2021 Regional Telecommunications Review Secretariat
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Submission in Response to the Regional Telecommunications Review *Issues Paper* July 2021

I appreciate the opportunity to make the attached submission to the 2021 Regional Telecommunications Review (the Review). The Review provides an opportunity to take stock of telecommunications and regional services developments in a less politically charged circumstance than any previous review.

While I live in an area outside of metropolitan Sydney, the Illawarra region is not one of the areas the review primarily targets. My basis for submitting is a thirty-year career in telecommunications spanning customer service, corporate sales, strategy, and regulatory and public affairs working for telecommunications providers that ranged from Telstra to Unwired and periods of contract consulting.

Apart from my employment by providers, I was also employed on contract as an Assistant Secretary in the then Department of Broadband, Communications and the Digital Economy to work on the Review chaired by Dr Glasson. In addition, I was employed as Special Adviser and Speechwriter in the office of Stephen Conroy as Minister for Broadband, Communications and the Digital Economy from December 2011 to June 2013, and subsequently for Minister Anthony Albanese and Shadow Minister Jason Clare.

I am currently a part-time candidate for a PhD at the University of Wollongong and a columnist for InnovationAus.com. Although NNNCo also lists me as Government Relations Adviser, this is an unpaid role, and I have provided no advice in the last twelve months.

This submission starts with a summary of the history of regional telecommunications reviews and then makes suggestions about infrastructure developments for consideration by the review committee. Nothing in the submission is confidential, and I am happy for it and this letter to be published on the Review's website. I am available to appear before the Committee if required. I can be contacted at

Yours sincerely

David Havyatt

Submission to the 2021 Regional Telecommunications Review Contents

Background

History of the Regional Telecommunications Reviews

The 2021 Review (the Hartsuyker Review) is the fifth Regional Telecommunications Review.[1] However, it is the seventh review of telecommunications service provision this century.

The first review was the Telecommunications Service Inquiry chaired by Tim Besley that reported in September 2000 (report titled Connecting Australia).[2] The second was the Regional Telecommunications Inquiry chaired by Dick Estens that reported in November 2002.[3] The context of the first two inquiries was the further privatisation of Telstra. In particular, the response to the Estens inquiry justified the National Party support for privatisation.

The provisions in the *Telecommunications (Consumer Protection and Service Standards) Act 1999* for establishing a Regional Telecommunications Independent Review Committee (RTIRC) and the associated reviews were the recommendations of Chapter 9 of that report.[4]

On the establishment of the current review committee, I emailed the Secretariat a letter to the Chair of the inquiry in which I wrote:

> *My recommendation to you and your Committee is that you ask the Department to prepare a four column table listing all the recommendations of the previous six inquiries in the first column. In the second column these should be coded to reflect what aspect of communications they address (mobiles, broadband, fixed voice in regional, voice in remote, customer service, etc). In the third column they should list the government response to each recommendation. In the fourth column the Department should give a current update on arrangements as they apply today.*

> *I encourage the Committee to read all the earlier reports, the purpose of the table is to inform the Committee about what recommendations have been effective. The Committee could profitably use this as the foundation for an issues paper. There is no doubt that voice services in remote Australia, data caps on satellite NBN and mobile coverage will feature highly in submissions. The question for the Committee is how to make recommendations that will actually make a difference.*

The response from the Secretariat read, in part:

> *The previous Regional Telecommunications Reviews are available on the website, and the Committee is aware of these previous Reviews, including those you have noted, together with the recommendations and responses.*

> *As you are aware, the Committee is required to consult publicly and details on the Committee's consultation process will be published shortly.*

I proposed that the Secretariat provide a full table of the history of recommendations and responses with a further column to detail the circumstances as they apply today (or, more generally, the

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[1] https://www.infrastructure.gov.au/who-we-are/regional-telecommunications-review
[2] A copy of the report can be found at http://www.digecon.havyatt.com.au/docs/0041.pdf, while copies of the Government's two responses can be found at http://www.digecon.havyatt.com.au/docs/0044.pdf and http://www.digecon.havyatt.com.au/docs/0045.pdf.
[3] The report and response respectively can be found at http://www.digecon.havyatt.com.au/docs/0046.pdf and http://www.digecon.havyatt.com.au/docs/0047.pdf
[4] Interestingly, the Estens committee thought the secretariat for the committees should be provided by the (then) Australian Communications Authority.

outcomes of the government response). As I wrote, the intent was to inform the Committee of what proposals have been effective. While it is feasible for part of this work to be done by me as part of this submission, I am not as well placed as the Secretariat to thoroughly research the current provisions about recommendations. Therefore, I resubmit this recommendation to the Committee.

