasonable starting point, but are by no means, exhaustive:

- TS 22.261 - Service Requirements;
- TS 23.501 - Service Architecture;
- TS 24.501 - Core Protocols; and
- TS 38.331 - RAN protocols

We would be happy to provide the ACCC a more thorough appraisal of the 3GPP standards, if this is of interest.

Beyond the current standard for 5G, to bring forward a solution for TDR on earlier mobile network generations, we will need to design and propose a solution with sufficient traffic management controls that can deliver TDR capability with minimal risk to resilience and user experience. We would welcome an opportunity to make such a proposal, cognisant that it will take some time to develop.

9.5. Processes and accountabilities must be established

Outside the coming 3GPP standard, TDR requires extensive controls across all carriers' networks to manage the risks to resilience and unique challenges that TDR poses. This requires the MNOs to work together to make a workable solution outside the established 3GPP standard. It will require bilateral

"Disaster Roaming Agreements" to be established between the carriers well in advance of a disaster situation. These bilateral technical and commercial agreements will cover the operational mechanisms for a failing network operator to signal to a surviving network operator that the survivor should start broadcasting the impacted network's PLMN.

It will also require a coordinating entity responsible for defining the geographic area where TDR will be applied and for passing details of the area to the MNOs. The MNOs will then be responsible for the activation and subsequent deactivation of TDR. Sitting above these responsibilities and processes will need to be a policy that contains an unambiguous definition of "an emergency". In addition to scenarios such as natural disasters, terrorist situations, and the like, there may be other scenarios that constitute an emergency. For example, recently in Japan, KDDI experienced a prolonged 61-hour outage leaving over 30 million people in Japan without service.[61] Inclusion or exclusion of such scenarios must be captured in an overarching TDR policy.

The entity may be an existing entity (for example, today Emergency Management Victoria manages the Emergency Alert System on behalf of all states and territories), or it may be a newly created entity for the purpose. It should not, in our view, be a single MNO. In addition, all MNOs responsible for, or involved in the TDR solutions need to be engaged and agree that the solution can support the protocols and definitions proposed.

Ultimately however, to progress this solution, all MNOs will need to work together and with government and emergency services to make a TDR solution, based on 3GPP standards, work.

9.5.1. Answers to consultation questions 27 and 29

27. What are the protocols for declaring a natural disaster or emergency? How is this communicated and co-ordinated with mobile network operators?

Protocols need to be developed; however, we consider the existing protocols and processes used in the current SMS Emergency Alert service would make a good template on which to base the protocols and processes for TDR. The protocols for TDR will have to address many factors related to the activation, deactivation, and management of the fluid situation during a disaster. Some factors that will need to be covered by the protocols are:

- The threshold conditions for the activation and subsequent deactivation of TDR. For example, a threshold condition might include a minimum of base stations within a small radius, as in some situations, neighbouring base stations will provide coverage. Another threshold consideration may be mains power failure or imminent mains power failure, which would *negate* a decision to activate TDR to maintain battery reserves for the longest possible time.
- Pre-emptive activation, for example, where there is ordinarily only one network with coverage, TDR may be activated in advance of the disaster reaching that area (and before the only network is disrupted).
- Definition of the geography where TDR will be activated.
- Reaction to the dynamic and fluid nature of a disaster. Network disruptions will "move" as the disaster moves, or through the inability to maintain network operation (for example, inability to refuel generators).

[61] See After KDDI failure, SoftBank backs inter-carrier roaming. 8 May 2022. https://www.lightreading.com/asia/after-kddi-failure-softbank-backs-inter-carrier-roaming/d/d-id/779480

Much of this exists today within the SMS Emergency Alert service. The threshold conditions triggering the SMS Emergency Alert exist, and the ability for Emergency Service Organisations (ESOs) to define a geography to which the SMSs will be sent also exists. Refinement is required for the activation and deactivation of TDR, especially if TDR is to be used in the context of prolonged network outage. In addition, tight thresholds will need to be developed to ensure TDR is activated in a manner that does not lessen the ability to serve as many people in the community as possible (for example, not accelerating battery depletion), which may differ from the protocols and thresholds used for the SMS Emergency Alert service.

