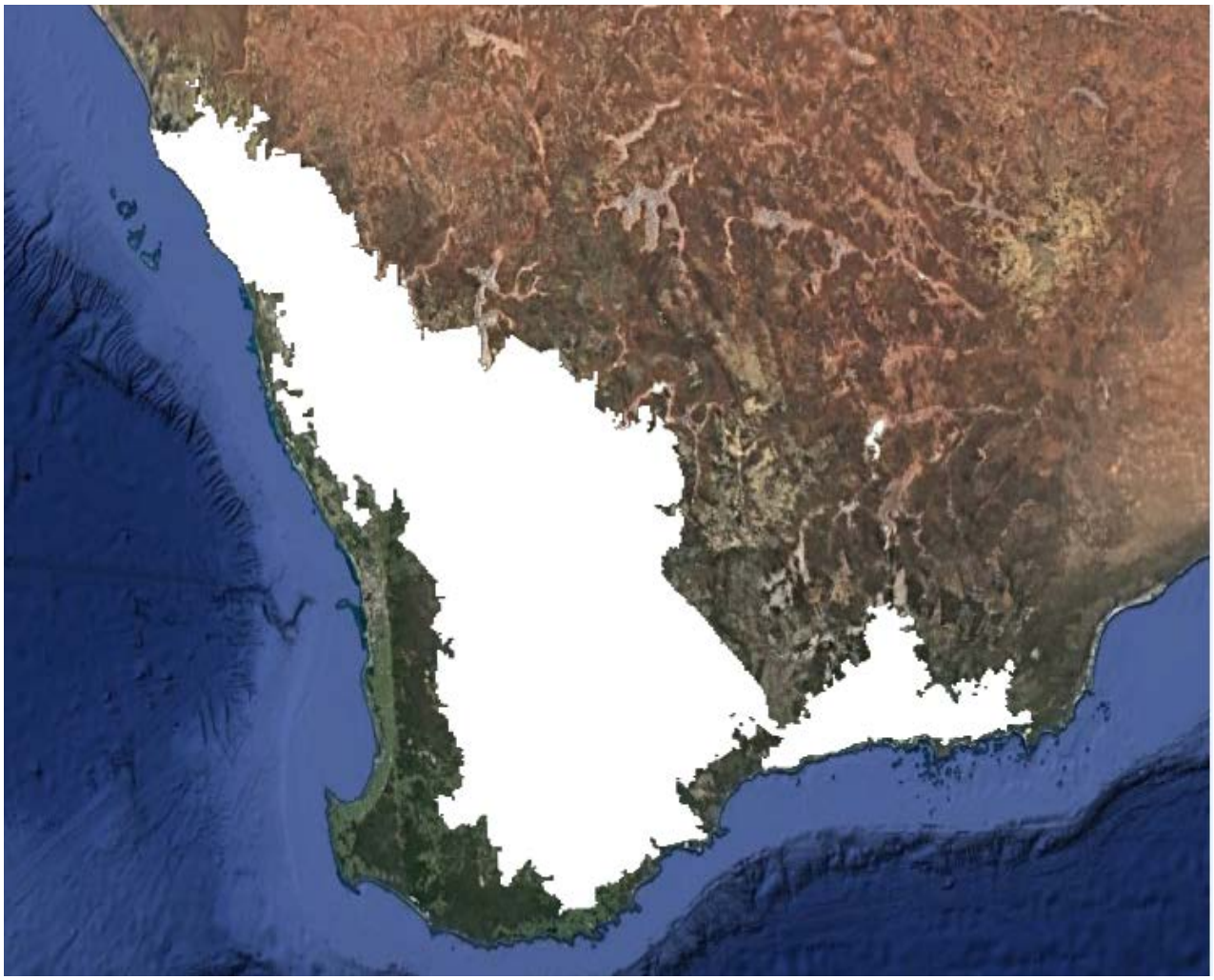
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Improved Connectivity in the WA Grainbelt Commonwealth Feasibility Study

December 2020



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Executive summary

In the context of the 2019–20 Federal Budget, the Australian Government committed to undertake a feasibility study into improving digital connectivity in the Western Australian (WA) Grainbelt (the Grainbelt). The feasibility study was commissioned in response to concerns raised by WA businesses and farming groups that the existing telecommunications infrastructure in the Grainbelt is not sufficient for enterprise grade services. In particular there was concern that this is holding back productivity as there is not sufficient connectivity to support the adoption of digital farm technologies for agricultural and pastoral businesses in regional WA.

The Department of Infrastructure, Transport, Regional Development and Communications has developed a detailed feasibility study examining digital connectivity in the Grainbelt. However, due to the extent of commercial-in-confidence information included in the report, elements of the study are unable to be disclosed publically. This public version of the study has been produced to provide a broad overview of the situation within the Grainbelt and give a high level summary of the findings presented in the commercial-in-confidence version.

This feasibility study draws on existing data in relation to the Grainbelt, and the investigations of the WA Government on proposed solutions through its *Grainbelt Digital Enhancement Project*. Technical and commercial advice from consultants Nova Systems and Analysys Mason was also sought, to assist in understanding the challenges and the opportunities for improving connectivity in the Grainbelt.

In order to present a picture of the current digital connectivity in the Grainbelt, the study first outlines the existing coverage, discusses the connectivity needs of the Grainbelt, and provides an overview of government investment, both Commonwealth and State, in the Grainbelt to date. Investment to improve communications aligns with the ongoing collaborative work that has occurred between governments to improve regional communications through measures such as the Mobile Black Spot Program (MBSP).

The study examines different models to improve connectivity, state government initiatives and future technological advances which may be considered to increase broadband connectivity in similar regional areas.

This study has highlighted that the increasing demand for connectivity in the region is, to some extent, being supported from the existing supply. There is already significant coverage in the area and mapping indicates that some form of coverage extends to most premises in the Grainbelt area.

However, there are opportunities to improve the capacity and reliability of services for local communities and agricultural businesses in some areas.

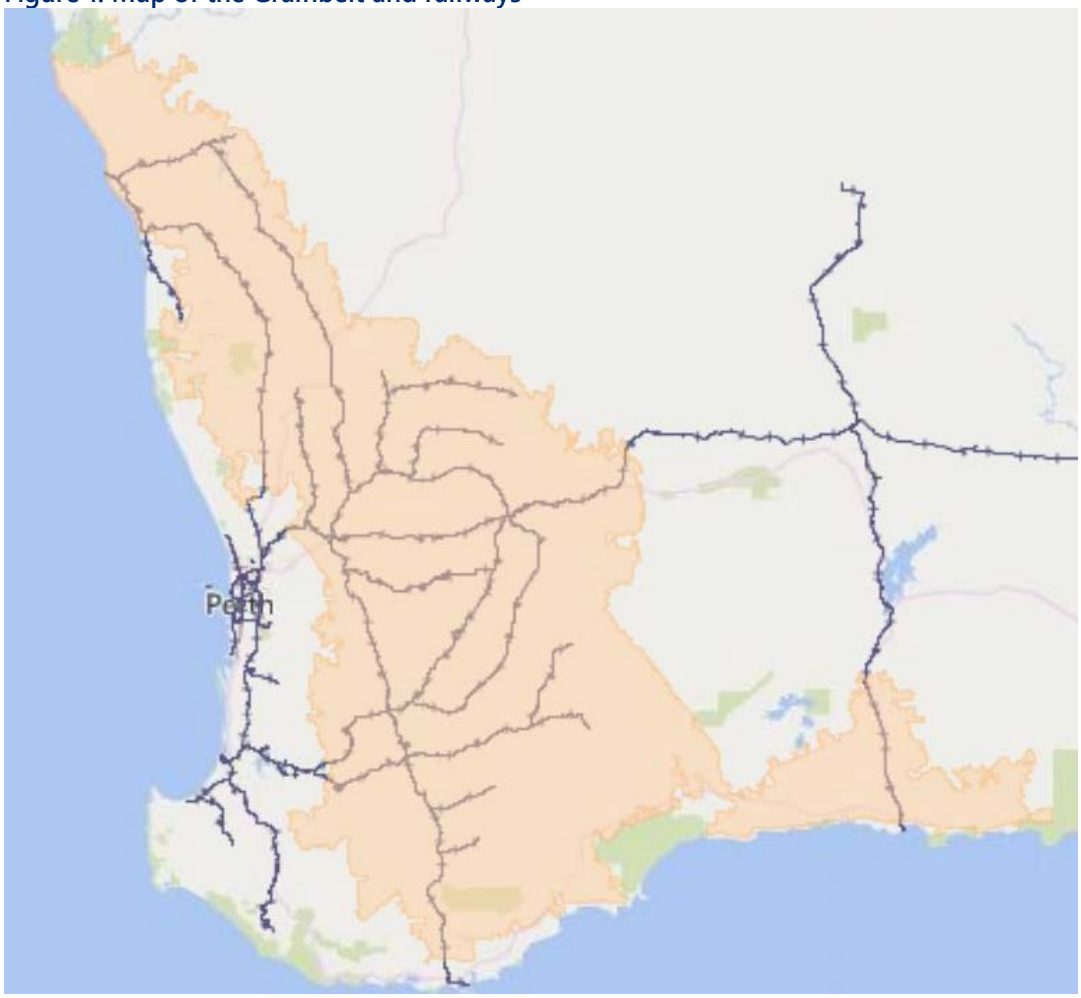
A targeted approach, using localised, place-based solutions is an efficient and effective way to achieve improved connectivity in these areas. These kinds of projects may be supported through existing or future targeted regional funding programs, such as the Regional Connectivity Program (RCP) or other similar programs that are focussed on providing targeted investment in local priorities to maximise economic opportunities and region-wide benefits for regional, rural and remote Australians.