In particular, I encourage the Committee to reflect on the effectiveness of the schemes that have seen taxpayers' funds dissipated in a myriad of small projects that have made little substantive difference to regional Australians. These begin with the Networking the Nation projects and include, I would argue, most of the so-called mobile blackspot funding.

Developments in Australian Telecommunications

Since the start of the century, and this review process, telecommunications in Australia has undergone massive changes. Yet while these changes have occurred, some characteristics remain the same.

At the start of the century, broadband internet access was just coming to the fore. There was a great deal of interest in the competitive potential of broadband services delivered by unbundled local loop services. However, this competition depended on the ability of Internet Service Providers (ISPs) to access Telstra exchanges to install DSLAMs and acquire backhaul transmission to their own networks. As a result, competition developed differentially across geographic areas, and in 2005 Telstra proposed to the government a new approach using fibre to the node technology. Telstra's proposition was based, however, on discriminatory access to the new service.[5]

Telstra's offer was rejected, and what could only be considered a 'tender for regulatory arrangements' was commenced. Arising from the Telstra offer, the Australian Government announced $600M funding the Broadband Connect Infrastructure Program. OPEL, a joint venture of Optus with Elders, reached an agreement with the government for a combined fixed wireless and DSLAM extension of broadband in regional areas for the announced $600 million and an additional $358 million.[6]

With the election of the Labor Government in 2007, policy implementation began on the previously announced National Broadband Network. The Government terminated OPEL's contract because Departmental analysis showed the contract conditions could not be met.[7] As the tender received no acceptable proposal, the Government moved instead to a model of fibre to the premises combined with fixed wireless and satellite to be operated by a Government-owned entity.

The NBN has unfortunately been down-scaled from its initial specification. The move to Fibre to the Node or Kerb, and the use of HFC networks, has limited the connection bandwidth opportunities. This technology change has also seen the disappearance of the idea of a universal terminating unit with four ethernet ports. The satellite and fixed wireless services have provided significant improvements in internet connectivity; however, they are still limited in capacity compared to fibre networks. Geostationary satellites also include a very appreciable propagation delay that manifests as high latency. Many web applications assume low latency and involve multiple communications as you navigate the website.

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[5] https://webarchive.nla.gov.au/awa/20060821215445/http://www.telstra.com.au/abouttelstra/investor/docs/tls339_briefingpaper.pdf

[6] https://www.optus.com.au/about/media-centre/media-releases/2007/06/elders-and-optus-to-build-rural-and-regional-broadband-network

[7] https://www.theaustralian.com.au/australian-it-old/conroy-scraps-opel-deal/news-story/35b8943fff4b2f4f0a76675cc491fa65 note Optus argued the decision was based on flawed Departmental advice https://www.zdnet.com/article/flawed-decision-killed-au1bn-opel-deal-optus/ and the action brought by Optus was eventually settled for an undisclosed amount https://www.afr.com/companies/professional-services/canberra-settles-28m-stoush-with-optus-over-opel-20161219-gte4u7

Australia introduced three licences for digital (second generation) mobile telecommunications as part of the competition reforms in 1991. The licences were accompanied by apparatus licences for the whole of Australia in the 900MHz band for GSM mobiles. A licence condition was that each operator must be in a position to serve no less than 80% of the population by 1997[8]. As the networks developed, the extent of network coverage became a feature of competitive advertising, which has made it to court.[9]

In 1998 the first spectrum auctions re-farmed 850MHz spectrum (previously utilised from analogue mobile telecommunications) and the 1800 MHz band, suitable for 2G digital mobile (be that the GSM standard already operated by the three incumbents, CDMA or TDMA as both used in the USA). The three incumbents and four new entrants had been successful in acquiring spectrum. AAPT and Hutchison Telecom divided half the 850 MHz between them and One.Tel and Qualcomm acquired a small slice of 1800 MHz. One.Tel contracted Lucent to build a network, but despite earlier advice, they had acquired insufficient spectrum. The Government auctioned additional 1800 MHz spectrum in an auction for which the three incumbents had stringent competition limits. This proved to be a most extraordinary auction, with One.Tel and Hutchison paying over half a billion dollars each.[10]

