



Mobile Infrastructure Report 2023

November 2023



Acknowledgment of country

The ACCC acknowledges the traditional owners and custodians of Country throughout Australia and recognises their continuing connection to the land, sea and community. We pay our respects to them and their cultures; and to their Elders past, present and future.

Australian Competition and Consumer Commission
Land of the Ngunnawal people
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1. Overview

1.1 Telstra continues to have the most mobile sites with significant dominance in regional and remote areas

As at 31 January 2023, Telstra had the most mobile sites with 11,302 sites in operation followed by Optus (8,821) and TPG (5,769). Telstra had the greatest increase in mobile sites, up 300 sites since 2022, followed by Optus (189 more sites) and TPG (41 more sites).

The number of sites each MNO had in Major Cities was relatively comparable between 2018 and 2023. As at 31 January 2023, Telstra was slightly ahead with 5,493 sites followed by Optus (5,416) and TPG (4,383).

On the other hand, Telstra had considerably more mobile sites than Optus and TPG in regional and remote areas of Australia between 2018 and 2023. For example, in regional areas in 2023, Telstra had 40% more sites than Optus and 216% more sites than TPG. The gap between Telstra and Optus has reduced from 45% in 2018. However, the gap between Telstra and TPG has widened in regional areas (192% in 2018).

While in remote areas, Telstra had 282% more sites than Optus and 2318% more sites than TPG in 2023. Similarly, the gap between Telstra and Optus has reduced from 324% in 2018. But the gap between Telstra and TPG has also widened in remote areas since 2018 (up from 2176%).

1.2 Transition away from 3G networks continues

So far the transition away from 3G sites appears to be largely taking place in Major Cities. Telstra and TPG have been reducing their number of 3G sites in Major Cities since 2018 and 2019 respectively. However, since 2022, Optus has also started to reduce their number of 3G sites in Major Cities, and the pace of reduction was significant compared to those of Telstra and TPG.

The number of 3G sites will likely decrease substantially in the next 12–18 months with Telstra, Optus and TPG all having announced plans to shut down their 3G networks. TPG is expected to be the first in December 2023 followed by Telstra and then Optus in 2024.¹

As a consequence of the impending shutdown, all the mobile network operators are progressively repurposing their 3G 2100 MHz spectrum for 4G/5G services. Telstra and Optus have significantly reduced their use of 2100 MHz for 3G services compared to TPG.

As at 31 January 2023, there were still many 3G only sites in operation. Unless 4G/5G coverage is provided by other sites in the relevant areas, these 3G only sites will need to be upgraded to 4G or 5G so that customers do not lose coverage and/or experience reduced quality of service after 3G networks are switched off. Telstra had the most 3G only sites with 767 3G only sites still in operation with a majority in Major Cities or Very Remote Australia. Optus and TPG had substantially less 3G only sites, 127 and 92 sites respectively.

¹ TPG Telecom, [TPG Telecom confirms December 2023 switch off for 3G network](#), TPG Telecom, 2022, accessed 16 August 2023. Telstra, [3G Network Service Closure: End of the line for 3G](#), Telstra, accessed 16 August 2023. Optus, [We're upgrading our network with changes to 3G](#), Optus, accessed 16 August 2023.

Overall, as at 31 January 2023, there remained some difference in the size of 3G and 4G coverage for some operators. Optus's overall 4G outdoor coverage was around 119% of its 3G outdoor coverage. On the other hand, Telstra's 4G outdoor coverage was around 80% of its 3G outdoor coverage, and TPG's 4G outdoor coverage was around 62% of its 3G outdoor coverage.²

1.3 5G roll out gathering pace

All MNOs now have a 5G presence in each of the ABS Remoteness Areas with the exception of TPG in Very Remote Australia.

As at 31 January 2023, Telstra had the most 5G sites (4,559) with 57% more 5G sites than Optus (2,905) and more than twice as many sites as TPG (2,063). TPG added the most 5G sites (1,034) since 2022, followed by Optus (973) and Telstra (488). The vast majority of these sites were rolled out in Major Cities. TPG also rolled out its first 5G sites in Outer Regional (17) and Remote Australia (5) between 2022 and 2023.

To date, the roll out of 5G sites has predominantly involved using low and mid-band spectrum. Notably, Optus reported use of low band spectrum (900 MHz) for 5G for the first time in 2023.

Telstra had deployed the most sites that utilise low band 5G spectrum with 2,605 sites using 850 MHz spectrum, as at 31 January 2023. However, Optus and TPG have both increased their low band usage with both adding approximately 1,000 5G sites in the last year using low band spectrum.

Furthermore, use of high band spectrum (26 GHz) is also beginning to grow with Telstra leading the way with 289 sites using this spectrum followed by Optus (72) and TPG (6).

1.4 Difference between outdoor coverage and external antenna coverage could be significant

There are 2 main types of coverage maps – outdoor coverage and external antenna coverage. Outdoor coverage is the reception you can expect to receive outdoors with a typical handheld device. External antenna coverage is expected coverage when a handheld device is augmented using an external antenna, for example, an external antenna mounted on a vehicle.

As a result of amendments to the Infrastructure RKR in 2022, the MNOs are now required to provide both external antenna coverage maps and outdoor coverage maps for 3G, 4G and 5G technologies (where in operation). This information was provided by all 3 MNOs for the first time in 2023. This additional information enables the ACCC to assess changes in external antenna coverage and outdoor coverage over time, as well as the differences between the size of the coverage accessible via handheld device and coverage accessible with the aid of external antennas.

The extent to which each MNOs network is accessible outdoors via a typical handheld device varies. In some cases, the difference between coverage areas accessible via handheld device and coverage accessible with the aid of external antennas could be significant. For example, Optus's 4G outdoor geographic coverage is around 83% of its 4G external antenna geographic coverage. This means around 17% of Optus's 4G network coverage can only be accessed via an external antenna. TPG's 4G outdoor geographic coverage is 74% of its 4G external antenna geographic coverage. On the other hand, Telstra's 4G outdoor geographic coverage is around 52% of its 4G external antenna geographic coverage.

² These are aggregate comparisons between the total area of each MNOs 3G and 4G outdoor coverage maps. The ACCC could not verify if each MNOs 3G outdoor coverage areas are also covered by 4G.

2. Background

The Mobile Infrastructure Report 2023 provides analysis on the changes in the national mobile network operators' (MNOs) mobile infrastructure and coverage from 2018 to 2023, based on information collected from the MNOs under the [Audit of Telecommunications Infrastructure Assets – Record Keeping Rules](#) (Infrastructure RKR).

The ACCC has collected Infrastructure RKR data relevant to mobile infrastructure from the national MNOs – Singtel Optus Pty Limited (Optus), Telstra Corporation Limited (Telstra) and TPG Telecom Limited (TPG) – for the period from 2018 to 2023. We have disclosed this data pursuant to section 152BUA of the *Competition and Consumer Act 2010*. The disclosed Infrastructure RKR data includes detailed information on the mobile sites operated by each MNO and historical coverage maps as at 31 January for each year from 2018 to 2023.

The datasets are available at data.gov.au at the following address: <https://data.gov.au/dataset/ds-dga-4b472a18-d0fa-409c-994a-ab17162bcb90/details?q=ACCC>.

For each year from 2018 to 2023, the data made available includes:

- an Excel spreadsheet containing a list of the MNO's active mobile sites, with unique identification number (i.e. Radio Frequency National Site Archive (RFNSA) ID), the location of the site, the type of technology and associated spectrum deployed at each site and whether the site is co-funded under a government co-contribution program and if so, which one³
- coverage maps by technology (3G, 4G and 5G) and, in some instances, also by frequency bands.⁴

The ACCC has also derived and published key statistics from the relevant data. These are contained in an Excel spreadsheet titled 'Mobile Infrastructure Report 2023 – output tables' and is available on the ACCC's website at: <https://www.accc.gov.au/regulated-infrastructure/telecommunications-internet/mobile-services-regulation/mobile-infrastructure-report/mobile-infrastructure-report-2023>.

The key statistics include:

- the total number and the change in the number of mobile sites that an MNO operates for 3G, 4G and 5G technologies⁵
- the number of new and decommissioned sites and the proportion of new sites that are co-funded under a government co-contribution program
- the extent to which the MNOs are co-locating on the sites they operate
- the number of, and the change in the number of, sites on which each frequency band is deployed for each technology
- percentage change in the land mass covered by each MNO's network as shown by their historical coverage maps for each technology
- 4G coverage areas as a proportion of 3G coverage areas for each MNO's network over time
- outdoor geographic coverage areas as a proportion of external antenna geographic coverage for 3G and 4G for each MNO's network.

3 Unique identification number (RFNSA ID) and co-funding status only available from 2020 onwards.

4 MNOs are only required to provide coverage maps by frequency bands from 2020 onwards. However, some have chosen to provide maps by frequency bands in previous years whereas others have provided maps by technology type. The ACCC has used the frequency band maps provided by an MNO to construct technology level maps where the latter was not already provided by the MNO.

5 Analysis is limited to 3G, 4G and 5G technologies. 2G sites were switched off by Optus and Telstra before 2018. TPG turned off its 2G sites by 2019. Mobile site information and coverage maps for TPG's 2G network in 2018 is available.

The key statistics are also disaggregated by [Australian Bureau of Statistics' \(ABS\) Australian Statistical Geography Standard \(ASGS\) Remoteness Structure](#) and state/territory. The 2016 version of this ABS Remoteness Structure classification has been applied to all reference years between 2018 and 2022 (inclusive). The latest, 2021 version of this classification has been applied to all reference years from 2023 onwards. As result, some of the changes in the data between 2022 and 2023 are the result of re-classification in ABS Remoteness Area. The impact of this update is minor.

The disclosure of the Infrastructure RKR data, together with the derived statistics and Mobile Infrastructure Report stems from an earlier ACCC commitment and provides:⁶

- more transparency on how the MNOs' mobile infrastructure and coverage have changed over time and scrutiny of these changes in specific geographic areas
- more accountability over investment claims made by the MNOs, particularly in specific geographic areas
- useful information on the state of mobile networks for policymakers, particularly when formulating policy responses to mobile coverage issues.

6 ACCC, [Measures to address regional mobile issues](#), October 2017, p 26.

3. Mobile site analysis

A mobile site hosts radio equipment that uses radiofrequency spectrum to provide connectivity to mobile devices. With the use of backhaul, they connect end users to their service provider's core network for voice and data connectivity. A mobile site exists in various forms including on a mobile tower, on top of commercial or residential buildings and light poles as well as inside buildings, collectively referred to as passive infrastructure. Passive infrastructure may have been built by an MNO or a third party such as a specialist infrastructure company.

An MNO may deploy their equipment on the same passive infrastructure as another MNO(s), this is known as co-location, which is a form of passive infrastructure sharing (see section 3.8). Co-location is one way to reduce the cost of site deployment. Reducing the cost of site deployment enhances the ability of MNOs to invest in additional mobile infrastructure to improve the breadth or depth of their coverage, thereby promoting competition in downstream markets. Due to the use of co-location, the total number of mobile towers/structures in Australia is not equal to the sum of the mobile sites for each MNO.