Background

As part of the 2019–20 Federal Budget, the Australian Government committed to undertake a feasibility study into improving digital connectivity in the WA Grainbelt (the Grainbelt). The Grainbelt is defined as the geographic area illustrated in orange in Figure 1.

The Grainbelt represents an area of approximately 200,000 square kilometres extending 450 kilometres north of Perth to Geraldton (Northampton), 400 kilometres south of Perth to Albany; and 550 kilometres east of Perth to Esperance. There are approximately 95,000 premises located in the Grainbelt area.

Figure 1: Map of the Grainbelt and railways



The Grainbelt is the largest agricultural producing region in WA and a key contributor to the economy. WA generates about 50 per cent of Australia's total wheat production and generates $2–3 billion for the WA economy each year. Wheat production occurs across the Grainbelt on 4200 mostly family-run farms ranging in size from 1000–15,000 hectares.[1]

The feasibility study was commissioned in response to concerns that current arrangements were not offering sufficient connectivity to support agricultural and pastoral businesses in the Grainbelt region. For the WA agricultural industry to adopt new digital farming technologies and remain nationally and internationally competitive, there is a need for fast, affordable and reliable connectivity in the Grainbelt.

In concert with this study, the WA Government has undertaken its own investigations into improving digital connectivity in the Grainbelt. This study has used information gathered from the *Grainbelt Digital Enhancement Project* to help identify the technical and commercial opportunities and challenges related to improving connectivity in the Grainbelt. For commercial-in-confidence reasons, the details of this information are unable to be publically disclosed.

Existing Coverage in the WA Grainbelt

NBN footprint in the WA Grainbelt area

The rollout of the National Broadband Network (NBN) is almost complete in regional Australia. The Australian Government has committed to delivering peak wholesale speeds of at least 25 megabits per second (Mbps) to all premises, and 50 Mbps to 90 per cent of fixed line premises. NBN Co Limited (NBN Co.), the company responsible for rolling out and operating the NBN, has completed its volume build with only 109,000 premises still requiring construction as at 30 June 2020. Regional Australia is being served by a combination of fixed line, fixed wireless and, for the more difficult-to-serve premises, the Sky Muster satellite service. Around 73 per cent of premises (including new developments) outside of major urban areas are being serviced by fixed line broadband.

In 2018, the Regional Telecommunications Independent Review Committee (RTIRC) found that while the NBN Sky Muster satellite service was a significant improvement over previous satellite services, the NBN Sky Muster satellite service was not meeting all user needs and expectations in regional areas in terms of data demand and speed. For example, while premises served by fixed line and fixed wireless technologies were averaging monthly downloads in excess of 200GB per premises, the average monthly downloads for Sky Muster users were being managed at 40GB.[2]

There have been significant recent improvements in the Sky Muster satellite services available to users since the service was first made available, including those in the agriculture sector. This includes increased maximum wholesale data limits and the launch of the Sky Muster Plus product. Sky Muster Plus provides regional Australians with unmetered data for all online content

[1] WA Government, Department of Primary Industries and Regional Development, Western Australian Grains Industry, https://www.agric.wa.gov.au/grains-research-development/western-australian-grains-industry#:~:text=WA%20produces%20about%2014%20million,%2C%20oats%2C%20lupins%20and%20peas.

[2] The 2018 Regional Telecommunications Review – Getting it right out there, page 25

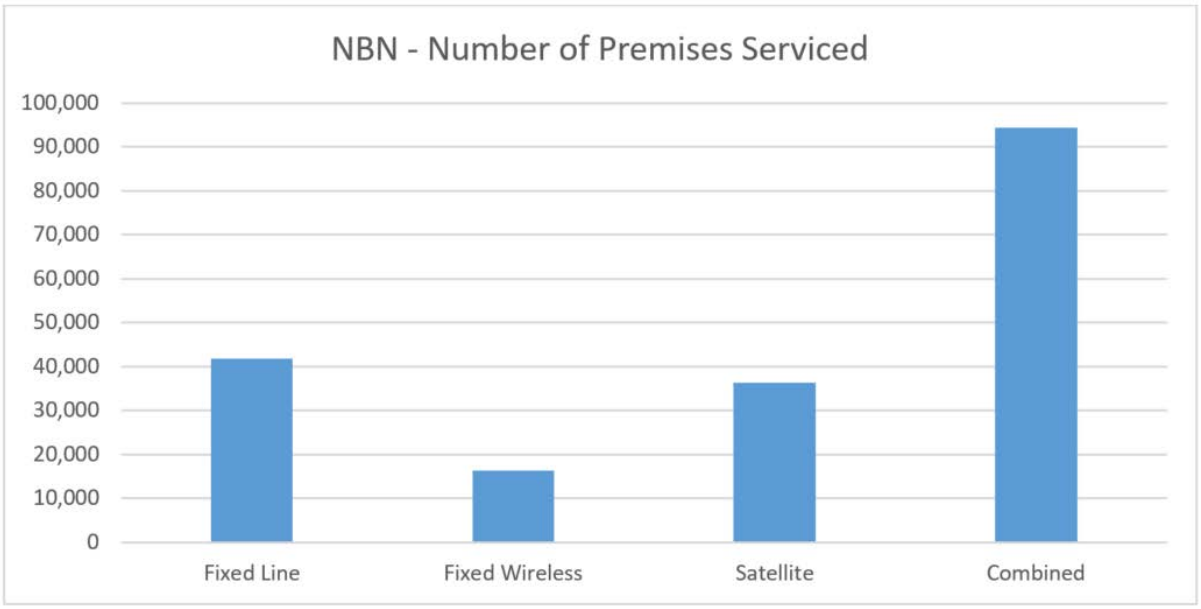
and applications, with only two exclusions that will continue to be metered – video streaming and Virtual Private Network (VPN) traffic.

Unmetered services are not shaped once an end user reaches their monthly data cap, which enables more reliable access to key online functions, and relieves data pressures for many Sky Muster satellite service users.

While these improvements are welcome, there still remains areas, primarily of high economic and social value, where the existing Sky Muster satellite service could be complemented by other technologies including fixed line and fixed wireless.

The following graph provides a breakdown of the number of premises in the Grainbelt that are serviced by the different NBN services available (fixed line, fixed wireless or the Sky Muster satellite service).

Figure 2: Number of Premises serviced by the NBN



As indicated in the above graph, there is a significant amount of existing NBN fixed line or fixed wireless services for premises in the Grainbelt area. The remaining premises are served by the Sky Muster satellite service.

NBN Fixed Line Coverage in the WA Grainbelt

While fixed line services account for approximately 143 square kilometres of coverage, this coverage services 41,745 premises or 44 per cent of premises in the Grainbelt. This reflects the population distribution in the Grainbelt, with a high number of premises based near larger towns where there is access to fixed line services. For example, both Geraldton and Esperance, the two largest townships in the region have fixed line services deployed.

NBN Sky Muster Satellite Service in the WA Grainbelt

For the more regional areas of the Grainbelt, the Sky Muster satellite service provides the most landmass coverage. The Sky Muster satellite service reaches approximately 185,688 square kilometres or 97 per cent of the region, and currently provides service for 36,323 premises equating to 38 per cent of premises in the Grainbelt.

NBN Fixed Wireless Coverage in the WA Grainbelt

Currently, the NBN fixed wireless service covers 5,796 square kilometres, or 3 per cent of the total area of the Grainbelt and provides services to 16,363 premises or 17 per cent of premises. Generally fixed wireless is deployed around the outskirts of the larger towns and within some of the more densely populated areas. Increasing the amount of fixed wireless coverage in the Grainbelt would improve connectivity in areas where the Sky Muster satellite service is the only NBN technology available. The advantages of fixed wireless coverage for regional areas of Australia will be discussed in the following section.