Over the next few years, the industry consolidated back to three operators. One.Tel collapsed, and first, AAPT's spectrum was sold to Hutchison before Hutchison merged with Vodafone. Second, a new player emerged in wireless data in Unwired that utilised spectrum previously used for pay-TV by Australis. Unwired changed its name to vividwireless when it upgraded its technology to the WiMax standard. Third, when further spectrum was allocated for 4G mobile, another new entrant, TPG, successfully acquired spectrum. The 4G standard adopted the air interface of the WiMax standard, and Optus acquired vividwireless. Finally, following the Government ban on Huawei equipment in Australian mobile networks, TPG abandoned its mobile ambitions and merged with Vodafone.[11]

The dominant network in Australia is now 4G, with the deployment of 5G starting. The progression from 2G to 3G primarily enabled useful speed packet data, while 3G to 4G was designed to increase data bandwidth significantly. 5G makes several changes, including higher speeds, lower latency and the greater capacity for the number of sessions an individual base station can host. Together with developments in spectrum agility, these make 5G networks better for high volume data applications and the many low data throughput applications typical of the Internet of Things. [12]

The Issues Paper (P.6) observes that 'mobile phones remain the device most frequently used to connect to the internet and to make voice calls.' This observation is undoubtedly correct, especially since the introduction of Mobile Number Portability in 2000 has resulted in the mobile number becoming a 'number for life' and mobile handsets developing easy to use directories.

However, while the devices are most commonly used for these purposes, it is not always the mobile network used. Mobile devices all come with the ability to connect to WiFi services, and these connections are used for the bulk of data transfer. Additionally, with some providers, the handset will use the WiFi connection to make voice calls (for example, my Apple iPhone on a Telstra account plus a Telstra broadband service over Fibre to the Home NBN.)

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[8] https://www.digecon.havyatt.com.au/docs/0006.pdf

[9] For a 2014 Telstra win see https://www.news.com.au/finance/business/telstra-wins-over-optus-in-misleading-ads-case/news-story/48d144879add8bb86117ee252cde096a ,for a 2020 Optus win see https://www.itnews.com.au/news/telstra-loses-to-optus-in-network-coverage-ad-case-553988

[10] https://www.acma.gov.au/auction-summary-18-ghz-pcs-2000

[11] The OzMobileNet website provides an excellent history http://3gwiz.com.au/ozmobilenet/?page_id=24 and timeline http://3gwiz.com.au/ozmobilenet/?page_id=4 up to 2015.

[12] See https://www.cengn.ca/information-centre/innovation/timeline-from-1g-to-5g-a-brief-history-on-cell-phones/ and https://www.sicomtesting.com/en/blog/dal-1g-al-5g-il-passato-e-il-futuro-degli-standard-gsm-umts-hspa-ed-lte/ for simple descriptions of the generations.

Unfortunately, the ABS has stopped producing the half-yearly *Internet Activity, Australia* data.[13] However, the data below shows that up to June 2018, handsets through mobile networks download about 100th the data volume of fixed connections and that the ratio between them has barely changed. While 5G networks will significantly expand the download capacity of mobile networks, telecommunications providers will be better served by targeting the capabilities at new applications (such as IoT) rather than cannibalising fixed-line services.
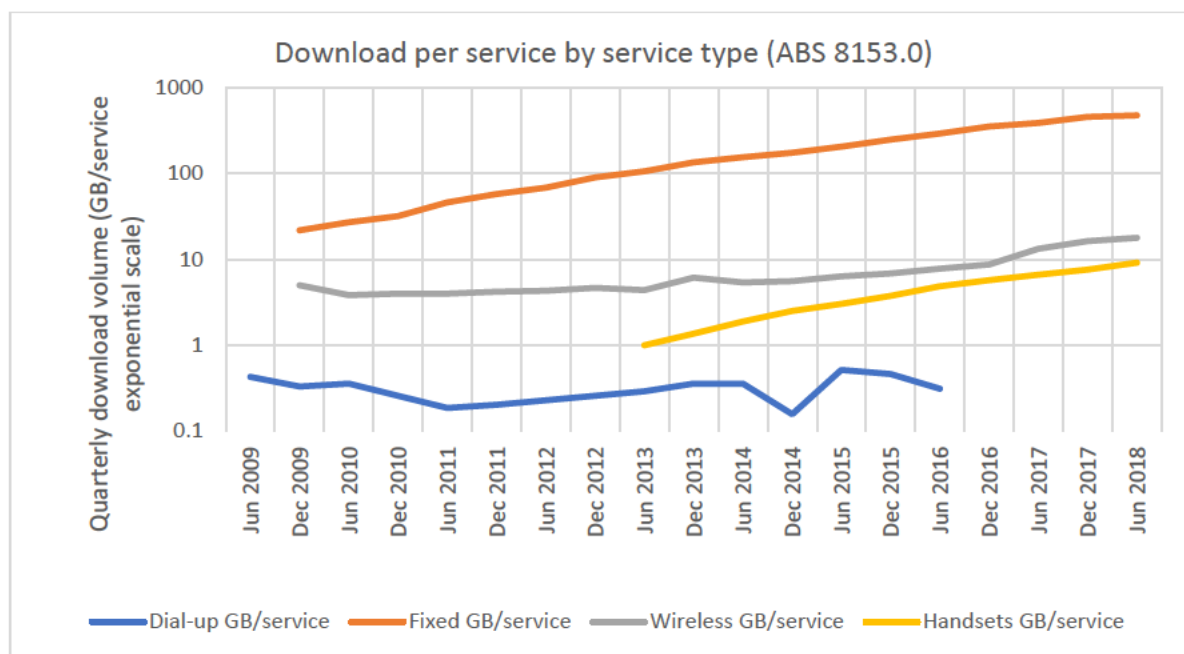