29. What are the costs involved in providing temporary mobile roaming during emergencies?

Much of the cost will be incurred in establishing the underlying TDR capability (in the network and in user devices) and, in particular, developing and implementing the new traffic management capabilities and processes to activate, deactivate and "harmonise"[62] emergency areas, which are needed to manage the dynamic nature of a disaster, risks to network resilience and user experience. Further costs will likely be incurred in establishing the overlay procedures and capabilities for a central coordinator (entity) to activate and deactivate TDR as/when the need arises. Until further work is conducted to scope out a solution to the procedures and protocols contemplated in Q27 above, it is difficult to provide an estimate of the implementation costs.

Federal Government funding could be used to cover these costs.

9.6. Government funding will be required and commercial terms for carriage between the MNOs agreed

In section 9.4 we have identified the need to develop a solution outside international 3GPP standards, despite there being risks associated with attempting to use ordinary roaming in a temporary disaster-related context. In section 9.5 we have then outlined the need to establish processes and accountabilities to overlay the technical implementation. Bespoke technical solutions developed solely for the Australian market will inevitably be costly, and there will be further costs realised in the IT-Systems to coordinate the roaming solution between networks as well as the cost of the processes, procedures, and accountabilities. Federal Government funding could be used to cover these costs.

In addition, to ensure ongoing network incentive to extend and maintain networks it will be important for the MNOs of users who take advantage of TDR pay the carrying MNO for the roaming service. If there is no cost recovery for the MNOs to deploy TDR, it will act as a disincentivise to the other MNOs to harden and maintaining their network.

9.7. Cell Broadcast Emergency Alert

Cell Broadcast Emergency Alert is a complementary solution to the Government's SMS Emergency Alert[63] service. SMS Emergency Alert provides notification to both fixed line services using an automated voice recording, and to mobile phones using an SMS. However, SMS Emergency Alert is limited in the delivery of the SMS notification to mobile phones in that messages are only sent to users via their own network operator (MNO). Thus, if a user is outside their MNO's coverage, they will not receive the alert message, even if they are within the coverage of another MNO's network.

62 The geographic area will move and evolve as the disaster moves and as outages occur on the mobile networks. Traffic from one MNO may initially move to another MNO, who then succumbs, necessitating a moving to the remaining MNO.

63 Emergency Alert. https://www.emergencyalert.gov.au/

The Cell Broadcast Emergency Alert solution resolves this issue. This technology, widely used internationally, can broadcast emergency warnings to large volumes of nearby recipients instantaneously via mobile networks. Like calls to Triple Zero, it works even if a mobile handset is on a different network to the base station sending out the message, without the complexity of roaming. In our submission[64] to the Governments 2021 Regional Telecommunications Inquiry, we welcomed the funding allocated by the Australian Government in its 2021-22 Budget to design a National Messaging System (NMS) based on Cell Broadcast technology. We continue to support the allocation of further funding to complete implementation of that system and extend the use of Cell Broadcast Emergency Alert to other emergency notification applications.

In addition, Cell Broadcast Emergency Alert can be developed and deployed in a shorter timeframe than a TDR solution. This is especially true of the 3GPP standardised version of TDR (which was only ratified in June 2022) and is also true of developing a bespoke implementation of TDR for 3G/4G networks that mitigates the resilience risks we've described earlier in this chapter. We believe it is important the Government make commitments to fully implement Cell Broadcast Emergency Alert emergency notifications nationally.

It is important to note that neither TDR nor Cell Broadcast Emergency Alert are guaranteed solutions to ensure connectivity during emergencies and natural disasters. Widespread power disruption or damage to fibre backhaul will likely impact all carriers' coverage in an area. Similarly, in many cases carrier cell sites are collocated on the same site and/or towers so any physical disruption from natural disaster (whether fire, flood or storm) will again disrupt coverage for all carriers.

64 Telstra submission to the 2021 Regional Telecommunications Review, available at https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-613-telstra-public.pdf