Advantages of fixed wireless coverage

A fixed wireless internet connection uses radio waves transmitted from a network transmission tower to a premises, connecting the premises to the broadband access network. This connection is typically used in circumstances where the distance between premises can be many kilometres. For this reason, fixed wireless can be an efficient and cost effective connectivity solution for people living in regional and remote areas of Australia. Generally, data travels from a transmission tower located up to 14 kilometres away, to an authorised external antenna that has been fitted to the premises. Fixed wireless connections also require an authorised connection box to be installed at the point where the cable from the outdoor antenna enters the premises.[3]

The NBN fixed wireless services offer wholesale speeds of up to 75 Mbps in some areas, and the fixed wireless network is monitored so consumers are able to receive an expected performance threshold. By expanding the network and increasing capacity of individual fixed wireless sites and backhaul, NBN Co. is working to strengthen the capacity of fixed wireless towers so they appropriately support defined performance thresholds.

In June 2019, NBN Co. released a new fixed wireless wholesale speed tier that better reflects the capabilities of the fixed wireless network and more closely reflects consumer demand, which is heavily skewed towards downloads. The product supports maximum potential network download speeds of up to 75 Mbps with uploads of 10 Mbps. In practice this allows families to stream high definition video on separate devices simultaneously.

In addition to the NBN fixed wireless network, there are a number of Wireless Internet Service Providers (WISPs) providing targeted fixed wireless connectivity solutions for businesses and residential customers in regional and remote Australia. WISPAU is the association of WISPs in Australia who predominantly provide broadband services to regional Australia. As a group, WISPAU claim to service in excess of 200,000 regional Australians. WISPs provide a significant amount of fixed wireless coverage in regional WA.

[3] https://www.nbnco.com.au/learn/network-technology/fixed-wireless-explained

The WA Government's Digital Farm Grants Program has provided funding to fixed wireless providers in WA to support the delivery of fixed wireless services in the Grainbelt, and targeting areas of agricultural production specifically.

Mobile coverage in the WA Grainbelt area

There is a significant amount of existing mobile coverage in the Grainbelt area, but there are some areas that have poor or no mobile coverage. The mobile carriers have made significant investment in infrastructure within the Grainbelt, with a large number of mobile bases stations deployed in the region. A large number of mobile towers in the Grainbelt have been co-funded as part of the Australian Government's Mobile Black Spot Program (MBSP). Please refer to the section on Government investment in the Grainbelt area to date beginning on page 18. This network deployment highlights that there is existing fibre in place for backhaul arrangements.

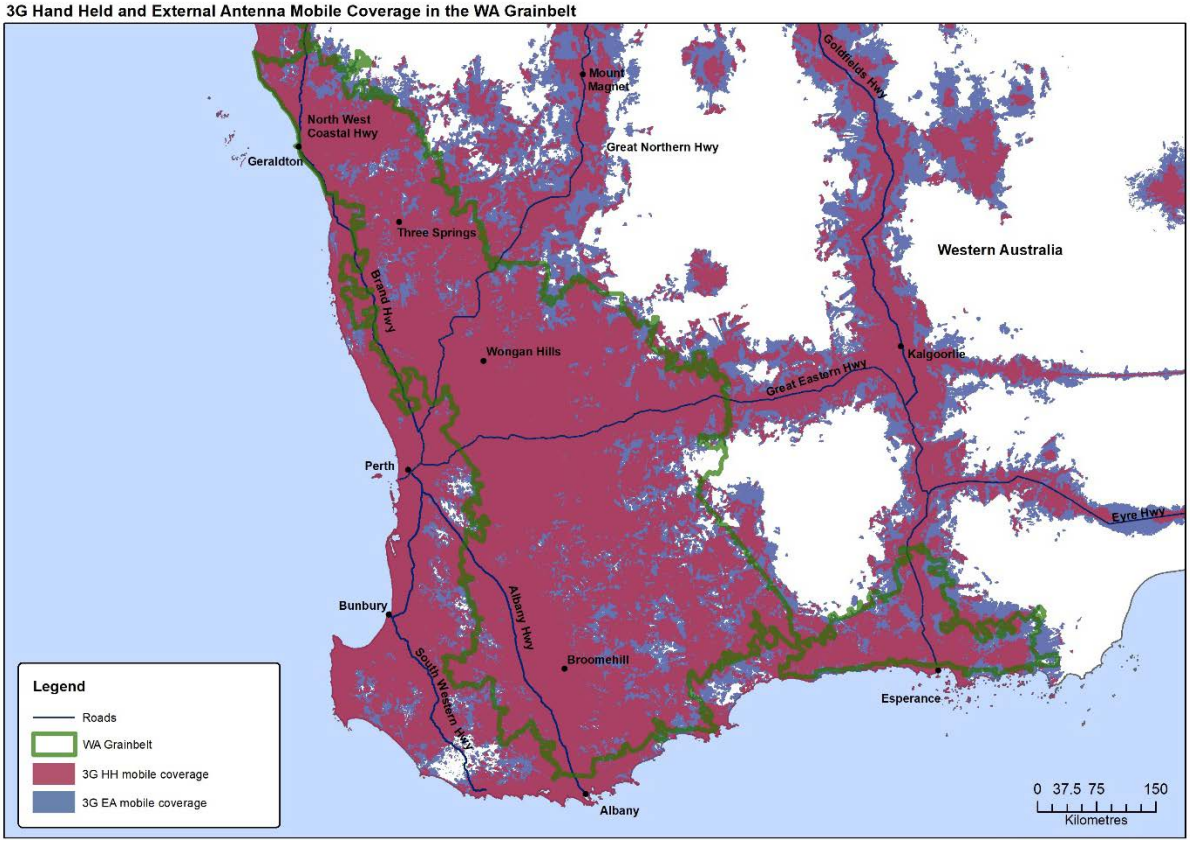
The majority of coverage is provided by Optus and Telstra. TPG Telecom (formerly Vodafone Hutchinson Australia) also provides some coverage in the WA Grainbelt area, but this is largely limited to the larger population areas such as Geraldton and Esperance.

Analysis of the publically available predictive coverage maps has shown that Telstra has the largest mobile coverage footprint in the Grainbelt area. This coverage has the potential to be improved significantly through widespread adoption of localised technologies such as approved antennas and repeaters. A repeater is a device that is capable of extending a signal to an area, while an antenna enables customers to receive improved reception in an existing coverage area.

Optus' predictive coverage maps indicate that it provides a significant amount of mobile coverage in the Grainbelt. While Optus has a smaller coverage footprint in the Grainbelt than Telstra, the coverage maps provided by Optus indicate that it still provides a significant amount of mobile coverage particularly in the more populated areas. Based on the predictive coverage maps of both carriers, the combined mobile coverage of Telstra and Optus provides consumers with choice of carrier in the more populated areas of the region.

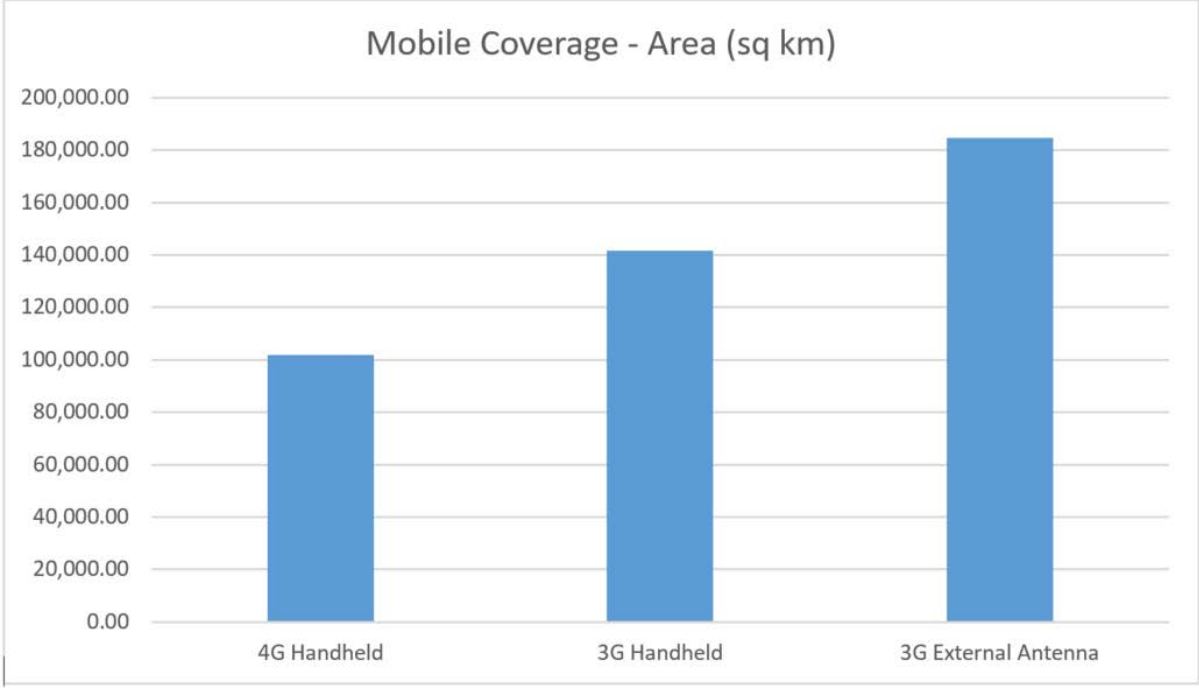
The below map shows the combined mobile coverage of the major network providers in the Grainbelt area (shaded pink). This information has been based on the mobile network providers' publicly available predictive coverage maps. The 3G handheld coverage is shown in maroon and the 3G external antenna coverage is shown in blue/purple. Areas where there is no existing 3G handheld or external antenna coverage appear in white. The Grainbelt area is outlined in green.