Figure 1: Download volume per service by connection type

Developments in satellite technology

When Australia first contemplated investment in satellite technology, the two primary applications were for long-distance high bandwidth services such as television signals and telephony in remote areas of Australia. Telecom Australia saw any investment in satellites as a competitive threat. It acted to take away one of these markets by developing (at the Telecom Research Laboratory in Clayton) the Digital Radio Concentrator System.[14] In 2001 Telstra won a tender for the $150 million allocated to provide 'local calls' to the customers in the 'extended zones.'[15]

As mentioned above, a problem with satellite services for the internet is the propagation delay as the satellite is in geostationary orbit 35,785 km above the Earth's Equator.[16] The propagation delay going up and down to the same point located on the Tropic of Cancer is about 0.24 seconds, and in practice it will be longer.

The AUSSAT satellites were used to connect some remote communities with telephony and data (e.g. mine sites) and to distribute television channels nationally. However, the latter use was eventually

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[13] https://www.abs.gov.au/statistics/industry/technology-and-innovation/internet-activity-australia/jun-2018
[14] Reinecke, I. and Schultz, J., 1983. *The phone book: the future of Australia's communications on the line*. Ringwood, Vic.: Penguin Books. Telstra reached agreement with NEC to commercialise the innovation but it had no commercial success in other markets. See also https://telsoc.org/journal/jtde-v7-n4/a242
[15] Grant, A. ed., 2004. *Australian Telecommunications Regulation: The Communication Law Centre Guide*. UNSW Press.
[16] https://www.britannica.com/science/geostationary-orbit

replaced with terrestrial as Telstra migrated its video product from the coax (analogue) network to digital transmission using the fibre network.[17]

As noted above, the NBN involved using satellites to connect 3-4% of premises. Despite protestation by some that the NBN satellites were 'unnecessary' or a 'Rolls Royce' solution,[18] NBN Co acquired two satellites. Before this, some providers used capacity from AUSSAT and other satellites to offer a satellite broadband service, usually in conjunction with a Government subsidy. NBN Co initially acquired some of this existing capacity to provide up to 40,000 services, with the Sky Muster service launching in 2016.

Reporting Date	Brownfields		New Developments (Greenfields)		Satellite		Wireless	
	Ready to Connect (A)	Premises Activated (B)	Ready to Connect (C)	Premises Activated (D)	Ready to Connect (E)	Premises Activated (F)	Ready to Connect (G)	Premises Activated (H)
As at 30 June 2011		620				166		
As at 30 June 2012		3,364	4,163	503		9,578	8,885	91
As at 30 June 2013	107,791	20,441	44,028	13,145		34,640	27,256	1,874
As at 30 June 2014	281,294	105,211	111,116	45,916		42,948	112,208	16,553
As at 30 June 2015	648,089	298,621	188,591	101,233		38,288	268,397	47,473
As at 30 June 2016	1,727,365	774,526	277,839	167,830	409,959	38,764	420,524	117,514
As at 30 June 2017	4,113,411	1,935,955	396,147	247,569	418,135	74,928	517,543	184,681
As at 30 June 2018	5,443,738	3,356,533	553,466	348,926	430,449	90,327	609,913	240,084
As at 30 June 2019	8,144,120	4,700,610	707,691	451,314	443,154	95,480	659,300	284,683
As at 30 June 2020	9,806,606	6,275,378	884,875	571,655	431,680	101,258	610,415	319,105
As at 30 June 2021	9,887,596	7,042,212	1,028,980	690,281	427,766	111,630	622,008	356,280