The number of mobile sites an MNO has equipment deployed on provides an indication of the overall scale of their network. MNOs add (see section 3.5) and remove sites (see section 3.7) from their network over time. An MNO can add a new site to improve capacity/reduce congestion but with no change in the overall reach of their coverage (i.e. site densification). Site densification has become more common with the roll out of 5G. An MNO may decommission a site because it has added equipment to a new mobile site nearby which provides the same or more depth and/or breadth of coverage. A mobile site can also have several technologies installed on it simultaneously. Therefore, MNOs may also add new equipment compatible with newer mobile technology on new or existing sites or remove older, legacy technologies such as 2G and 3G. Furthermore, it may, in some cases, be costly to maintain or upgrade a site (for example, from 3G to 4G/5G) so an MNO may decommission a site and deploy a new site at a lower cost or rely on a nearby site for coverage and/or capacity.

For these reasons, changes in the number of mobile sites an MNO operates in its network in itself (see section 3.1–3.4) is not necessarily indicative of the financial investment it has made on their network. The cost of rolling out a new mobile site could also vary across ABS Remoteness Areas. Adding a new site in a Major City will generally cost less than a new site in a Remote or Very Remote area.

Due to the higher cost of network deployment in regional and remote areas and the lower population density, the commercial incentives to deploy network infrastructure in these areas are typically lower than in metropolitan areas. Consequently, co-contribution funding may be a key driver for MNOs when considering expanding mobile coverage into these areas. Local, state and federal governments have developed co-contribution programs to provide subsidies to network operators in infrastructure deployment in these areas. Mobile sites funded under these programs are considered co-funded sites (see section 3.6).

3.1 Total number of sites

As at 31 January 2023, Telstra had the most mobile sites (11,302) followed by Optus (8,821) and TPG (5,769) (Table 3.1). Telstra's total mobile site count also increased the most of all MNOs, 300 more sites, since 2022, followed by Optus (189 more sites) and TPG (41 more sites).

Figure 3.1 displays a breakdown of the MNOs' sites by ABS Remoteness Areas in 2023. The number of sites each MNO had in Major Cities was relatively comparable in 2023. However, as can be seen in Table 3.1, the gap between the MNOs with the greatest and fewest number of sites in Major Cities has widened overtime to 1,110 sites in 2023 (Telstra vs TPG). This is higher than the gap of 529 sites in 2018 (Telstra vs TPG) and 957 sites in 2022 (Optus vs TPG).

In regional areas⁷ and remote areas⁸ of Australia, Telstra had substantially more sites than the other MNOs between 2018 and 2023 (Table 3.1).

Over the period, the gap between Telstra and Optus appears to have reduced. In regional areas in 2023, Telstra had 40% more sites than Optus, down from 45% in 2018. While in remote areas in 2023, Telstra had 282% more sites than Optus, a drop from 324% in 2018.

On the other hand, the gap between Telstra and TPG has widened. In regional areas in 2023, Telstra had 216% more sites than TPG, up from 192% in 2018. In remote areas, the gap is significantly larger. In 2023, Telstra had 2318% more sites than TPG up from 2176% in 2018. The gap between Telstra and TPG in remote areas is not surprising given TPG's limited mobile coverage in these areas.

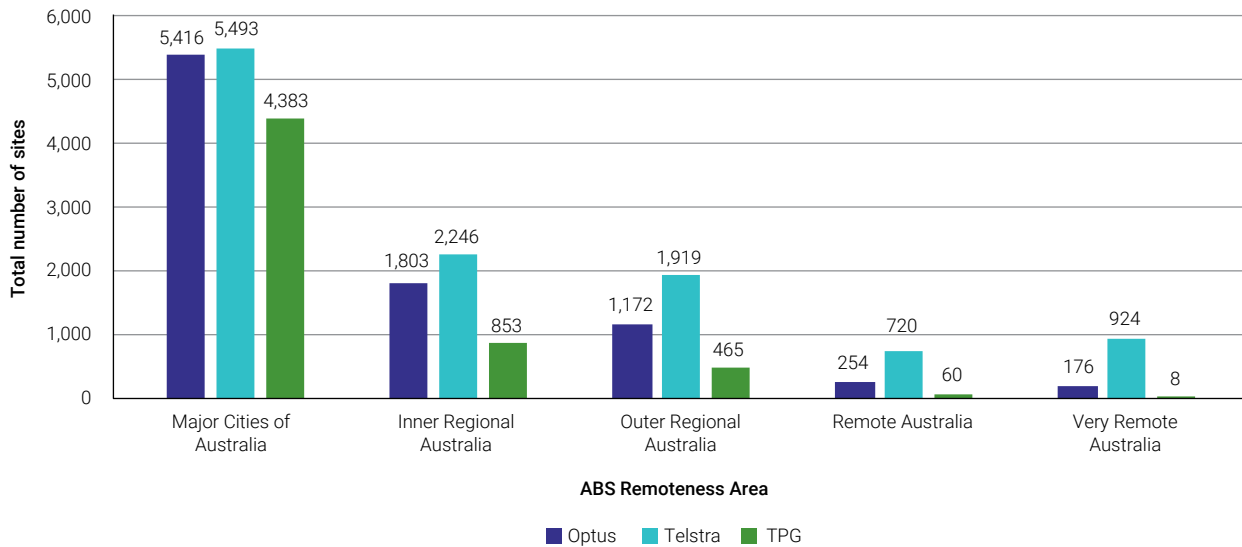
Table 3.1: Total number of sites by MNO & ABS Remoteness Area – Major Cities of Australia vs Regional areas of Australia vs Remote areas of Australia – 2018 to 2023

	2018	2019	2020	2021	2022	2023
Major Cities of Australia						
Optus	4,691	4,758	4,874	5,037	5,294	5,416
Telstra	4,736	4,800	5,059	5,166	5,257	5,493
TPG	4,207	4,268	4,306	4,503	4,337	4,383
Regional areas of Australia						
Optus	2,333	2,598	2,735	2,822	2,939	2,975
Telstra	3,373	3,756	3,920	4,054	4,139	4,165
TPG	1,157	1,271	1,301	1,319	1,321	1,318
Remote areas of Australia						
Optus	311	356	371	379	399	430
Telstra	1,320	1,416	1,472	1,546	1,606	1,644
TPG	58	69	68	70	70	68
Total						
Optus	7,335	7,712	7,980	8,238	8,632	8,821
Telstra	9,429	9,972	10,451	10,766	11,002	11,302
TPG	5,422	5,608	5,675	5,892	5,728	5,769

⁷ Regional areas of Australia means the sum of Inner and Outer Regional ABS Remoteness Areas.

⁸ Remote areas of Australia means the sum of Remote and Very Remote ABS Remoteness Areas.

Figure 3.1: Total number of sites by MNO & ABS Remoteness Area – 2023



3.2 3G sites

Figure 3.2 shows that the winding down of 3G networks has commenced for all 3 MNOs. Optus led the way since 2022 with a 382 decrease in number of 3G sites, followed by Telstra (-107 sites) and TPG (-17 sites).

To date, the transition away from 3G sites appears to be largely taking place in Major Cities. Telstra and TPG have been reducing their number of 3G sites in Major Cities since 2018 and 2019 respectively. However, since 2022, Optus has also started to reduce their number of 3G sites in Major Cities, and the pace of reduction was significant compared to those of Telstra and TPG (Figure 3.3).

Figure 3.2: Change in number of 3G sites by MNO – year-on-year – 2018 to 2023

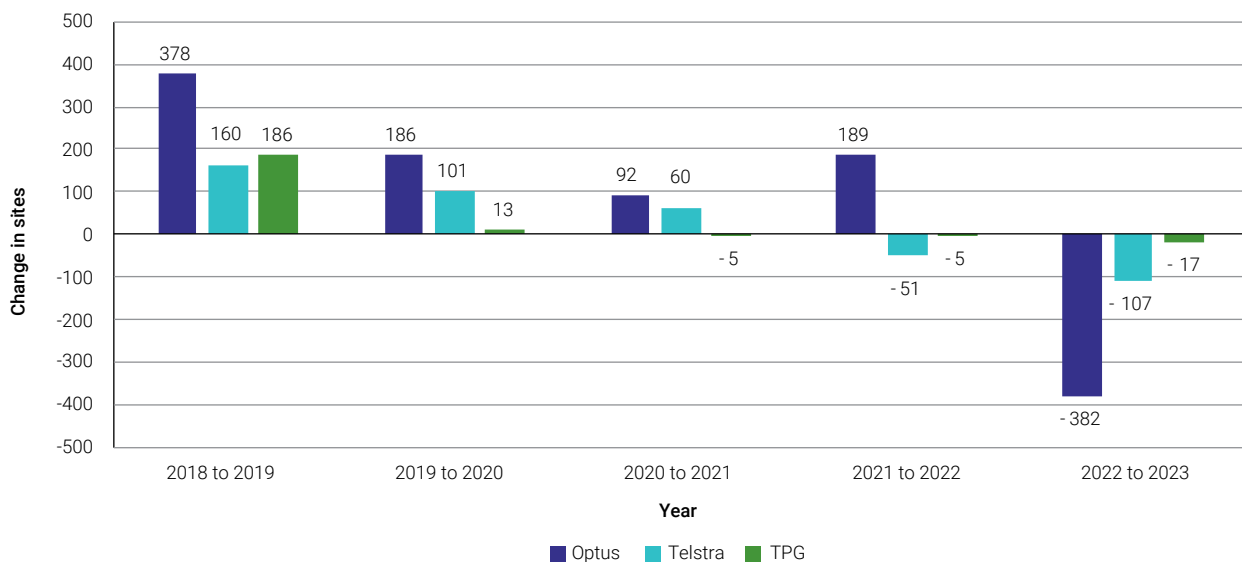
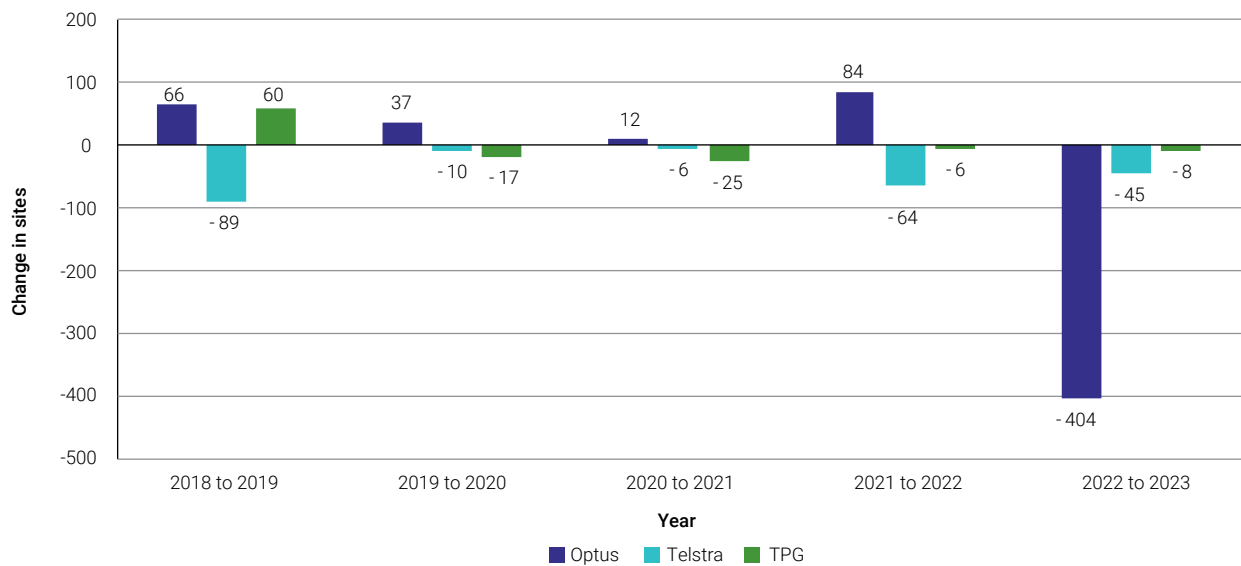


Figure 3.3: Change in number of 3G sites in Major Cities of Australia by MNO – year-on-year – 2018 to 2023



It is likely that the number of 3G sites will decrease significantly in the next 12–18 months with Optus, Telstra and TPG all having plans to shut down their 3G networks. TPG is expected to be the first in December 2023⁹, followed by Telstra in June 2024¹⁰ and Optus in September 2024.¹¹

We note that reductions in the number of 3G sites to date are not necessarily associated with any reductions in the size of 3G geographic coverage. Please see Section 4 for mobile coverage analysis. Figure 3.4 below shows there were still a significant number of 3G sites in operation as at 31 January 2023.