Figure 3: Combined mobile coverage of the major network providers—handheld coverage (maroon), external antenna coverage (blue).



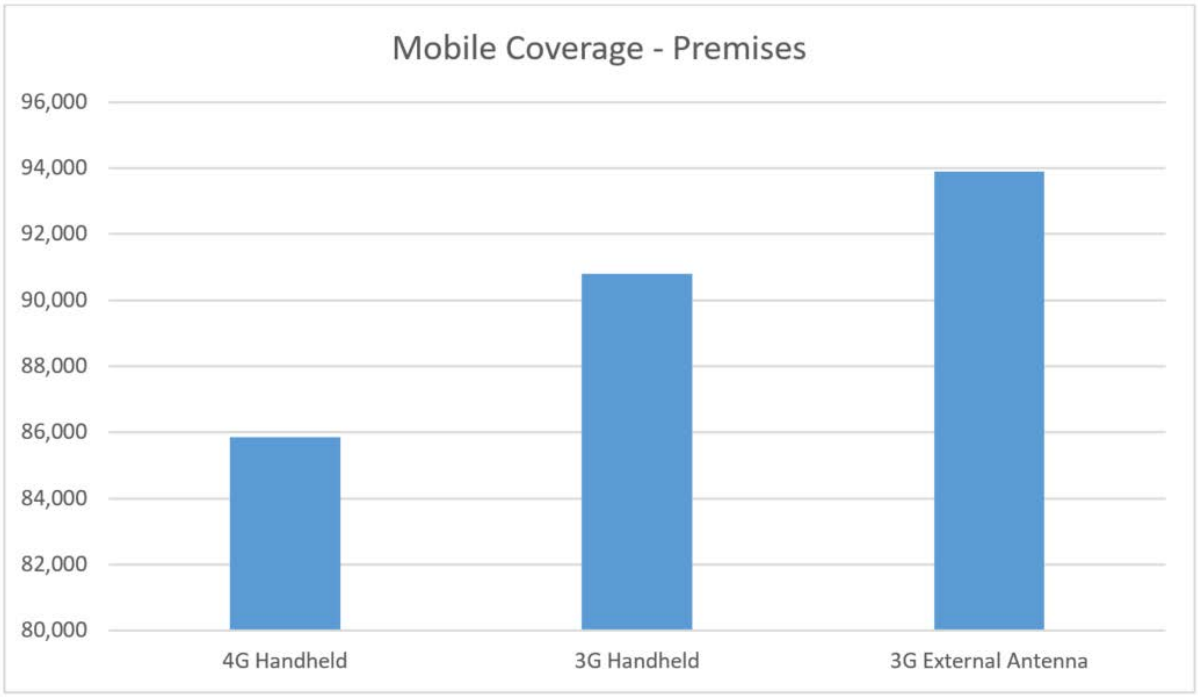
The following graphical information provides an overview of the premises that are able to access either 4G or 3G hand held coverage as well as 3G external antenna coverage. There is also a breakdown of the number and type of NBN services being used to serve premises in the Grainbelt area. The following graphs provide an overview of the number of premises and the overall area that have access to mobile coverage.

Figure 4: Mobile coverage in the Grainbelt



The combined 4G mobile hand held coverage in the area amounts to 101,992.6 square kilometres, which is approximately 53 per cent of the Grainbelt. Hand held coverage is where the signal is generally strong enough for a mobile device to be used without any modifications.

Figure 5: Premises with mobile coverage in the Grainbelt



The previous graph shows the number of premises with 4G handheld, 3G hand held and 3G external antenna coverage in the Grainbelt for the three major network providers combined.

Approximately 91 per cent of premises in the Grainbelt have 4G hand held coverage and 96 per cent of premises the Grainbelt receive 3G hand held coverage. For premises that are unable to access 3G hand held coverage, most premises are able to access 3G external antenna coverage.

93,908 of a total 94,431 premises the Grainbelt (99 per cent) are able to receive some form of 3G external antenna coverage. External antenna coverage means that a network coverage extension device, known as an 'external antenna' is required. This means that when 3G external antenna is applied, approximately 184,505 square kilometres, or approximately 96 per cent of the Grainbelt area has access to mobile coverage.

Telstra has announced it will switch off its 3G network in approximately four years' time as part of its long term transition to 5G. As part of its transition, Telstra has committed to complete its roll out of 4G technology across the country so that it matches the coverage currently provided by its 3G network before the switch off. Given there is a current difference between the amount of 3G and 4G coverage available in the Grainbelt, it would be expected that Telstra will look to upgrade some of its existing network to accommodate its proposed transition.

It is important to note that this is not the first time mobile network operators have transitioned from legacy mobile technology. For example, customers were successfully transitioned from 2G to 3G, before the mobile network operators switched off their 2G network.

The below table shows the total area and premises for 4G hand held, 3G hand held and external antenna coverage, and NBN services, in the Grainbelt.

Figure 6: Coverage in the Grainbelt area and premises covered.

Coverage	Provider	Area (sq. km)	% area coverage	Premises	% premises coverage
Entire Grainbelt	**N/A**	**191,626.07**	**100%**	**94,431**	**100%**
4G hand held	Combined Coverage	101,992.60	53%	85,855	91%
3G hand held	Combined Coverage	141,531.43	74%	90,801	96%
3G external antenna	Combined Coverage	184,505.25	96%	93,908	99%
3G external antenna	Fixe Line	142.693	0.074%	41,745	44%
3G external antenna	Fixed Wireless	5,795.56	3%	16,363	17%
3G external antenna	Satellite	185,687.82	97%	36,323	38%
3G external antenna	Total Coverage	191,626.07	100%	94,431	100%

The combined coverage represents the total amount of coverage or service where there is coverage or service available from at least one provider. Please note that the coverage footprint of mobile carriers overlaps in some areas.

The above table indicates that all premises within the Grainbelt have access to an NBN service and most have mobile coverage as well. However, there are some areas where connectivity may be improved. As discussed earlier, there may be scope to increase the amount of fixed wireless coverage in the Grainbelt and improve connectivity in areas where currently only Sky Muster satellite service and mobile coverage is available.

Summary

As previously indicated, the less populous areas of the Grainbelt are predominantly served by the Sky Muster satellite service, with fixed wireless services in some towns. The areas of large population such as Geraldton and Esperance also have fixed line services available with fixed wireless supporting the fringes of these larger towns. There are large areas of mobile coverage, mainly from Telstra and Optus, across most of the Grainbelt however, there still remains some areas that have poor or no mobile coverage. Providing improved coverage in targeted areas will help to support local communities as well as connectivity required for the use of Internet of Things for agricultural business.

Connectivity needs for Agricultural Businesses in the WA Grainbelt

As previously set out, this feasibility study was commissioned in response to concerns raised by WA businesses and farming groups that the existing telecommunications infrastructure in the Grainbelt is not sufficient for enterprise grade services.

There are concerns that a lack of connectivity is holding back productivity by not offering sufficient connectivity to support the adoption of digital farm technologies for agricultural and pastoral businesses in regional WA. The following will discuss the connectivity requirements for digital technologies used for agricultural purposes.

Digital farms: the use of IoT technology in farming

The Internet of Things (IoT) refers to an ecosystem in which applications and services are driven by data collected from devices that sense and interface with the physical world. These devices are supporting innovation and economic growth across many industries, including agriculture.

Next-generation precision agriculture, using digital technologies including IoT, is changing the nature of farming and food production in Australia. There is an opportunity for the agricultural sector to use IoT devices in 'smart farming' to manage agricultural processes more efficiently, improve overall productivity, and increase the sector's international competitiveness.