Figure 2: Extract from NBN Co Weekly Progress Report[19]

Figure 1 shows the number of premises' ready to connect' and the number activated by NBN technology. Interestingly it shows that only a quarter of the premises that NBN Co sees as being in the satellite footprint have taken up a service. Whether this indicates that these premises are actually receiving service from some alternative provider or instead are not utilising a broadband internet connection is unclear.

As part of its redesign of the NBN, the LNP government has required NBN Co to separate the satellite and fixed wireless network operation and terminated the uniform pricing policy. Because it also accommodates some competitive fixed supply, the Government has introduced the Regional Broadband Scheme that charges a levy on all non-NBN high-speed services.[20]

Alternatives to geostationary satellites are constellations of satellites in Low Earth Orbit (LEOs) or Medium Earth Orbit (MEOs).[21] Satellite imaging uses LEOs, while MEOs are used for navigation. In the 1990s, LEOs were promoted for global internet connectivity, with various projects proposed. These included Globalstar, Iridium, Odyssey, and Teledesic, though only Iridium completed its project.

However, a new generation of planned LEO deployments is now sponsored by some entrepreneurs making rockets themselves. Elon Musk's Space X is building Starlink[22], while Jeff Bezos at Amazon promotes its Kuiper constellation, and Richard Branson has invested in OneWeb. The commercial rocket industry is reducing launch costs, and the ongoing development of technology is making

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[17] As National Business Manager for the Media portfolio at Telstra I was part of the team that implemented this migration.

[18] https://www.news.com.au/breaking-news/turnbull-says-nbn-satellites-a-rolls-royce-option/news-story/50e71eeee14748919f1750ef6a86e741

[19] https://www.nbnco.com.au/content/dam/nbnco2/2019/documents/weekly-progress-report/Public_Progress_data%20-%20160921.pdf

[20] https://www.infrastructure.gov.au/sites/default/files/regional-broadband-scheme-factsheet-june2020.pdf

[21] See https://www.esa.int/Enabling_Support/Space_Transportation/Types_of_orbits

[22] https://www.cnet.com/home/internet/starlink-satellite-internet-explained/

satellites smaller and more efficient. Global consulting firm McKinsey & Company certainly thinks this generation of LEOs will have a different outcome.[23]

The benefits from LEOs are enormous.[24] Because the satellites are in orbit at heights of 500 to 1000 km, latency is significantly reduced. By how much would depend on the siting of ground stations. For Internet connectivity, the major interconnection points in Australia are in Sydney, Melbourne and Perth. The propagation delay from a user in Alice Springs to a ground station in Perth (a distance of just under 2,000 km) would be of the order of 0.009 seconds.

Because all forms of electromagnetic radiation (light and radio waves) travel slower in a medium like the glass of an optical cable rather than air (or a vacuum), this propagation delay is comparable to a fibre connection from Perth to Alice Springs. For example, if we assume a refractive index of 1.5 travels, the propagation delay through 2000km of fibre is 0.01 seconds (and the fibre doesn't run directly from Alice to Perth).

Other delay elements throughout internet connections include computation in signal regeneration and buffering delays at routers. But undoubtedly, LEOs can offer genuine metropolitan equivalence in internet connectivity in regional areas. There are also external costs associated with LEOs (i.e. impacts on others). For example, LEOs clutter the sky and add light pollution, making life harder for astronomers and increasing space debris. But these are reasons for limiting the number of competing constellations, not for opposing their development.

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[23] https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/large-leo-satellite-constellations-will-it-be-different-this-time

[24] https://www.adb.org/news/features/five-ways-low-earth-orbit-satellites-impact-asia-pacific

Communications Needs in Regional Australia

The Glasson Review

The report of the Glasson Review, *Framework for the Future,* provided the most comprehensive report of the four RTIRC's thus far.[25] The report was broken into two sections and started with considering the significance of telecommunications services, and then considered the adequacy of services (and the infrastructure to provide them) afterwards.