Importantly, there are still many 3G only sites in operation. Unless 4G/5G coverage is provided by other sites in the relevant areas, these 3G only sites will need to be upgraded to 4G and/or 5G to avoid customers losing coverage and/or having a reduced quality of service after the 3G shutdown.

As at 31 January 2023, Telstra had the most 3G only sites with 767 3G only sites with the majority of them in Major Cities (253 sites) or Very Remote Australia (238 sites) (Figure 3.5). Optus and TPG both had significantly less 3G only sites, 127 and 92 sites respectively. A majority of Optus’s 3G only sites were also in Major Cities (39 sites) or Very Remote Australia (54 sites). Given TPG’s planned 3G shutdown is the earliest of the 3 national MNOs and they have the smallest 3G network coverage it is unsurprising they have the lowest number of 3G only sites.

It is also very likely that the number of 3G only sites has declined further throughout the year given the reference date is 31 January 2023.

⁹ TPG Telecom, [TPG Telecom confirms December 2023 switch off for 3G network](#), TPG Telecom, 2022, accessed 16 August 2023.

¹⁰ Telstra, [3G Network Service Closure: End of the line for 3G](#), Telstra, accessed 16 August 2023.

¹¹ Optus, [We’re upgrading our network with changes to 3G](#), Optus, accessed 16 August 2023.

Figure 3.4: Number of 3G sites by MNO & ABS Remoteness Area – 2023

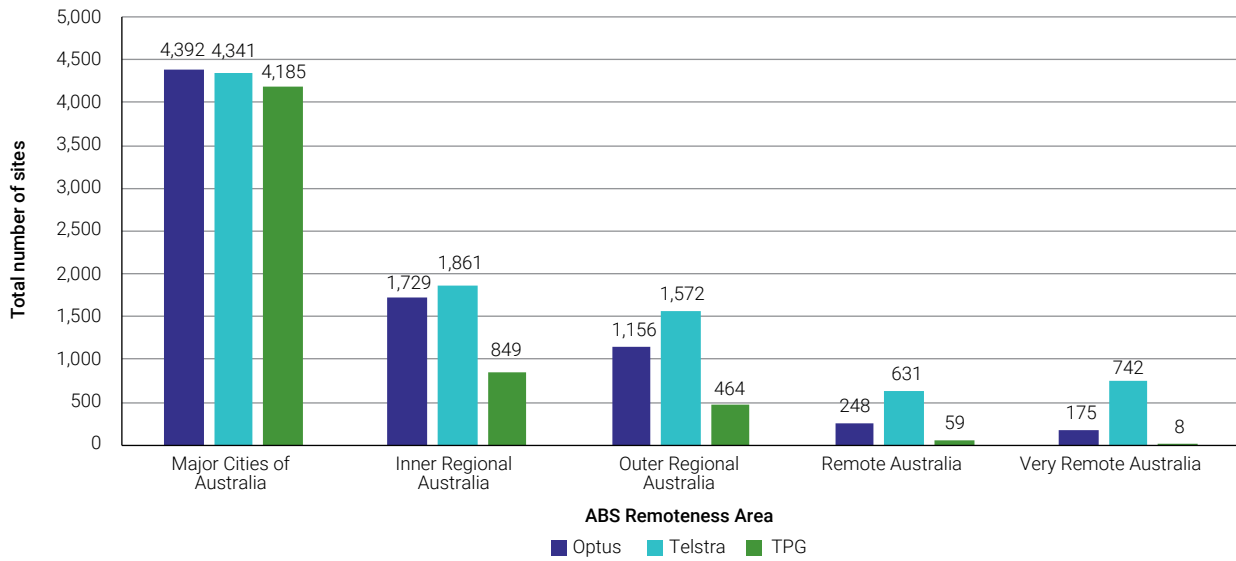
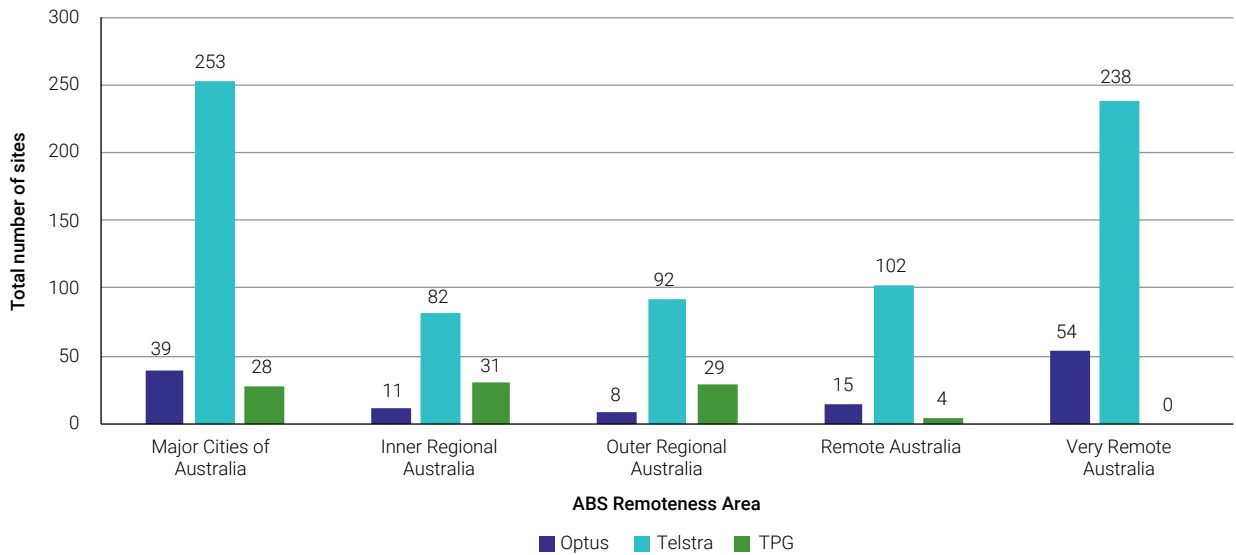


Figure 3.5: Number of 3G only sites by MNO & ABS Remoteness Area – 2023

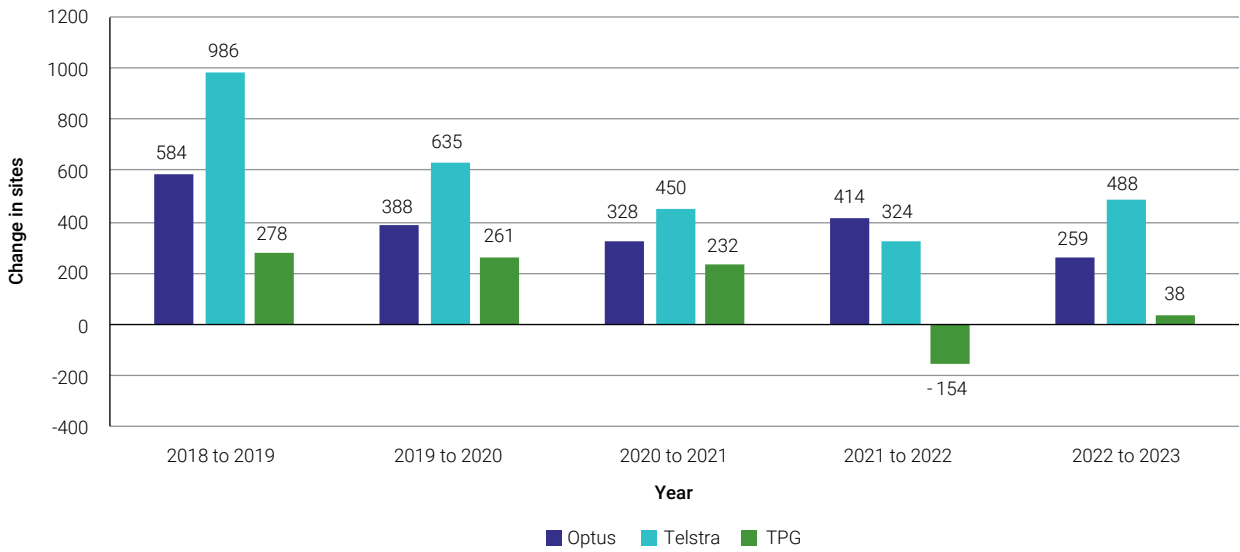


3.3 4G sites

The growth in the number of 4G sites has been mixed across the MNOs since 2018 (Figure 3.6). Telstra’s growth in 4G sites has slowed year-on-year since 2019 but experienced a rebound since 2022. Optus’s growth in 4G sites fell to its lowest level since at least 2018. On the other hand, TPG’s growth in 4G sites has continued to slow or decrease over the period.¹² These mixed results suggest the national MNOs are focusing on their 5G roll out. However, the number of 4G sites should grow further in the next 12–18 months as 3G only sites (Figure 3.5) transition to newer technologies such as 4G and 5G.