The benefits of the deployment and use of IoT devices for agricultural applications include; improving yield and quality of produce, expanding production, reducing operating costs, improving farm safety, livestock and crop health, and generating positive environmental impacts.

Temperature sensors, irrigation systems, drones, autonomous farming vehicles and machinery, and stock tracing tags are particular examples of IoT devices that are used for agricultural applications. These smart devices are able to assist farmers to monitor farm conditions and infrastructure remotely and in real-time. Access to real-time data and analytics assists farmers to farm safer and smarter by providing farmers with information that informs decision-making; helping them to adapt more quickly to changing conditions. This promotes efficiency in food production and minimises wastage; saving time, labour and money.

In the IoT, devices and objects have communications connectivity, either as a direct connection to the internet or mediated through local or wide area networks. There are a variety of different IoT technologies available with different uses and IoT is not limited to any specific technology platform.

An international market has opened up for IoT devices that provide 'industrial metering', 'switching' and/or 'control' (including smart infrastructure). This provides economies of scale for the agriculture sector to potentially access IoT devices.

Satellite based IoT solutions are also available with companies like Myriota and Fleet providing an additional alternative for IoT connectivity, particularly in remote and regional Australia due to the increased coverage that satellite systems are able to provide.

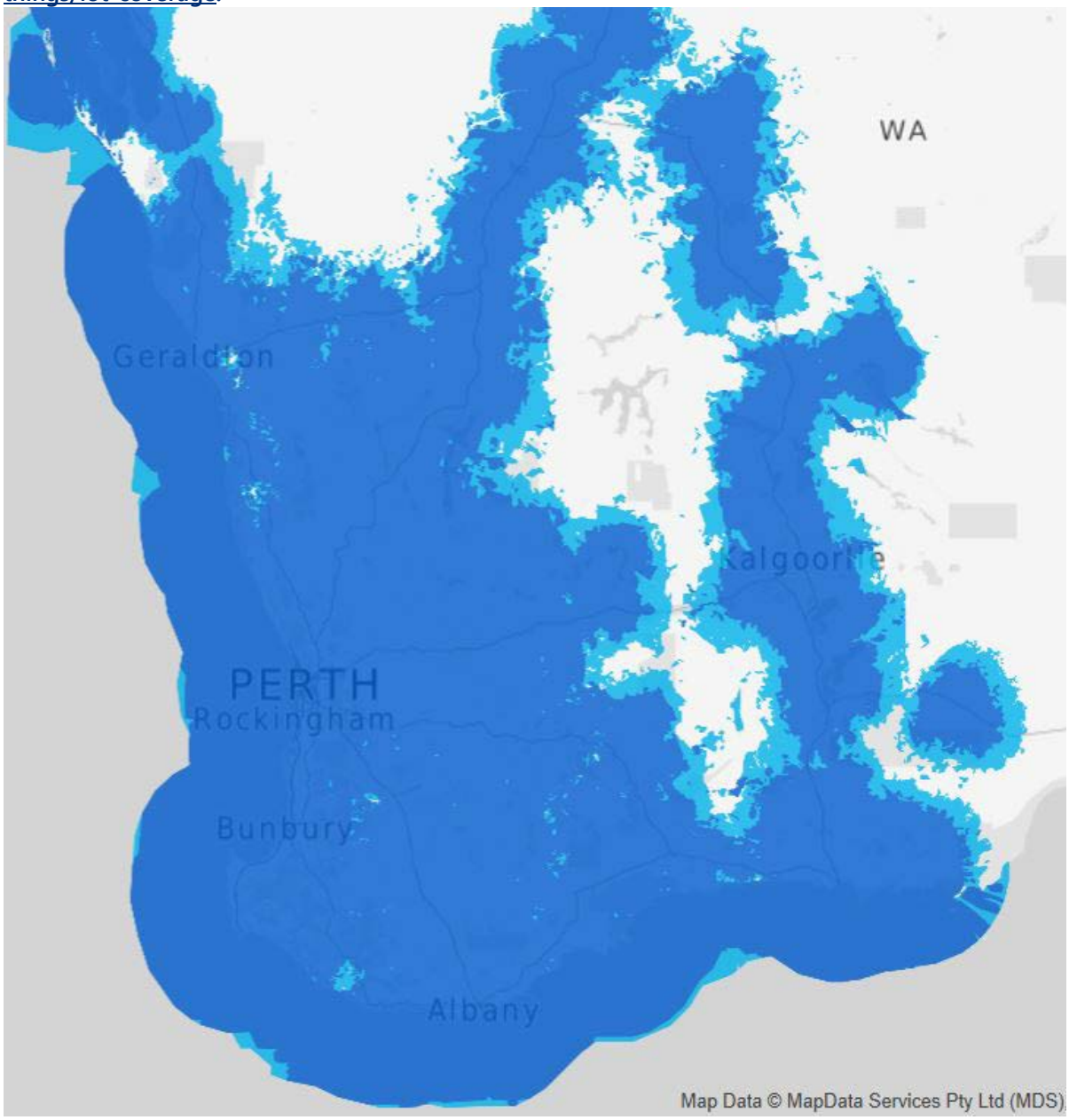
IoT-specific networks are well-suited to servicing agricultural applications in geographically remote or dispersed areas, and these networks have been rolled out across regional Australia.

MNOs have also been enabling the use of IoT devices across its 4G network. This has been performed through standardised variations of its existing network specified for IoT devices (i.e. Narrowband IoT and Category M1, commonly known as Cat-M1).

Telstra IoT coverage in the WA Grainbelt

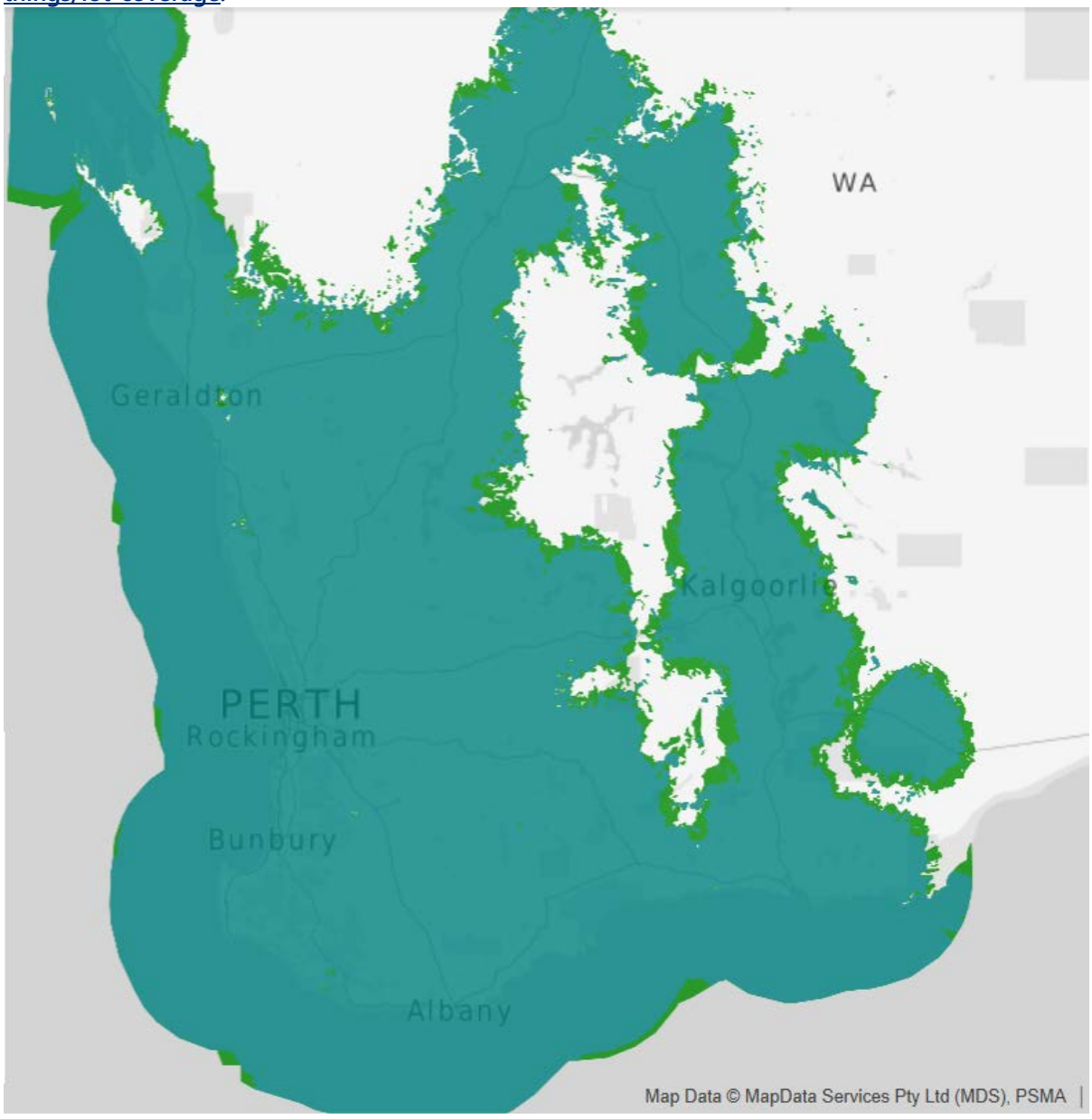
Telstra is one example of an MNO with an IoT Network that leverages its existing mobile network infrastructure. Telstra has designed parts of its networks to be purpose-built for IoT and are able to provide improved, cost-efficient coverage, including in challenging locations that high bandwidth technologies may not reach. As at July 2020, Telstra's Narrowband-IoT network (NB-IoT) coverage is around four million square kilometres, and Telstra has 3.5 million IoT services in operation across their portfolio of IoT networks, including NB-IoT and their LTE-M network. Telstra's Narrowband IoT network includes almost ubiquitous coverage of arable land and covers most of the Grainbelt. The Telstra Cellular Low Power Wide Area Networks (Cellular LPWANs) include an LTE-M (Cat-M1) network and a Narrowband IoT network, which provide coverage suitable to enable IoT devices. Telstra's existing CAT-M1 coverage footprint in WA is shown below.