By comparison, the Sinclair Review Report started with infrastructure and added a reference to the Digital Economy, and the current Issues Paper has a similar structure. The Shiff Review Report was similar to the Glasson structure but had a truncated set of applications. In particular, no consideration was given to the needs of, and innovation opportunities from, communications services in broadacre agriculture.

The Shiff Review suggested that business had three simple needs,

> *Most businesses, both regional and urban, have a common set of basic communication needs, including:*
> *• one or more voice lines for communicating with customers and suppliers*
> *• a broadband data service for accessing email and the internet*
> *• one or more mobile services to connect field workers or travelling employees.*

While noting that applications for the Internet of Things do not require high bandwidth data services, the report ignored the fact that 'field workers' can be anywhere on the property.

Recommendation 1: The Committee thoroughly review the needs for and benefits of communications services in regional Australia in this review.

The Glasson Review also proposed a radically different alternative arrangement for the specification and delivery of 'universal service.' This proposal (recommendation 3.1.1) moved beyond creating a service obligation on carriers by licence and instead created a framework where Government would specify Communication Service Standards covering voice, broadband and mobile services. The Government would then have an obligation to procure services to ensure those standards are met.

The Glasson report was written while the original NBN tender was open, and nothing had been decided about the then 2% outside of plans. The subsequent NBN delivery effectively sets a standard of a minimum 25/5 broadband service anywhere in Australia. The Committee considered that a mobile standard could be set that included the subsidised provision of Satellite mobile phones (at the time, the Iridium constellation was working to make integrated handsets.)

Recommendation 2: The Committee revisits the Glasson Review proposal for a new framework for ensuring service standards.

Service Requirements

A full review of service requirements is beyond the scope of this submission. However, what I do wish to emphasise is that services require more than just the transmission layer.

The response to the COVID 19 pandemic included the rushed implementation of telehealth as a means for a standard GP consultation and the rapid migration to homeschooling and online study of all kinds. Fortuitous developments in platforms (such as Zoom, Webex, and Microsoft Teams) made

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[25] See https://www.infrastructure.gov.au/who-we-are/regional-telecommunications-review At the time of writing the links to the Edward review report were broken, so the claim is based on recollection rather than a specific comparison.

some applications relatively easy to develop. However, they were nowhere near as effective as they could be. Concern has been expressed about patients with ongoing health needs, if only annual check-ups for the over 40s, not availing themselves of the services.

Two aspects of the last Labor government's approach to broadband and the digital economy was to target the needs of telehealth and online education. In its Digital Economy strategies, Labor invested in a range of developments and trials for both services.[26] Unfortunately, the incoming Liberal Government did not publish any analysis of these projects, which all ran beyond the 2013 election.

However, these developments are critical for the development of services in regional Australia. This includes the use of high-quality video and potentially haptic devices for remote consultation and diagnosis. In addition, the use of haptic controls and automated 'arms' could enable students to undertake some practical areas remote from campus.

Despite a policy that will invest $1.2 billion in 'Australia's digital future through the Digital Economy Strategy', the bulk of the funds go to rebuilding the MyGov and My Health record websites and some additional funding for digital skills and supporting Artificial Intelligence research.[27]

Recommendation 3: The Committee detail expectations for the revitalisation of the development of communication delivered services such as telehealth and online learning.

The second aspect of the development was the four-port network terminating unit. The provision of education or health services need not depend on the household's ability to afford sufficient bandwidth for over-the-top delivery or for the service to compete for bandwidth with entertainment services. The bandwidth required could be procured by the education or health provider using another port. This is an effective way of addressing socio-economic disadvantages in the delivery of these services.

Recommendation on the technology front follows.

Fixed Broadband Infrastructure Requirements

Figure 2 above shows that on 30 June 2021, there were 11,966,350 premises able to connect to the NBN. Figure 3 shows the proportion of these by connection type (with fixed-line divided by greenfields and brownfields).