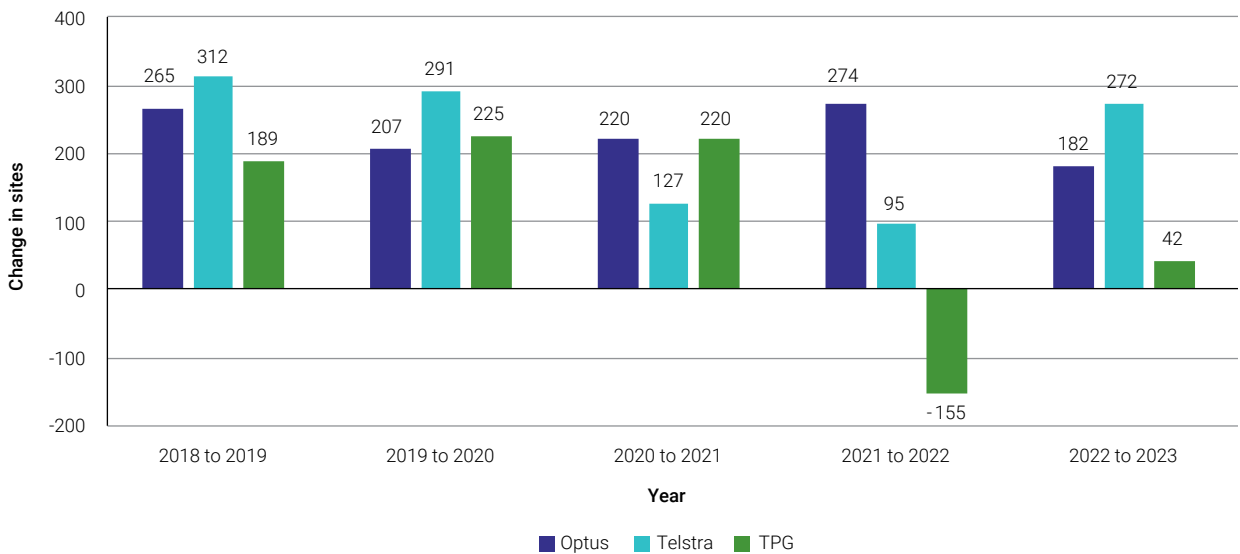
¹² The Mobile Infrastructure Report 2022 noted that this decrease was largely driven by changes in TPG’s 4G spectrum deployment.

Figure 3.6: Change in number of 4G sites by MNO – year-on-year – 2018 to 2023



Since 2018, in Major Cities, Optus and Telstra have added roughly the same number of 4G sites to their network, 1,148 and 1,097 sites respectively. TPG added considerably less sites over the same period (521 sites) (Figure 3.7).

Figure 3.7: Change in number of 4G sites in Major Cities of Australia by MNO – year-on-year – 2018 to 2023



In regional areas of Australia¹³, Telstra added more 4G sites than Optus and TPG between 2018 and 2023 (Figure 3.8). Over the period, Telstra added 1,091 sites, followed by Optus (704 sites) and TPG (127 sites). But the growth rate for Telstra has slowed significantly since 2019 with nearly half of those sites (502 sites) added between 2018 and 2019. Optus and TPG also experienced a general slowing of growth in regional areas of Australia since 2019.

In remote areas of Australia¹⁴, Telstra also added significantly more 4G sites than the other national MNOs between 2018 and 2023 (Figure 3.9). This is unsurprising given that Telstra has the largest 4G network coverage and has also benefited from a large share of co-contribution program funding (see section 3.6).

¹³ Regional areas of Australia means the sum of Inner and Outer Regional ABS Remoteness Areas.

¹⁴ Remote areas of Australia means the sum of Remote and Very Remote ABS Remoteness Areas.

Figure 3.8: Change in number of 4G sites in regional areas of Australia by MNO – year-on-year – 2018 to 2023

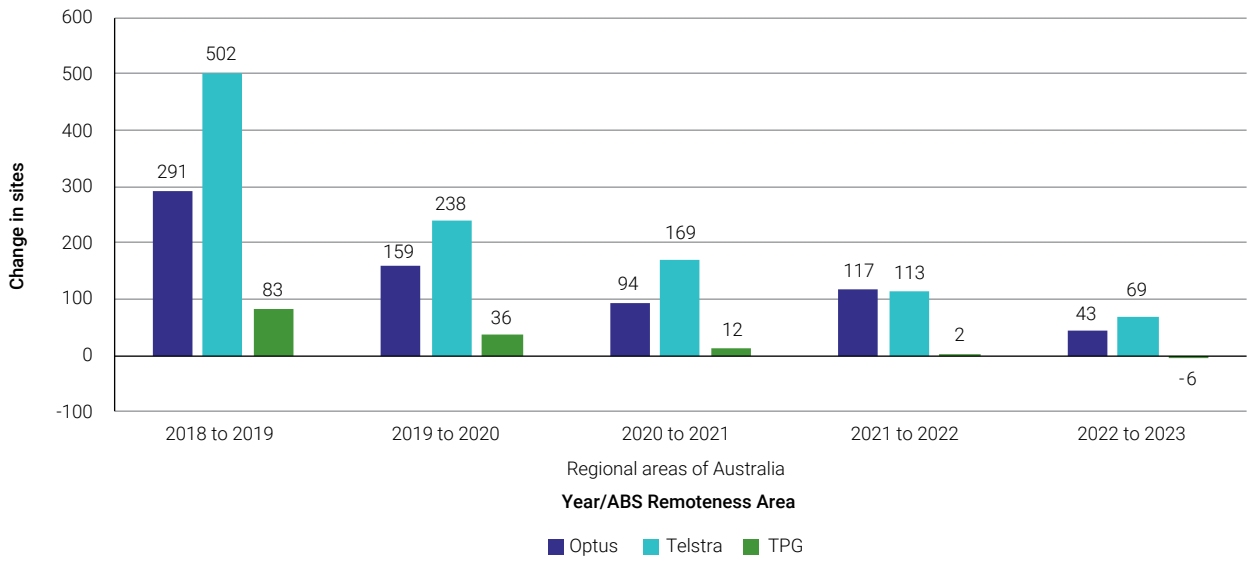
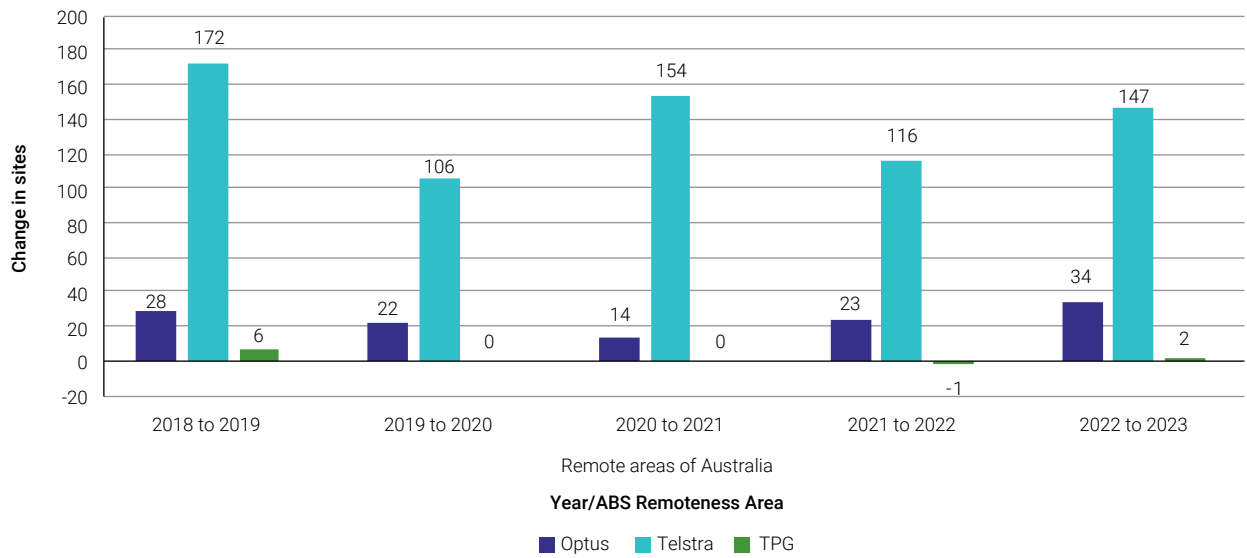


Figure 3.9: Change in number of 4G sites in remote areas of Australia by MNO – year-on-year – 2018 to 2023



3.4 5G sites

The roll out of 5G networks continued to progress for all MNOs. Each MNO now has a 5G presence in each of the ABS Remoteness Areas with the exception of TPG in Very Remote Australia. TPG did, however, roll out its first 5G sites in Outer Regional (17 sites) and Remote Australia (5 sites) between 2022 and 2023 (Table 3.2).

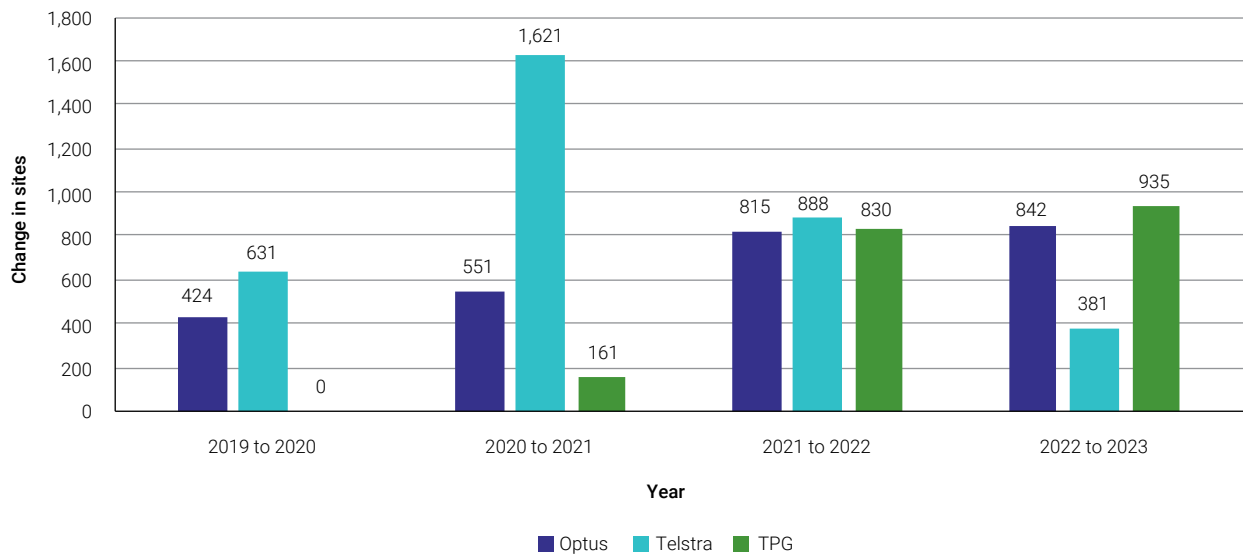
As at 31 January 2023, Telstra had the most 5G sites (4,559 sites) with 57% more 5G sites than Optus (2,905 sites) and more than twice as many sites as TPG (2,063 sites). TPG added the most 5G sites (1,034 sites) since 2022, followed by Optus (973 sites) and Telstra (488 sites) (Table 3.2). The vast majority of these sites were rolled out in Major Cities (Figure 3.10).

The ACCC expects to see continued growth in 5G sites in the near term as MNOs continue to roll out 5G sites. Given the MNOs are focussing on the 5G roll out and network expansion is likely to be significant in early phases of deployment, the MNOs' state of 5G network at the publication of this report may be significantly different to what is shown in Table 3.2 and Figure 3.10. This is because the reference date for each year's data is 31 January.