Figure 7: Telstra's CAT-M1 coverage footprint in WA (light blue indicates external antenna coverage) available at https://www.telstra.com.au/business-enterprise/solutions/internet-of-things/iot-coverage.



Telstra's existing Narrowband-IoT coverage footprint in WA is shown below.

Figure 8: Telstra's NB-IoT coverage footprint in WA (light green indicates external antenna coverage) available at https://www.telstra.com.au/business-enterprise/solutions/internet-of-things/iot-coverage.



As shown in the diagrams above, Telstra in particular has a significant amount of IoT coverage in the Grainbelt. In 2019, Telstra extended its coverage range of Narrowband IoT network towers to 120 kilometres per site, expanding Telstra's total coverage to almost four million square kilometres in January 2020. This has helped deliver new water, stock and crop management applications to remote communities.

Telstra's IoT network in the Grainbelt includes 'endpoints' or the physical computing devices that enable IoT applications. The endpoints are the same as the 'Telstra Captis environmental monitoring solution'[4], which delivers waste, water, air, soil and noise monitoring solutions in Australia (used by water companies like Sydney Water), and are suitable for the kinds of IoT applications required by the agricultural industry.

The Telstra Captis units support both the Cat-M1 and Narrowband-IoT networks, with Cat-M1 (a higher bandwidth up to 1Mbps) best utilised for fast moving assets, and Narrowband-IoT (a lower bandwidth running up to around 200 kilobits per second) which is good for slow moving or stationary assets that are commonly used in agricultural monitoring. The advantages are highlighted in the case study[5] below.

Case Study: Telstra Captis Environment Monitoring Solution utilised by Fertiliser Company to meet customer demand in the WA Grainbelt

The rollout of Telstra Enterprise Captis data loggers on Telstra's NB IoT network in WA is creating opportunities for agricultural businesses in the Grainbelt. For example, a large liquid fertiliser company supplying large remote farms across the Grainbelt has recently benefited from the installation of IoT technology to measure how much fertiliser is left in their tanks. Suppliers traditionally needed to put inventory much closer to customers to meet emergency orders, placing strains on stock and at times not being able to meet the customers' demands. By moving the fertiliser company to Telstra's IoT, the fertiliser company is able to monitor levels continuously in real-time. This has created significant efficiencies for the company.

Telstra's IoT network has been designed to last until at least the year 2035, providing a long term solution for IoT usage.

Summary of IoT requirements and coverage in the WA Grainbelt

Given the different modes of IoT service delivery available, existing coverage in the Grainbelt appears to be sufficient to support the current use of IoT technologies for farming and agricultural purposes. However, it remains unclear if the capacity of the network will be able to meet additional and future use of IoT devices.Government investment in the WA Grainbelt to date

Both the Australian Government and the WA Government understand the need for fast and reliable digital connectivity in the Grainbelt to support regional communities and agricultural businesses in these areas. With this in mind, there has already been significant investment to improve connectivity in the Grainbelt area from the Australian Government and the WA Government.

[4] The Telstra Captis Environmental Monitoring solution has been developed in collaboration with mIoT IoT Technologies. Telstra's Captis Environmental Monitoring solution uses devices operating on the Telstra network, to collect, analyse and act on data from IoT-enabled sensors. More information about this technology is available on the mIoT IoT Technologies website at https://www.miot.com.au/support/telstra-bridge/

[5] "Telstra's IoT network extension opening up new customer opportunities", Communications Day, Issue 5945, 19 June 2020, page 5

Australian Government Mobile Black Spot Program

Expanding mobile coverage has clear economic, social and public safety benefits for people living, working and travelling in regional and remote areas of Australia. This is why the Australian Government has committed $380 million to date to the Mobile Black Spot Program (MBSP) to invest in telecommunications infrastructure projects which address mobile black spots across Australia. To date, more than 1200 base stations have been funded across Australia under the first five rounds of the MBSP, generating a total investment of more than $836 million, including co-contributions from local, state and territory governments, MNOs and community organisations.

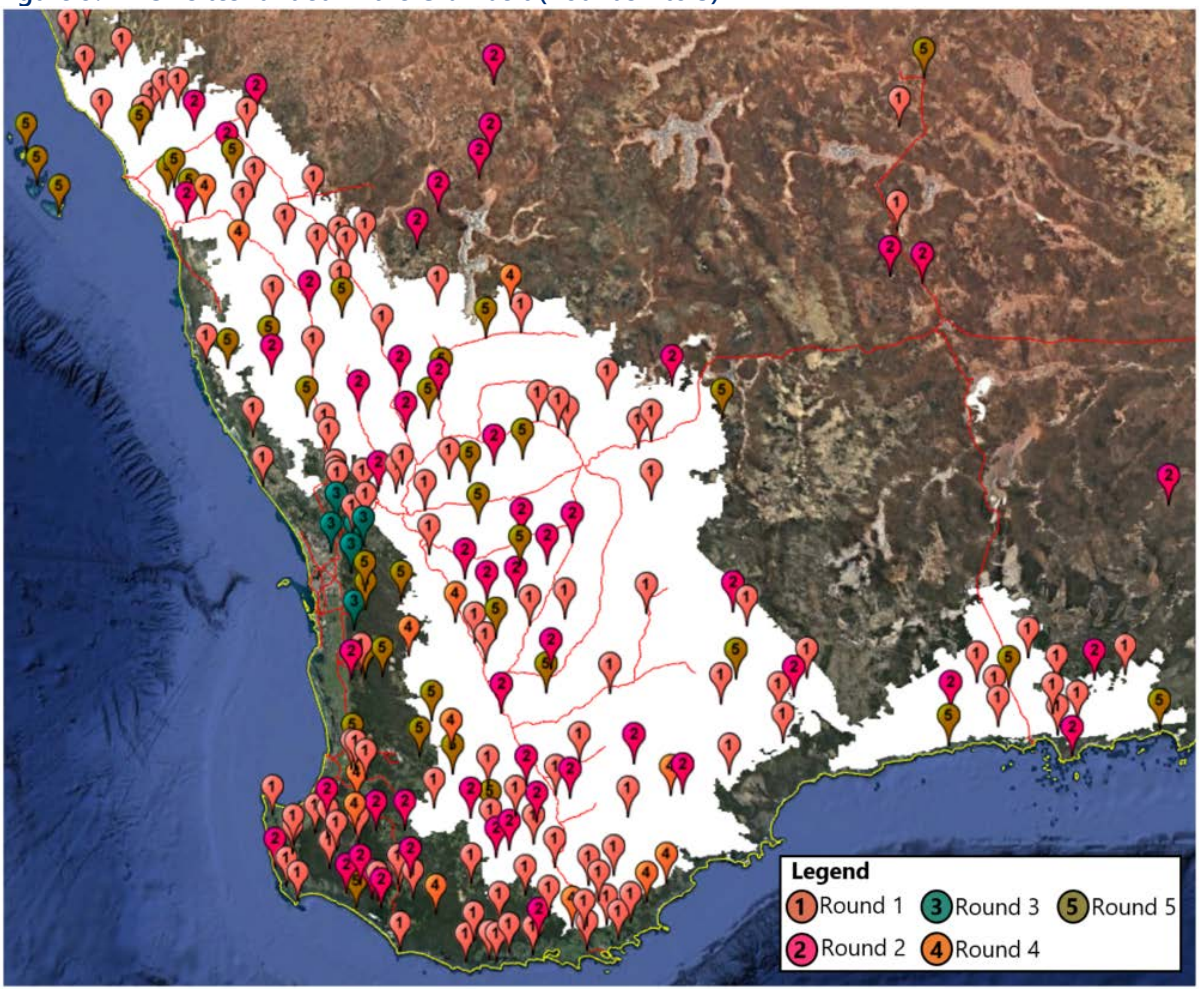
In the Grainbelt, a total of 136 mobile base stations have been funded under Rounds 1 to 5 of the MBSP, including additional small cells provided by the carriers in Rounds 1 and 2. 102 of these base stations have been completed and are on air, providing new and improved coverage to communities.