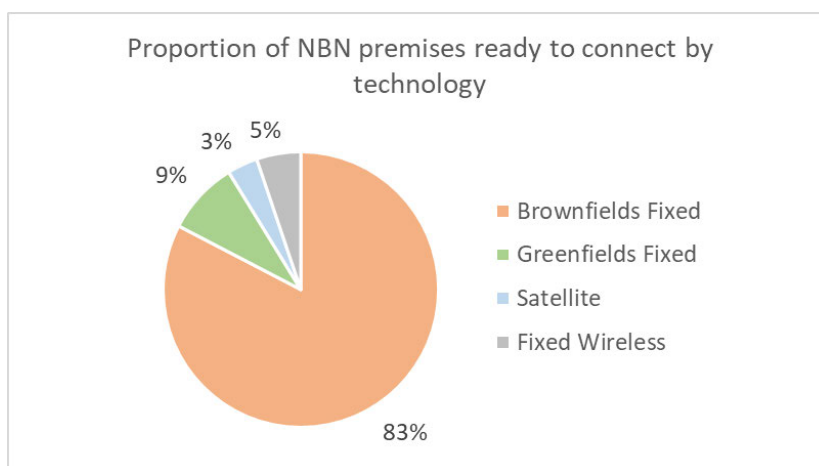In total, 92% are served by one of the fixed-line technologies.

Figure 3: Proportions of NBN services by technology

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[26] See http://www.digecon.havyatt.com.au/docs/0098.pdf , http://www.digecon.havyatt.com.au/docs/0088.pdf and http://www.digecon.havyatt.com.au/docs/0089.pdf

[27] See https://www.pm.gov.au/media/modern-digital-economy-secure-australias-future and https://digitaleconomy.pmc.gov.au/

At the time of writing, I have been unable to find details of the proportion of the brownfields services that are served by each of the technologies in use (FTTP, FTTN, FTTK and HFC). However, NBN Co says that 3.5 million premises can access speeds over 500 Mbps (this would include the 1 million greenfields premises). NBN has commenced a program to upgrade all fixed services to support speeds of up to 1 Gbps and has announced to date 2 million premises to be upgraded.[28]

The latest Statement of Expectations from Shareholder Ministers to NBN Co[29] says on this subject:

> *Within its capital constraints, NBN Co will continue to upgrade the network technologies to support retailers to meet demand from end users which exceeds these minimum requirements, including implementing current plans to expand access to peak download speeds of up to 1 gigabit per second.*

Apart from upgrades, there is also an issue of whether the fixed-line footprint should be extended. The original plans roughly included any community with 1000 premises or more. However, with further reductions in technology costs and experience effects, there is a case for extending coverage to communities with 500 premises or more.

As the Issues Paper notes, some customers still have fixed-line connections outside the NBN Co fixed-line footprint. Some of these customers are procuring a broadband service from Telstra using ADSL. It has been reported that Telstra is considering discontinuing these services.[30] These customers are likely to get a better broadband service by migrating to fixed wireless or satellite NBN, but given that NBN Co is offering FTTN, these services should be migrated to NBN Co.

> **Recommendation 4: The Committee include in its report a requirement that the NBN Co Statement of Expectations (SOE) be rewritten to specify a date by which all fixed-line premises can attain speeds of at least 500 Mbps. In addition, the SOE should include an expectation of an additional number of premises to be added to the brownfields coverage. Finally, the SOE should require the use of a four-port NTU.**

As noted in the Issues Paper, voice services in the NBN Co fixed-line footprint are now exclusively provided through voice over IP. Voice is now also delivered as voice over IP in mobile networks. There is no reason why voice in the fixed wireless NBN footprint shouldn't also be delivered as Voice over IP.

In areas served by Satellite infrastructure, the suggestions below that address latency would also make these services suitable for Voice over IP.

Most importantly, NBN Co will be the monopoly infrastructure provider for voice and broadband services well into the future. Even Kevin Rudd, who insisted that the NBN legislation included the provision for eventual privatisation, has now called for it to remain in Government ownership. Privatisation anywhere within the next two decades would crystallise financial losses and restrict the ability of the Government to further progress regional communications.

> **Recommendation 5: The Committee recommend that the privatisation provisions for the NBN be amended to prohibit any privatisation over the next twenty years, noting that such legislative change could be further amended in the future.**

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[28] https://www.nbnco.com.au/corporate-information/media-centre/media-statements/nbnco-announces-900000-more-homes-eligible-for-fibre-upgrade
[29] https://www.nbnco.com.au/content/dam/nbn/documents/about-nbn/policies/soe-shareholder-minister-letter-2021.pdf
[30] https://www.itnews.com.au/news/telstra-broaches-adsls-end-of-life-570516

Satellite Broadband Infrastructure Requirements

The Sky Muster satellites have served the community well. However, capacity constraints and propagation delays make it a less than satisfactory service. The various LEO constellations being competitively launched provide an opportunity for an upgrade path for the areas served by satellite.