Table 3.2: Number of 5G sites by MNO & ABS Remoteness Area – 2020 to 2023

ABS Remoteness Area	2020	2021	2022	2023
Major Cities of Australia				
Optus	424	975	1,790	2,632
Telstra	631	2,252	3,140	3,521
TPG	-	161	991	1,926
Inner Regional Australia				
Optus	2	35	122	209
Telstra	139	346	684	719
TPG	-	2	38	115
Outer Regional Australia				
Optus	-	-	14	49
Telstra	27	92	222	264
TPG	-	-	-	17
Remote Australia				
Optus	-	-	6	13
Telstra	-	5	23	34
TPG	-	-	-	5
Very Remote Australia				
Optus	-	-	-	2
Telstra	-	-	2	21
Total				
Optus	426	1,010	1,932	2,905
Telstra	797	2,695	4,071	4,559
TPG	-	163	1,029	2,063

Figure 3.10: Changes in number of 5G sites in Major Cities of Australia by MNO – year-on-year – 2020 to 2023



3.5 New sites¹⁵

Between 2022 and 2023, the MNOs collectively added a total of 960 new sites across their three networks. This is up from the collective 800 new sites added between 2021 and 2022 but less than the 1,000 new sites deployed between 2020 and 2021. A majority of these new sites added between 2022 and 2023 were deployed in Major Cities. In Major Cities, Telstra deployed the greatest number of new sites (351 sites), followed by Optus (253 sites), and then TPG (70 sites).

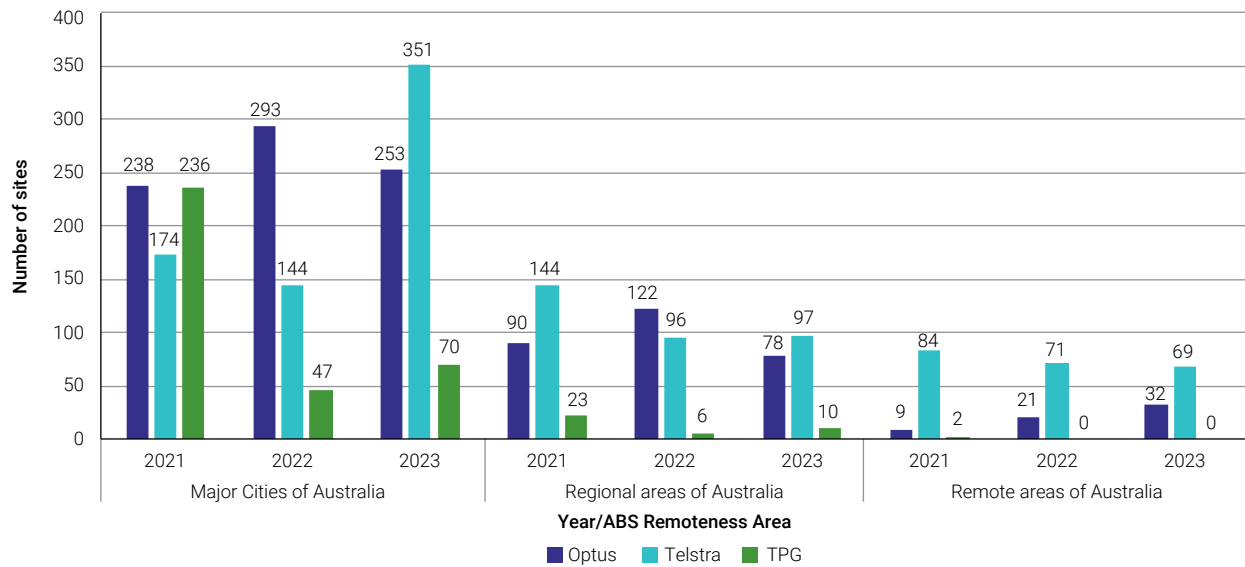
Over the same period, the MNOs deployed a materially lower number of new sites in regional¹⁶ and remote¹⁷ areas of Australia compared to Major Cities. In regional areas of Australia, Telstra added slightly more new sites (97 sites) than Optus (78 sites) and significantly more than TPG (10 sites) (Figure 3.11). Telstra continues to dominate the number of new sites in remote areas of Australia with 78% of new sites in these areas rolled out by Telstra since 2021. Between 2022 and 2023, Telstra added 69 new sites to its network in remote areas of Australia compared with 32 new sites by Optus and zero new sites by TPG.

¹⁵ Due to the data requirements of the Infrastructure RKR, data is only available for new sites added from 2020 onwards. New sites should be distinguished from net increase in the number of sites, which has been discussed in previous sections.

¹⁶ Regional areas of Australia means the sum of Inner and Outer Regional ABS Remoteness Areas.

¹⁷ Remote areas of Australia means the sum of Remote and Very Remote ABS Remoteness Areas.

Figure 3.11: Number of new sites by MNO & ABS Remoteness Area – Major Cities of Australia vs Regional areas of Australia vs Remote areas of Australia - 2020 to 2023



3.6 Co-funded sites¹⁸

Between 2022 and 2023, Telstra deployed the greatest number of new sites that were co-funded, with 36 of its new sites receiving co-contribution program funding, followed by Optus with 21 sites. For Telstra, this is significantly down from the previous 2 years and a decline from the previous year for Optus (Table 3.3). TPG did not deploy any new sites with the assistance of funding from a co-contribution program between 2020 and 2023.

¹⁸ Under Rule 5(3) of the Infrastructure RKR 2020, the record-keeper is only required to identify the relevant co-contribution programs for sites that received funding on and after 18 May 2020, unless the co-contribution program is the Federal Government’s Mobile Black Spot Program (MBSP), for which the record-keeper is required to identify the sites that received funding on and after 1 January 2015 and were still in operation in May 2020. This amendment did not require MNOs to resubmit its historical mobile site information with co-funded sites identified. The Infrastructure RKR requires reporting on active sites only so there will be a lag between when funding is awarded and when the proposed site becomes active.

Table 3.3: Number of new sites that are co-funded by MNO & ABS Remoteness Area – 2020 to 2023

	2021	2022	2023
Major Cities of Australia			
Optus	-	4	-
Telstra	3	3	1
Inner Regional Australia			
Optus	11	29	1
Telstra	38	19	4
Outer Regional Australia			
Optus	3	12	1
Telstra	46	23	7
Remote Australia			
Optus	1	8	5
Telstra	13	7	3
Very Remote Australia			
Optus	3	7	14
Telstra	15	15	21
Total			
Optus	18	60	21
Telstra	115	67	36

In recent years, one of the most significant co-contribution programs is the Federal Government's Mobile Black Spot Program (MBSP). As at 31 January 2023, Telstra had deployed 809 sites with the assistance of funding from this co-contribution program. This is significantly higher than the number of co-funded sites deployed by Optus and TPG combined (Table 3.4). Table 3.4 also shows that an ongoing majority of the Federal Government's MBSP funded sites are in Inner and Outer Regional Australia. Additionally, there were a total of 311 co-funded sites across the MNOs in Remote and Very Remote areas in 2023, up from 273 in 2022.

Table 3.4: Total number of Federal Government Mobile Black Spot Program sites by MNO & ABS Remoteness Area – 2020 to 2023

	2020	2021	2022	2023
Major Cities of Australia				
Telstra	8	11	14	15
Inner Regional Australia				
Optus	22	26	41	44
Telstra	187	222	234	233
TPG	8	8	8	9
Outer Regional Australia				
Optus	21	22	30	28
Telstra	276	320	340	343
TPG	44	44	43	41
Remote Australia				
Optus	16	17	22	27
Telstra	87	96	102	108
TPG	8	8	8	9
Very Remote Australia				
Optus	34	37	43	57
Telstra	72	87	98	110
Total				
Optus	93	102	136	156
Telstra	630	736	788	809
TPG	60	60	59	59

3.7 Decommissioned sites¹⁹

Between 31 January 2022 and 31 January 2023, the MNOs collectively decommissioned a total of 430 sites, up from 334 sites between 2021 and 2022. Of the 334 decommissioned sites, 325 or 76% were in Major Cities. In total, Telstra decommissioned the most sites (217 sites) followed by Optus (174 sites) and TPG (39 sites) in the same period (Table 3.5).

¹⁹ Due to the data requirements of the Infrastructure RKR, data is only available for decommissioned sites from 2020 onwards.

Table 3.5: Number of decommissioned sites by MNO & ABS Remoteness Area – 2020 to 2022

	2021	2022	2023
Major Cities of Australia			
Optus	75	36	152
Telstra	67	53	138
TPG	39	213	35
Inner Regional Australia			
Optus	3	4	13
Telstra	4	8	19
TPG	3	2	2
Outer Regional Australia			
Optus	0	1	3
Telstra	6	3	16
TPG	2	2	2
Remote Australia			
Optus	1	0	5
Telstra	5	4	15
Very Remote Australia			
Optus	0	1	1
Telstra	5	7	29
Total			
Optus	79	42	174
Telstra	87	75	217
TPG	44	217	39

3.8 Co-located sites²⁰

Between 31 January 2022 and 31 January 2023, the level of co-location across the MNOs remained relatively steady. Telstra had the lowest percentage of co-location across the MNOs. Of its total active sites in 2023, 34.3% (35% in 2022) were co-located with another MNO. The percentage of co-location was much higher for Optus and TPG with co-location occurring at 69.4% (70.5% in 2022) and 89.8% (90% in 2022) of their total active sites, respectively, in 2023 (Table 3.6).

Table 3.6 also indicates that the level of co-location varies significantly across MNOs and across ABS Remoteness Areas. For example, co-location in 2023 is as high as 92.6% of TPG’s total sites in Major Cities but as low as 5.3% of Telstra’s sites in Very Remote Australia. The level of co-location declines across all MNOs as their site locations move from Major Cities to less populated Regional and Remote areas.

This low level of co-location for Telstra flows through to a high number of ‘Telstra Only’ sites. Where co-location did occur, the most common combination was all three MNOs, continuing the same trend

²⁰ Due to the data requirements of the Infrastructure RKR, data is only available for co-located sites from 2020 onwards.

from the previous 2 years. The least common combination of co-location was sites co-located by TPG & Telstra across all 4 years (Table 3.7).

Table 3.6: Co-located sites as percentage (%) of total sites by MNO & ABS Remoteness Area – 2020 to 2023

	2020	2021	2022	2023
Major Cities of Australia				
Optus	84.9	83.4	80.3	79.0
Telstra	46.0	46.2	46.4	44.3
TPG	92.2	89.1	92.9	92.6
Inner Regional Australia				
Optus	63.4	62.5	60.9	60.5
Telstra	35.5	35.3	35.8	36.3
TPG	85.3	85.4	85.4	85.0
Outer Regional Australia				
Optus	52.9	52.9	52.4	51.9
Telstra	26.1	25.9	25.6	25.4
TPG	75.7	75.3	75.7	75.9
Remote Australia				
Optus	40.9	41.2	40.9	39.8
Telstra	11.8	11.7	11.9	12.2
TPG	61.7	62.9	64.5	65.0
Very Remote Australia				
Optus	26.7	25.8	28.0	28.4
Telstra	4.7	4.4	4.8	5.3
TPG	62.5	62.5	62.5	62.5
Total				
Optus	73.7	72.7	70.5	69.4
Telstra	35.1	34.9	35.0	34.3
TPG	89.5	87.2	90.0	89.8

Table 3.7: Total number of sites by MNO co-location combination – 2020 to 2023

	2020	2021	2022	2023
Optus & Telstra	1,028	1,070	1,137	1,154
Optus ONLY	2,095	2,252	2,548	2,696
Telstra ONLY	6,787	7,005	7,149	7,428
TPG & Optus	2,441	2,446	2,440	2,459
TPG & Telstra	220	221	209	208
TPG ONLY	598	755	572	590
TPG, Optus & Telstra	2,416	2,470	2,507	2,512

3.9 Types of spectrum deployed

An MNO uses a range of radiofrequency spectrum bands for the purpose of providing mobile services. The spectrum an MNO deploys at each of its mobile sites is one of the factors that may impact end-user experience. Radiofrequency spectrum can be used across a variety of technologies including 3G, 4G and 5G and can also be repurposed or re-farmed over time to support a different technology. Generally, spectrum is classified into three categories – low band, mid-band and high band. Each band has different propagation characteristics which serve a different main purpose (capacity and/or coverage) in the MNOs' networks. The equipment at a mobile site can also support the use of multiple bands at the same time.