Under Round 5 of the program, the Government funded 27 proposed solutions in or on the periphery of the Grainbelt area. This will generate a further $17.3 million investment in the region bringing the total investment in the Grainbelt to approximately $124.3 million, of which $35.9 million is Commonwealth funding and $33.06 million is funding from the WA Government.

Co-contributions from state governments have been very important towards the success of the MBSP. Given this, the co-contribution model should be considered in the design of future grants programs, including, for example, whether it be a targeted grants program for the Grainbelt or existing programs such as the Australian Government's Regional Connectivity Program (RCP).

The following diagram shows the distribution of the mobile base stations funded under Rounds 1 to 5 of the Government's MBSP in and around the Grainbelt.

Figure 9: MBSP sites funded in the Grainbelt (Rounds 1 to 5)



The next step in the MBSP is conducting Round 5A, with applications due by 10 February 2021. Round 5A includes a focus on improving mobile connectivity along major transport corridors and in disaster-prone regions, such as bushfire-prone areas, as well as the testing of new technologies that support shared mobile coverage in regional areas.This will provide further opportunities to improve mobile coverage in the Grainbelt.

As part of the Program, $80 million in funding has also been allocated for Round 6, the process for which is expected to commence after the Round 5A competitive assessment process is complete.

Further information is available on the Department of Infrastructure, Transport, Regional Development and Communications' website at www.communications.gov.au/mbsp.

Australian Government Regional Connectivity Program

The Stronger Regional Digital Connectivity Package (the Package) was announced in the Government's response to the 2018 Regional Telecommunications Review. The purpose of the package is to improve broadband and mobile services in areas of high economic, social and public safety significance, particularly in areas served predominantly by the Sky Muster satellite service using a strategic place-based approach.

As part of the Government's Stronger Regional Digital Connectivity Package, the Government committed to a new Regional Connectivity Program (RCP) to improve digital connectivity for people in regional, rural and remote Australia.

The RCP is an important part of the Government's investment in regional telecommunications and will provide up to $83 million in grants for communications infrastructure projects in regional, rural and remote Australia. The RCP targets investment in local priorities to maximise economic opportunities and region-wide benefits.

With the rollout of the NBN almost complete in regional Australia, there is an opportunity for the network to be complemented in some areas with bespoke, place-based solutions. The RCP has been designed to complement the NBN and the Government's MBSP, particularly in Sky Muster satellite service areas.

The program provides an opportunity for communities and telecommunications providers to identify bespoke solutions to improve connectivity in the Grainbelt.

The types of projects that could be supported through the RCP include the development of enterprise-grade broadband networks that enable the agricultural or horticultural sectors to use the latest applications and technologies. This could include fixed wireless projects in Sky Muster areas.

There is significant potential for programs such as the RCP, to improve digital connectivity in the Grainbelt. The WA Government has indicated interest in the program and a series of projects it would be willing to support.

Western Australia Government Digital Farm Grants Program

The WA Government's Digital Farm Grants Program (DFGP) was first made available in 2018 with up to $5 million available for Round 1 and a further $2 million under Round 2 in 2019. Grants of up to $500,000 were made available on a matching co-contribution basis to cover capital costs of improving connectivity to multiple farming enterprises and associated stakeholders.

The WA Government DFGP is a similar model to the Australian Government's RCP. Both are grants programs that have been designed to support place-based solutions and target investment in local priorities to maximise economic opportunities and region-wide benefits in regional Australia.

More information about the program can be found on the WA Government Department of Primary Industries and Regional Development website at https://www.agric.wa.gov.au/r4r/digital-farm-grants-program.

Round 1 Outcomes

Many of the projects funded under Round 1 of the WA Government's DFGP are located in the Grainbelt region of WA. Under Round 1, a total of $4.8 million in grant funding was allocated to five successful recipients to deliver 11 Digital Farm projects across the State.

Logic IT Solutions Pty Ltd, a local telecommunications provider based in Geraldton, is responsible for delivering services of up to 200mbs on 27 towers, which are now providing farmers in the Chapman Valley and North Midlands with access to enterprise grade broadband connectivity

across more than 14,000 square kilometres. Pivotel Pty Ltd has also successfully delivered three new solar powered towers, which are now providing service across approximately 50 square kilometres in the Grainbelt agricultural district of Wickepin. As part of its Mt Barker Project, Pivotel Pty Ltd will also provide new coverage to the Great Southern region.

Other grant recipients include Superloop Limited, which has deployed telecommunications infrastructure in WA's Great Southern communities of Narrogin, Wagin, Kojonup, Katanning, and Broomehill East. Telstra Corporation Limited is delivering a project in Goodlands, while Bunbury telecommunications provider CipherTel Pty Ltd will deliver digital connectivity projects in Kununurra, Williams, Wagerup/Boddington, and Capel/Busselton. The projects in Williams and Boddington are located in the Grainbelt.

All the projects are expected to be finalised by early of 2021 and once up and running, will offer end-to-end digital connectivity services for agribusinesses and communities in regional WA.

Round 2 Outcomes

The outcomes of the second $2.1 million round of the WA Government's DFGP were announced in July 2020. There were three successful recipients and four projects funded under Round 2. The four projects will deliver broadband connectivity to an estimated 245 farms, covering an additional 24,000 square kilometres. The areas that will be serviced by these projects include the Shires of Merriden, Bruce Rock and Narembeen in the Grainbelt region.

Specifically, the funded projects include a CRISP Wireless telecommunications project in Merredin, Bruce Rock and Narembeen, a Logic IT fixed wireless network from Greater Geraldton to Mullewa, and a Logic IT fixed wireless project in Dandaragan. Outside the Grainbelt area, CipherTel also received funding for a project in the Carnarvon Horticultural District.

A map of all projects funded under Rounds 1 and 2 of the DFGP is at Attachment A.

Round 3

The WA Government recently commenced Round 3 of the DFGP with applications for this round opening in October 2020. Round 3 is targeted towards the Grainbelt region and will provide up to $7 million in funding for connectivity solutions for agribusinesses in the area. Applications for Round 3 closed on 27 November 2020. All applications are currently being assessed by the WA Government, with the outcomes to be announced after this process has been completed.

Digital Connectivity Approaches for the Grainbelt

In August 2018, the WA Government commenced its Grainbelt Digital Enhancement Project (the Project). The aim of the Project was to deliver high capacity broadband and improved access to digital technology to far-reaching, broad coverage areas throughout WA's Grainbelt.

The process undertaken by the WA Government for the Project has helped to inform this study. This information has been used to consider whether to undertake an all-encompassing approach to improving connectivity or to use a targeted placed based program for the Grainbelt region. Proposals put forward considered a variety of different approaches to improving connectivity in the area. However due to commercial-in-confidence requirements, detailed information on the proposals is not publically available.

The Project, and advice received from external consultants, has assisted the government in determining whether a targeted approach or a broader approach would be more effective towards achieving improved connectivity in the WA Grainbelt. An example of a 'broader' approach would be to build a new fibre optic network to provide increased coverage throughout the whole of the Grainbelt region. A targeted approach would be to provide for smaller, place-based solutions in the areas where there are connectivity issues.

As there is a significant amount of existing coverage in the most populous areas of the Grainbelt region of WA a broader approach would appear to substantially overbuild existing communications infrastructure. Given this, it is anticipated there would be minimal benefits in the areas where there is already good coverage. In addition, the costs of implementing a broader approach are significant and the commercial risks are high.

A targeted approach therefore appears to be the most technically and commercially viable means to achieve improved connectivity. By targeting those areas where there is little or no coverage, connectivity solutions can be deployed more efficiently and deliver more immediate benefits to the communities and businesses that need it. A targeted approach would require less commercial risk for all involved and could be supported under existing government programs or new government funding programs.

Future technologies

While this study has focused on existing technologies to improve connectivity, evolving technology is also enabling broader connectivity solutions that may assist to improve coverage in the Grainbelt area over time. These technologies include Low Earth Orbit (LEO) satellite networks and High-Altitude Platform Stations (HAPS) that are able to provide wide area wireless services.