The capacity of a network depends on the quantity of spectrum available in a band, not on the frequency of that band. That is, the same quanta of spectrum in the low band can provide the same capacity as the same quanta of spectrum in the mid or high band. However, because larger amounts of spectrum are available in the higher bands those bands are likely to have greater capacity.

Table 3.8: Spectrum overview

Spectrum band	Purpose	Key characteristic	Site density	Band deployment by technology type in 2023
Low (Less than 1 GHz)	Mainly provides coverage with some capacity	Transmits information over greater distances and through obstacles such as buildings more easily than higher frequencies. This means it is ideal for providing mobile services in sparsely populated regional/remote areas.	Allows for the deployment of a smaller number of sites, as a given site provides coverage over a greater geographical area.	Optus: 3G, 4G, 5G Telstra: 3G, 4G, 5G TPG: 3G, 4G, 5G
Mid (1-6 GHz)	Mainly provides capacity with some coverage, supplements low band	Transmits information over shorter distances than that of low band spectrum. It is likely to have a larger amount of spectrum available than in the low band, and hence a higher capacity, which makes it very useful in more populated and congested areas.	An MNO may need to build more sites when using this spectrum compared to low-band, to cover areas of the same size.	Optus: 3G, 4G, 5G Telstra: 3G, 4G, 5G TPG: 3G, 4G, 5G
High (Greater than 6 GHz)	Mainly provides capacity	The distances information can travel is very short range (mainly line of sight) and less than both low band and mid-band spectrum. Provides significant capacity making it ideal for use in high traffic areas	An MNO will need to build more sites when using this spectrum compared to low-band and mid band to cover areas of the same size.	Optus: 5G Telstra: 5G TPG: 5G

3.10 3G sites – spectrum deployed

All 3 MNOs have progressively reduced the use of mid-band spectrum for 3G (i.e. 2100 MHz), particularly Optus, who experienced a significant drop between 2022 and 2023 (Table 3.9).

As discussed in section 3.2, all MNOs are planning to shut down their 3G networks within the next 12–18 months. Consequently, 2100 MHz spectrum for 3G services is being repurposed for 4G and 5G services. Telstra and Optus are substantially more advanced in their reduced use of 2100 MHz for 3G services than TPG.

Conversely, the use of low-band spectrum (i.e. 850 or 900 MHz) for 3G services has increased slowly over time for all MNOs with the exception of Telstra, who experienced a mild decline in 3G 850 MHz capable sites between 2021 and 2023.

Table 3.9: Total number of 3G sites by MNO & radiofrequency spectrum deployed – 2018 to 2023

	2018	2019	2020	2021	2022	2023
Optus						
900 MHz	6,539	7,103	7,359	7,480	7,688	7,693
2100 MHz	5,707	5,852	5,789	5,745	5,627	8
Telstra						
850 MHz	8,944	9,114	9,221	9,283	9,238	9,134
2100 MHz	1,381	640	46	42	25	20
TPG						
900 MHz	4,801	5,141	5,391	5,438	5,472	5,473
2100 MHz	4,615	4,684	2,689	1,771	1,367	1,082

3.11 4G sites – spectrum deployed

In contrast to 3G sites, the focus for MNOs on their 4G sites has been the increased use of mid-band spectrum. MNOs also use several mid-bands for the deployment of 4G services. Table 3.10 shows that the number of 4G sites utilising mid-band spectrum has increased at a faster rate than the number of 4G sites that use low band spectrum since 2018. This is likely to reflect that 4G is currently the predominant mobile technology that carries most of the traffic across the networks.

The most noticeable shift in spectrum usage since 2022 has been Optus’s decreased use of the 900 MHz band. As is shown in Table 3.11 below, this spectrum appears to have been re-purposed for 5G.

Table 3.10: Total number of 4G sites by MNO & radiofrequency spectrum deployed – 2018 to 2023

	2018	2019	2020	2021	2022	2023
Optus						
700 MHz	5,590	6,271	6,639	6,895	7,196	7,425
900 MHz	33	36	40	542	1,531	533
1800 MHz	4,519	5,340	5,751	6,140	6,522	6,786
2100 MHz	1,053	3,014	3,486	4,037	4,656	5,154
2300 MHz	2,984	3,253	3,426	3,575	3,701	3,768
2600 MHz	2,235	2,795	3,139	3,489	4,093	4,745
3500 MHz	-	-	-	1	-	-
Telstra						
700 MHz	6,641	7,680	8,220	8,631	8,913	9,214
900 MHz	94	16	15	-	10	4
1800 MHz	4,994	5,160	5,358	5,581	5,861	6,041
2100 MHz	67	600	1,378	2,051	2,513	2,754
2600 MHz	1,139	2,010	2,700	3,421	3,757	4,169
TPG						
700 MHz	4	6	55	318	11	14
850 MHz	4,774	5,082	5,321	5,383	5,401	5,457
1800 MHz	3,792	4,161	4,445	4,525	4,623	4,745
2100 MHz	2,355	2,983	3,546	3,800	3,949	4,168
2600 MHz	-	-	-	155	-	-

3.12 5G sites – spectrum deployed

As at 31 January 2023, the roll out of 5G is still in its early stages and so far it has been predominantly rolled out using low and mid-band spectrum. However, use of high band spectrum (26 GHz) is beginning to grow with Telstra leading the way with 289 sites using this spectrum (Table 3.11).

Telstra had deployed the most sites that utilise low band 5G spectrum with 2,605 sites using 850 MHz spectrum, as at 31 January 2023. However, Optus and TPG have both increased their low band usage with both adding approximately 1,000 5G sites in the last year using low band spectrum (Table 3.11). Optus reported use of low band spectrum (900 MHz) for 5G for the first time in 2023.

The ACCC expects to see more spectrum being deployed for 5G for future reports as MNOs continue to re-farm 3G spectrum and acquire additional spectrum for 5G use. For example, the ACMA has recently allocated spectrum in the 3.4 GHz and 3.7 GHz bands.²¹

²¹ ACMA, [Allocating summary – 3.4/3.7 GHz bands \(2023\)](#), ACMA, accessed 18 August 2023.

Table 3.11: Total number of 5G sites by MNO & radiofrequency spectrum deployed – 2020 to 2023

	2020	2021	2022	2023
Optus				
900 MHz	-	-	-	982
2100 MHz	-	208	956	2,579
2300 MHz	-	291	988	1,677
3500 MHz	426	1,006	1,596	2,225
26000 MHz		4	25	72
Telstra				
700 MHz	-	-	10	11
850 MHz	2	-	1,836	2,605
2100 MHz	-	-	1	2
2600 MHz	-	60	269	732
3600 MHz	797	2,641	3,904	4,108
26000 MHz	-	-	102	289
TPG				
700 MHz	-	19	906	1,988
2100 MHz	-	-	-	57
3600 MHz	-	145	947	1,695
26000 MHz	-	-	1	6

4. Mobile coverage analysis²²

Mobile coverage is an extremely important factor for consumers when deciding which mobile service to acquire and serves as an important point of differentiation between the MNOs. Many consumers are willing to pay higher prices for greater levels of mobile coverage notably in regional and remote areas. For this reason, the MNOs actively compete on mobile coverage. An MNO can increase its geographic coverage by building more sites or by increasing its use of radiofrequency spectrum particularly its low band. Increasing the geographic coverage of its network is one way in which an MNO can improve its network for end users, by providing coverage in more areas.

The MNOs estimate and illustrate mobile coverage by producing coverage maps which indicate where their customers can expect to have mobile reception. While the report and underlying data analysis can accurately depict changes in mobile infrastructure, namely mobile sites, assessment of changes in coverage maps provided by the MNOs has been challenging.

Coverage maps are modelled on predicted coverage and therefore may not reflect the 'on the ground' experience for all end users. There are several factors that can impact mobile coverage including buildings, foliage/trees, bad weather, hills or mountains, the number of nearby people using the same mobile site and the end user's device.

Furthermore, the parameters that underpin these predictive coverage models differ across the MNOs and can change over time for a given MNO. These changes could mean that increases or decreases in the measurement of coverage from year to year may not necessarily reflect changes in the 'on the ground' experience of end users. Instead, the changes may reflect differences in the parameters that underpin the modelling of the predictive coverage maps or variations in the precision/accuracy of the models. Slight fluctuations in coverage areas from year to year could also result from optimisation activities undertaken by the MNOs, such as adjusting the tilt of antennas to reduce interference. Additionally, the introduction of new versions of prediction models/tools and potential differences in rounding and aggregation can also result in minor variability in coverage predictions from year to year, even if there are no actual changes in coverage.

From 2018 to 2022, the MNOs have provided coverage maps based on different levels of coverage (i.e. outdoor or external antenna coverage). In 2022, the ACCC amended the Infrastructure RKR to clarify the requirements regarding the provision of coverage maps.²³

Analysis below relates to 2 levels of coverage maps:

1. Outdoor coverage – coverage and quality of reception a customer can expect when using a device outdoors with typical handheld use, based on an elevated upright standing, head height position.²⁴
2. External antenna coverage – expected coverage when a device is augmented using an external antenna or other coverage extension device that utilises an external antenna. This includes an external antenna mounted to a vehicle.²⁵

In general, coverage maps which are based on external antenna coverage predict wider coverage areas than coverage maps based on outdoor coverage. This is because a device connected to an external antenna has more effective radiated transmit power and better receives mobile signal than a typical standalone handheld device.

22 Refers to geographic land mass coverage and ocean/sea coverage has been excluded from analysis.

23 ACCC, [Audit of telecommunications infrastructure assets record keeping](#), 19 August 2022, accessed 18 August 2023.

24 AMTA, [Networks & Coverage](#), AMTA, n.d., accessed 18 August 2023.

25 AMTA, [Networks & Coverage](#), AMTA, n.d., accessed 18 August 2023.

The MNOs' coverage maps are not directly comparable as there is currently no requirement that they adopt a set of common parameters in predicting their coverage.

As such, the coverage analysis below does not support any direct comparison between the coverage data across the MNOs. The key purpose of our analysis is to provide a broad indication of the trend in how each MNO's coverage has changed over time based on the coverage maps provided by the MNOs. Where an MNO has made changes to any input assumption that has significantly impacted its predicted coverage, these are noted in the analysis below.

The coverage analysis is based on historical coverage maps that reflect the MNOs' network coverage as at 31 January for each respective year from 2018 to 2023. For the most up to date coverage information, mobile users should refer to the coverage maps available on the website of their service provider.

Like previous reports, we have not included commentary on changes in 5G coverage given the limited amount of data that was available at 31 January 2023 and the extreme percentage changes experienced year-on-year. Some analysis can be found in the output tables that accompany this report.

Finally, as noted in Section 1 of this report, The 2016 version of the ABS Remoteness Structure classification has been applied to all reference years between 2018 and 2022 (inclusive). The latest, 2021 version of this classification has been applied to all reference years from 2023 onwards. As result, some of the changes in the data between 2022 and 2023 are the result of re-classification in ABS Remoteness Area. The impact of this update is minor.

4.1 Optus – 3G geographic coverage

Optus – 3G geographic coverage – outdoor

Analysis on changes in Optus 3G outdoor coverage from 2021 to 2023 cannot be conducted as in 2022, Optus did not provide a 3G outdoor coverage map to the ACCC. We consider that as 3G networks approach end of life, fluctuations in 3G outdoor coverage are likely to have been marginal.

Between 31 January 2018 and 31 January 2023, Optus's 3G outdoor coverage decreased slightly by 0.3%. Very Remote Australia increased by the greatest percentage, up by 30.1% (Table 4.1).

Table 4.1: Percentage change (%) in 3G outdoor geographic coverage by ABS Remoteness Area – Optus – 2018 to 2023

	2018 to 2019	2019 to 2020	2020 to 2021	2021 to 2022	2022 to 2023	2018 to 2023
Major Cities of Australia	0.9	0.2	0.0	n/a	n/a	1.0
Inner Regional Australia	2.0	0.8	-7.2	n/a	n/a	-5.0
Outer Regional Australia	3.1	0.7	-9.0	n/a	n/a	-8.3
Remote Australia	1.8	3.2	2.1	n/a	n/a	10.3
Very Remote Australia	-3.2	15.1	17.5	n/a	n/a	30.1
Total	2.0	2.5	-3.7	n/a	n/a	-0.3

Optus – 3G geographic coverage – external antenna

Analysis on changes in Optus' 3G external antenna geographic coverage is limited as the ACCC has been provided 3G external antenna maps in 2022 and 2023.

In the 12 months to 31 January 2023, Optus's 3G external antenna geographic coverage grew by 1.7% (Table 4.2).

Table 4.2: Percentage change (%) in 3G external antenna geographic coverage by ABS Remoteness Area – Optus – 2022 to 2023

	2022 to 2023
Major Cities of Australia	1.3
Inner Regional Australia	-1.2
Outer Regional Australia	-0.1
Remote Australia	5.1
Very Remote Australia	4.9
Total	1.7

As at 31 January 2023, Optus's 3G outdoor coverage was approximately 70% of its 3G external antenna coverage (Table 4.3).

This means that around 70% of Optus's overall 3G network can be accessed without having to purchase an external antenna. However, only 56% of Optus's 3G network in Very Remote Australia can be accessed with a standard mobile handset.

Table 4.3: 3G outdoor geographic coverage as percentage (%) of 3G external antenna geographic coverage by ABS Remoteness Area - Optus - 2023

	2023
Major Cities of Australia	97.2
Inner Regional Australia	85.7
Outer Regional Australia	73.3
Remote Australia	60.2
Very Remote Australia	56.0
Total	70.0

4.2 Optus – 4G geographic coverage

Optus – 4G geographic coverage – outdoor

Analysis on changes in Optus' 4G outdoor coverage from 2020 to 2023 cannot be included in this year's report as Optus stopped providing these coverage maps to the ACCC in some capacity in 2021. Between 2021 and 2022, Optus changed what it submitted to the ACCC from a combination of 4G outdoor and external coverage maps to entirely 4G external antenna coverage maps.

Between 31 January 2018 and 31 January 2023, Optus's 4G outdoor coverage increased by 46.9%. Very Remote Australia increased by the greatest percentage, up by nearly 200% (Table 4.4).

Table 4.4: Percentage change (%) in 4G outdoor geographic coverage by ABS Remoteness Area – Optus – 2018 to 2023

	2018 to 2019	2019 to 2020	2020 to 2021	2021 to 2022	2022 to 2023	2018 to 2023
Major Cities of Australia	-0.5	0.4	n/a	n/a	n/a	3.2
Inner Regional Australia	-6.6	2.6	n/a	n/a	n/a	11.6
Outer Regional Australia	-11.7	2.4	n/a	n/a	n/a	27.2
Remote Australia	-15.5	4.5	n/a	n/a	n/a	98.4
Very Remote Australia	-14.6	1.4	n/a	n/a	n/a	198.7
Total	-11.0	2.6	n/a	n/a	n/a	46.9

Table 4.5 shows that in 2023 at an absolute/aggregate level, Optus's 4G outdoor geographic coverage as a percentage of its 3G outdoor geographic coverage was above 100% across all ABS Remoteness Areas.

Table 4.5: 4G outdoor geographic coverage as percentage (%) of 3G outdoor geographic coverage by ABS Remoteness Area - Optus - 2018 to 2023

	2018	2019	2020	2021	2022	2023
Major Cities of Australia	100.6	99.2	99.4	n/a	n/a	102.7
Inner Regional Australia	91.4	83.8	85.2	n/a	n/a	107.4
Outer Regional Australia	82.7	70.8	72.0	n/a	n/a	114.7
Remote Australia	71.2	59.1	59.9	n/a	n/a	128.1
Very Remote Australia	62.0	54.7	48.2	n/a	n/a	142.3
Total	80.9	70.6	70.7	n/a	n/a	119.2

Optus – 4G geographic coverage – external antenna

In 2021, Optus moved to predicting its 4G geographic coverage based largely on external antenna, when previously it was based on outdoor coverage. Therefore, 2021 4G results are based on a combination of predicted external antenna and outdoor coverage. For this reason, Optus' results for '2020 to 2021' and '2021 to 2022' should be considered with caution and as estimates only. Optus 4G data for 2022 and 2023 is based entirely on external antenna.

Table 4.6 shows that Optus's total 4G external antenna geographic coverage increased marginally by 0.9% since 2022.

Table 4.6: Percentage change (%) in 4G external antenna geographic coverage by ABS Remoteness Area – Optus – 2020 to 2023

	2020 to 2021	2021 to 2022	2022 to 2023
Major Cities of Australia	0.6	1.1	2.3
Inner Regional Australia	13.6	9.3	1.4
Outer Regional Australia	41.3	16.1	-1.6
Remote Australia	113.8	32.6	3.3
Very Remote Australia	225.7	40.3	3.1
Total	57.2	21.5	0.9

Table 4.7 indicates that in 2023 at an absolute/aggregate level, Optus's 4G external antenna geographic coverage as a percentage of its 3G external antenna geographic coverage was close to or above 100% across all ABS Remoteness Areas.

Table 4.7: 4G external antenna geographic coverage as percentage of 3G external antenna geographic coverage by ABS Remoteness Area – Optus – 2022 and 2023

	2022	2023
Major Cities of Australia	99.6	100.5
Inner Regional Australia	97.1	99.6
Outer Regional Australia	98.0	96.5
Remote Australia	102.4	100.6
Very Remote Australia	110.9	108.9
Total	100.9	100.1

As at 31 January 2023, Optus's 4G outdoor coverage was approximately 83.4% of its 4G external antenna coverage (Table 4.8).

This means that around 83.4% of Optus's overall 4G network can be accessed without having to purchase an external antenna.

Table 4.8: 4G outdoor geographic coverage as percentage (%) of 4G external antenna geographic coverage by ABS Remoteness Area - Optus - 2023

	2023
Major Cities of Australia	99.3
Inner Regional Australia	92.5
Outer Regional Australia	87.1
Remote Australia	76.7
Very Remote Australia	73.2
Total	83.4

4.3 Telstra – 3G geographic coverage

Telstra – 3G geographic coverage – outdoor

Analysis on changes in Telstra’s 3G outdoor geographic coverage is limited due to the nature of information Telstra submitted to the ACCC. Prior to 2022, Telstra only provided 3G coverage maps based on external antenna.

Between 31 January 2022 and 31 January 2023, Telstra increased its 3G outdoor geographic coverage by 0.9%. A small change in coverage is expected given that Telstra is planning to shutdown its 3G network mid-way through 2024.

Table 4.9: Percentage change (%) in 3G outdoor geographic coverage by ABS Remoteness Area – Telstra – 2022 to 2023

	2022 to 2023
Major Cities of Australia	2.4
Inner Regional Australia	1.5
Outer Regional Australia	-1.6
Remote Australia	2.6
Very Remote Australia	2.2
Total	0.9

Telstra – 3G geographic coverage – external antenna

Between 31 January 2018 and 31 January 2023, Telstra increased its 3G external antenna geographic coverage by 5%. Most of this increase (2.6%) was experienced between 2018 and 2019. Very Remote Australia experienced the greatest increase in geographic coverage, up 8.3% since 2018 (Table 4.10).

Table 4.10: Percentage change (%) in 3G external antenna geographic coverage by ABS Remoteness Area – Telstra – 2018 to 2023

	2018 to 2019	2019 to 2020	2020 to 2021	2021 to 2022	2022 to 2023	2018 to 2023
Major Cities of Australia	0.1	0.0	-0.2	0.6	2.2	2.6
Inner Regional Australia	0.7	0.2	0.1	0.1	1.4	2.6
Outer Regional Australia	1.6	0.3	0.2	-0.1	-1.7	0.2
Remote Australia	2.3	0.6	0.7	0.2	1.6	5.5
Very Remote Australia	3.9	1.6	0.0	0.9	1.7	8.3
Total	2.6	0.9	0.2	0.4	0.8	5.0

As at 31 January 2023, Telstra’s 3G outdoor coverage was approximately 54.3% of its 3G external antenna coverage (Table 4.11). This means that just over half of Telstra’s 3G network can be accessed without having to purchase an external antenna. However, only 37.8% of Telstra’s 3G network in Very Remote Australia can be accessed with a standard mobile handset.

Table 4.11: 3G outdoor geographic coverage as percentage (%) of 3G external antenna geographic coverage by ABS Remoteness Area – Telstra – 2022 and 2023

	2022	2023
Major Cities of Australia	98.7	98.9
Inner Regional Australia	86.4	86.4
Outer Regional Australia	71.8	71.9
Remote Australia	50.6	51.0
Very Remote Australia	37.6	37.8
Total	54.2	54.3

4.4 Telstra – 4G geographic coverage

Telstra – 4G geographic coverage – outdoor

Analysis on changes in Telstra’s 4G outdoor geographic coverage is limited due to the nature of information Telstra submitted to the ACCC. Prior to 2022, Telstra only provided 4G coverage maps based on external antenna.

Between 31 January 2022 and 31 January 2023, Telstra increased its 4G outdoor geographic coverage by 6.6%. Very Remote Australia experienced the greatest increase at 20.8% (Table 4.12).