LEO satellites revolve at an altitude between 160 to 2,000 kilometres and a constellation of these satellites are able to provide continuous, global coverage as the satellites move. Unlike Geosynchronous Equatorial Orbit (GEO) or 'Geostationary' satellites, LEO satellites fly at a much faster pace because of their proximity to the Earth, in order to remain in orbit. LEO satellite technology could provide an advantage for increasing connectivity in regional Australia as the technology is able to provide widespread high bandwidth, low latency coverage. This would facilitate high capacity, high speed connectivity in regional and remote areas of Australia. While there are some existing LEO satellite communications providers, this technology is not currently commercially available.

LEO satellite networks could be considered as a possible future solution with the potential to enable near-ubiquitous coverage of the Grainbelt region. As the technology develops, there is a possibility that LEO satellite networks could be deployed within the forecast lifetime of any proposed new wholesale fibre backhaul network.

Another emerging technology is HAPS. The International Telecommunications Union (ITU) Radio Regulations defines HAPS as a station located on an object at an altitude of 20 to 50 kilometres and at a specified, nominal, fixed point relative to the Earth. HAPS operate in the stratosphere, below satellites, but well above the range for civilian aircraft.

HAPS have the potential to achieve coverage over wide, previously unserved or underserved areas, which would supplement existing terrestrial infrastructure and provide backhaul support

for mobile broadband systems. However, HAPS technology is still being tested and telecommunications use cases in Australia are unclear, as no company has so far presented a viable business case with a telecommunications partner/s and customer base. While this technology is still being tested and is not yet commercially viable, Australia has been involved as a testing ground for HAPS technology with Airbus beginning trials of its solar-electric unmanned aerial vehicle known as Zephyr in December 2018.

Another comparable HAPS technology under development is Project Loon, using solar-powered balloon constellations (loons) to provide ubiquitous broadband coverage. The loons act as a connectivity bridge between the core network and areas that require additional coverage. As loons are not stationary, dynamic coordination is required to ensure continuous connectivity.

In addition to international research and development undertaken by Google, Project Loon has been trialled in Australia previously, with Telstra reporting trials in Queensland in 2014, and ongoing test flights continuing to date in WA. Google has not announced the outcomes of these trials, or sought to commence commercial deployment in Australia.

Given their unique advantages, LEO satellite networks and HAPS may have a future role in providing connectivity solutions in regional and remote Australia. While these technologies have not been proven in Australia and a viable commercial business case is yet to be put forward, the Australian Government is actively monitoring the development of these technologies and is engaging with industry on future solutions to improve coverage in regional and remote areas of Australia. Mobile carriers are already taking advantage of satellite capability using satellite for backhaul arrangements, particularly in very remote areas.

Conclusion

In summary, there is significant mobile and broadband coverage in the Grainbelt. Data and mapping shows that mobile and broadband coverage extends to most premises in the Grainbelt area, with 61 per cent of premises having access to NBN fixed line or fixed wireless services. However, there are some areas where there are opportunities to improve the capacity and reliability of internet services for local communities and agricultural business. While broader, large-scale solutions have been investigated, we consider that targeted, small-scale solutions through established telecommunications service providers and regional funding programs would be the most effective and efficient way to improve connectivity in the Grainbelt.

The Australian Government has already made significant investment in the Grainbelt area and continues to do so, under the Government's MBSP. The WA Government has also been investing in improving connectivity in the Grainbelt through the Digital Farm Grants Program and as a significant co-contributor to the MBSP. There is scope to continue to improve connectivity in the Grainbelt through these existing programs, as well as through new programs such as the Australian Government's RCP.

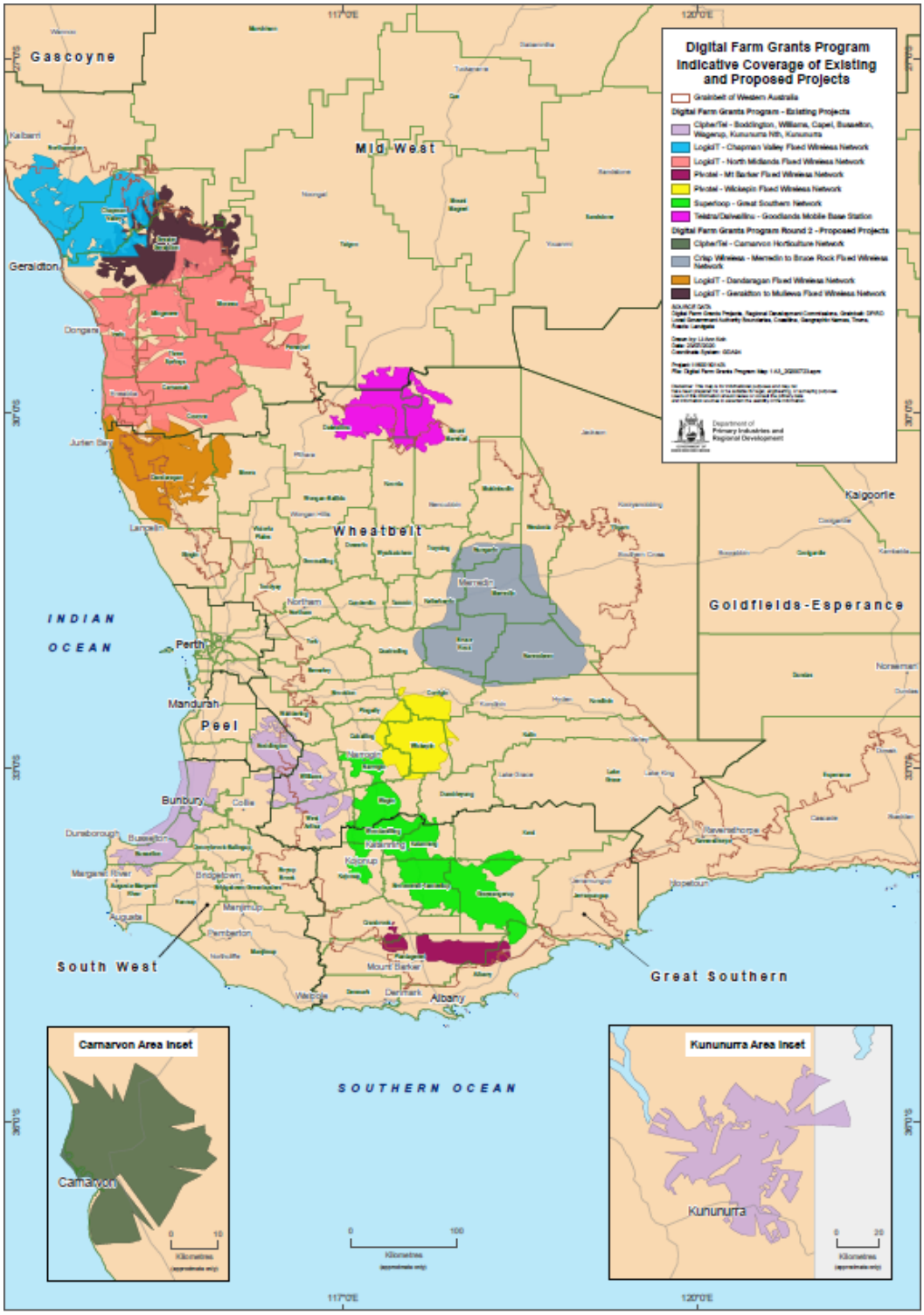
Under the RCP, there are opportunities for the Government to partner with local communities and telecommunications service providers to improve connectivity in the Grainbelt area through targeted, place-based solutions. These solutions are likely to be more cost effective and may better meet the needs of the communities that they are intended to serve.

Importantly, these are national programs with funding allocated following a competitive grant application and assessment process (including the amount of co-contributions proposed) and there is no guarantee that funding would ultimately be allocated to the Grainbelt.

Also as technology advances it is worth considering the potential use of new technologies such as LEO's and HAPS in the future. These are capable of achieving coverage over wide, previously unserved or underserved areas across large expanses of regional Australia, including the Grainbelt region. However, despite the potential of these technologies, they remain in their infancy and are yet to be proven commercially.

Overall we consider a wholesale approach to improving digital connectivity in the Grainbelt not to be feasible. Alternatively, there are opportunities for the Government to contribute to improved connectivity in the Grainbelt through a number of smaller scale projects in the area under existing government programs. In addition, there is scope to undertake a more targeted program that would be able to provide improved connectivity through alternative means such as upgrades to fixed line and fixed wireless in identified areas.

Attachment A: WA Government DFGP Projects



Map of the WA Government DFGP projects. Available at: https://www.agric.wa.gov.au/sites/gateway/files/Digital%20Farm%20Grants%20Program%20Map%201%20A3_20200723.pdf