Table 4.12: Percentage change (%) in 4G outdoor geographic coverage by ABS Remoteness Area – Telstra – 2022 to 2023

	2022 to 2023
Major Cities of Australia	2.0
Inner Regional Australia	0.2
Outer Regional Australia	0.2
Remote Australia	10.6
Very Remote Australia	20.8
Total	6.6

As at 31 January 2023, Telstra’s 4G outdoor geographic coverage was 79.8% of its 3G outdoor geographic coverage. 4G outdoor geographic coverage as a percentage of 3G outdoor geographic coverage was highest in Major Cities (100.4%) followed closely by Inner Regional Australia (97.9%). Very Remote Australia had the lowest percentage (63.9%).

Table 4.13: 4G outdoor geographic coverage as percentage of 3G outdoor geographic coverage by ABS Remoteness Area – Telstra – 2022 and 2023

	2022	2023
Major Cities of Australia	100.8	100.4
Inner Regional Australia	99.2	97.9
Outer Regional Australia	85.3	86.8
Remote Australia	71.4	77.0
Very Remote Australia	54.1	63.9
Total	75.5	79.8

Telstra – 4G geographic coverage – external antenna

Telstra's 4G external antenna geographic coverage increased by 36.9% between 31 January 2018 and 31 January 2023 with an increase of 6.9% since 2022 (Table 4.14). But like 3G external antenna coverage, most of the increases over the period occurred between 2018 and 2019.

Remote and Very Remote Australia experienced the greatest increase in 4G external antenna geographic coverage, up 44.5% and 79.9%, respectively, since 2018. Very Remote Australia also had the largest increase (17.7%) in 4G external antenna geographic coverage between 2022 and 2023.

Table 4.14: Percentage change (%) in 4G external antenna geographic coverage by ABS Remoteness Area – Telstra – 2018 to 2023

	2018 to 2019	2019 to 2020	2020 to 2021	2021 to 2022	2022 to 2023	2018 to 2023
Major Cities of Australia	-0.2	0.3	-0.3	0.5	2.2	2.6
Inner Regional Australia	2.4	1.1	0.3	1.3	0.7	5.9
Outer Regional Australia	6.2	2.7	1.5	2.1	-1.2	11.6
Remote Australia	16.4	5.9	4.1	6.4	5.8	44.5
Very Remote Australia	19.1	11.7	3.2	11.4	17.7	79.9
Total	11.4	5.9	2.4	5.9	6.9	36.9

As at 31 January 2023, Telstra's total 4G external antenna geographic coverage was 83.1% of its 3G external antenna geographic coverage, up from 63.7% in 2018 (Table 4.15). In 2023, 4G geographic coverage as a percentage of 3G geographic coverage was greater than 90% in Major Cities and both regional areas.

On the other hand, 4G external antenna geographic coverage as percentage of its 3G external antenna geographic coverage in Remote and Very Remote Australia was 84.5% and 71.8%, respectively, in 2023 (Table 4.15). However, significant gains were made in Very Remote Australia in the last year up nearly 10 percentage points, the largest increase for the 2018 to 2023 period.

Table 4.15: 4G external antenna geographic coverage as percentage of 3G external antenna geographic coverage by ABS Remoteness Area – Telstra – 2018 to 2023

	2018	2019	2020	2021	2022	2023
Major Cities of Australia	100.1	99.9	100.2	100.2	100.0	100.1
Inner Regional Australia	96.7	98.3	99.2	99.4	100.6	99.8
Outer Regional Australia	84.7	88.5	90.6	91.8	93.8	94.3
Remote Australia	61.7	70.2	73.9	76.4	81.1	84.5
Very Remote Australia	43.2	49.6	54.4	56.1	62.0	71.8
Total	63.7	69.2	72.6	74.2	78.3	83.1

As at 31 January 2023, Telstra's 4G outdoor coverage was approximately 52.1% of its 4G external antenna coverage (Table 4.16). This means that just over half of Telstra's overall 4G network can be accessed without having to purchase an external antenna. Only 33.6% of Telstra's 4G network in Very Remote Australia can be accessed with a standard mobile handset.

Table 4.16: 4G outdoor geographic coverage as percentage (%) of 4G external antenna geographic coverage by ABS Remoteness Area – Telstra – 2022 and 2023

	2022	2023
Major Cities of Australia	99.4	99.2
Inner Regional Australia	85.1	84.7
Outer Regional Australia	65.3	66.2
Remote Australia	44.5	46.6
Very Remote Australia	32.7	33.6
Total	52.3	52.1

4.5 TPG – 3G geographic coverage²⁶

TPG – 3G geographic coverage – outdoor

Between 31 January 2018 and 31 January 2023, TPG’s 3G outdoor geographic coverage remained relatively steady (increased by 0.9%) (Table 4.17). 3G outdoor geographic coverage in Outer Regional Australia, Remote Australia and Very Remote Australia has increased since 2018. However, Inner Regional Australia experienced a minor decrease (0.8%) in 3G outdoor geographic coverage between 2018 and 2023.

Between 2022 and 2023, TPG’s 3G outdoor geographic coverage remained unchanged. As a result, the changes in coverage across Remoteness Area for this period is largely the result of the reclassification of some coverage areas.

Table 4.17: Percentage change (%) in 3G outdoor geographic coverage by ABS Remoteness Area – TPG – 2018 to 2023

	2018 to 2019	2019 to 2020	2020 to 2021	2021 to 2022	2022 to 2023	2018 to 2023
Major Cities of Australia	0.0	-0.4	0.0	0.1	2.1	1.7
Inner Regional Australia	1.1	-4.1	0.2	0.0	2.2	-0.8
Outer Regional Australia	3.7	-0.8	-0.4	0.1	-1.6	0.9
Remote Australia	4.5	-1.5	-0.2	0.1	2.0	4.9
Very Remote Australia	0.9	0.1	-0.4	0.3	-0.1	0.8
Total	2.8	-1.8	-0.2	0.1	0.1	0.9

²⁶ TPG’s 3G 2018 and 2019 coverage maps are based on higher power thresholds than its 2020 and 2021 coverage maps due to a bug in its mapping software. Higher power thresholds for mobile sites means each site has a wider area of predicted coverage. It is a significant exercise to re-predict historical maps. Therefore, 2018 and 2019 coverage maps have not been re-predicted to align with the lower power threshold of the 2020 and 2021 coverage maps. TPG’s 3G coverage maps do not include coverage it could access via its roaming agreement with Optus.

TPG – 3G geographic coverage – external antenna

Analysis on changes in TPG’s 3G external antenna geographic coverage has not been included in this year’s report as only one year’s worth of data is available.

As at 31 January 2023, TPG’s 3G outdoor coverage was approximately 73.5% of its 3G external antenna coverage (Table 4.18). This means that around 73.5% of TPG’s overall 3G network can be accessed without having to purchase an external antenna. Around half of TPG’s 3G network in Very Remote Australia can be accessed with a standard mobile handset.

Table 4.18: 3G outdoor geographic coverage as percentage (%) of 3G external antenna geographic coverage by ABS Remoteness Area – TPG – 2023

	2023
Major Cities of Australia	99.6
Inner Regional Australia	86.7
Outer Regional Australia	73.0
Remote Australia	57.2
Very Remote Australia	51.0
Total	73.5

4.6 TPG – 4G geographic coverage²⁷

TPG – 4G geographic coverage – outdoor

TPG’s 4G outdoor geographic coverage increased by 3% between 31 January 2018 and 31 January 2023 (Table 4.19). 4G outdoor geographic coverage increased across all ABS Remoteness Areas except Very Remote Australia which declined by 2.5% from 2018 to 2023.

As with 3G coverage, the changes between 2022 and 2023 across Remoteness Area are largely driven by the re-classification of some coverage areas given the total remained unchanged.

²⁷ TPG’s 4G coverage maps do not include coverage it could access via its roaming agreement with Optus.

Table 4.19: Percentage change (%) in 4G outdoor geographic coverage by ABS Remoteness Area – TPG – 2018 to 2023

	2018 to 2019	2019 to 2020	2020 to 2021	2021 to 2022	2022 to 2023	2018 to 2023
Major Cities of Australia	0.4	0.3	0.0	0.0	2.1	2.9
Inner Regional Australia	2.2	0.4	-0.4	-0.1	1.6	3.7
Outer Regional Australia	4.5	0.4	-1.1	0.1	-1.8	2.0
Remote Australia	7.9	-0.1	-1.3	-1.7	3.0	7.7
Very Remote Australia	-0.7	-0.8	-3.3	2.5	0.0	-2.5
Total	3.6	0.3	-0.9	-0.1	0.1	3.0

Between 31 January 2018 and 31 January 2023, TPG’s 4G outdoor geographic coverage as a percentage of its 3G outdoor geographic coverage marginally improved across all ABS Remoteness Areas except Very Remote Australia (Table 4.20).

These results show that in Remote and Very Remote Australia TPG’s 4G outdoor coverage was less than half the size of its 3G outdoor coverage. However, we note that these figures represent TPG’s coverage as at 31 January 2023 and may not reflect the state of its coverage at the time of publication.

Table 4.20: 4G outdoor coverage as percentage of 3G outdoor geographic coverage by ABS Remoteness Area – TPG – 2018 to 2023

	2018	2019	2020	2021	2022	2023
Major Cities of Australia	97.9	98.3	99.1	99.1	99.0	99.0
Inner Regional Australia	73.7	74.5	78.0	77.5	77.4	77.0
Outer Regional Australia	55.6	56.1	56.8	56.4	56.4	56.2
Remote Australia	43.2	44.6	45.2	44.7	43.9	44.4
Very Remote Australia	44.3	43.6	43.2	41.9	42.9	42.9
Total	60.5	61.0	62.3	61.9	61.8	61.8

TPG – 4G geographic coverage – external antenna

Analysis on changes in TPG’s 4G external antenna geographic coverage has not been included in this year’s report as only one years’ worth of data is available. Discussion on changes in 4G external antenna coverage will be included in future reports.

Table 4.21 shows a similar trend to that of table 4.20. In particular, as of 31 January 2023, TPG’s 4G external antenna coverage was less than half of its 3G external antenna coverage area in Remote and Very Remote Australia.

Table 4.21: 4G external antenna geographic coverage as percentage (%) of 3G external antenna geographic coverage by ABS Remoteness Area – TPG – 2023

	2023
Major Cities of Australia	99.6
Inner Regional Australia	81.1
Outer Regional Australia	58.6
Remote Australia	41.0
Very Remote Australia	37.5
Total	61.4

As at 31 January 2023, TPG’s 4G outdoor coverage was approximately 74% of its 4G external antenna coverage (Table 4.22). This means that around 74% of TPG’s overall 4G network can be accessed without having to purchase an external antenna. These are similar trends to that of Table 4.18.

Table 4.22: 4G outdoor geographic coverage as percentage (%) of 4G external antenna geographic coverage by ABS Remoteness Area – TPG – 2023

	2023
Major Cities of Australia	99.0
Inner Regional Australia	82.3
Outer Regional Australia	70.0
Remote Australia	62.0
Very Remote Australia	58.2
Total	74.0