The existence of multiple constellations prompts the question of whether future services can be competitively supplied. However, this perception ignores the additional costs inherent in making services available in regional areas of Australia. The two highest costs are installing ground stations through which the satellites connect to the internet and deploying material and support resources for installation.

Both of these result in significant economies of scale that far outweigh any prospective cost-benefit from competition. The existence of competing constellations does, however, create the opportunity to use 'competition for the market' in selecting a space segment provider.

An option would be to tender a multi-year contract for one firm to provide a new broadband satellite service for all Australian territories. However, a better option would be to seek an equity position in one of the operations to secure future requirements. Additionally, the Australian tender should cover the services for Australia and a service to cover every island nation in the Pacific and East Indian Ocean to be provided as a form of overseas aid to these regions.

The capability of broadband services delivered by LEOs becomes particularly relevant in providing coverage for mobile handsets in broadacre agriculture. Using Starlink as an example, the dish and wireless router are straightforward to set up.[31] The service is not mobile, but it is portable. Once set in location and turned on, it takes six or seven minutes for the dish to position itself. So, for example, a person doing fencing could have a Starlink on the roof of the vehicle and WiFi coverage in the vicinity of the vehicle. We will discuss under mobile some other options.

As a strategic investment in the Indo-Pacific region, this will be delivered far sooner and far more cheaply than new submarines. (It is not suggested that they are an alternative to the submarines).

> **Recommendation 6: The Committee research the prospect of a tender for broadband services from the LEO constellation providers. Depending on the outcome, consider recommending that such a tender process commence.**

Mobile Communications

Without doubt, the topic that has occupied more time for all the regional telecommunications inquiries and their predecessors is mobile services. The lower the population density, the less likely consumers will be with mobile coverage.

Appendix 1 provides copies of the coverage maps provided by each of the network operators. These graphically demonstrate the extent to which Telstra's coverage is more extensive than the other networks and the extent that others trail. In addition, these maps show the benefit of the ACCC's Regional Mobile Issues Forum and the networks' commitment to 'to improve coverage map comparability.' [32]

The other suggestion arising from the Forum to 'develop a co-building process for greenfield sites' is less likely to yield benefits. Apart from the fact that some coordination has been taking place through the Mobile Carriers Forum, a new base station is only of value to a network if it extends contiguous

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[31] https://www.youtube.com/watch?v=Sjo4Y6YjCi8
[32] This action in part responds to recommendation 2.1.3 of the Glasson Review, though the pathway to it was not the one included in the Government response. https://www.accc.gov.au/regulated-infrastructure/communications/mobile-services/regional-mobile-issues/industry-engagement-on-implementing-proposed-measures

coverage. Similar reasoning suggests that programs to extend coverage are really only effective when Telstra gets funded because they are more likely to get contiguous coverage from the black spot infrastructure.

The Glasson Review recommendation 2.1.2 read:

> *The Australian Government request the Australian Competition and Consumer Commission inquire into the merits of mandated terrestrial inter-carrier roaming in single carrier coverage areas in Australia to enable consumers to have a choice of provider.*

The Government response to the recommendation was:

> *The Government rejects this recommendation. Responsibility for administering the telecommunications access regime lies with the Australian Competition and Consumer Commission (ACCC). The ACCC has considered mobile roaming in the past and has already indicated it intends to monitor developments with respect to the provision of domestic inter-carrier roaming services, and may initiate a further inquiry should it receive information indicating that declaration of domestic intercarrier roaming service may be appropriate. The need for the action proposed by this recommendation is further diminished in light of the announcements by mobile phone carriers in 2008 of commercially negotiated roaming arrangements and of extensions to networks coverage across Australia.*

Notwithstanding that response, the ACCC commenced another inquiry into domestic mobile roaming in 2016, the third such inquiry following earlier reviews in 1998 and 2005.[33] Without going into all the details, the ACCC decided not to declare roaming as doing so did not meet the definition of the Long-Term Interests of Consumers. In particular, it failed on the efficiency criteria.

As noted above, the extent of coverage has become a core competitive feature of the industry. The greater extent of Telstra's coverage is something they zealously guard. They continue to invest in the edge of their network on base stations that would never be justified on the revenue earned from the use of those stations. The investments are justified by the externality of coverage reach and the premium they can charge as a consequence.

Were Telstra required to share access, the incentive to further extend coverage would fall away completely. An incentive could still exist if the price of access (what Optus and Vodafone had to pay Telstra) were to include the total value of the externality benefit Optus and Vodafone acquired as a consequence. However, such a pricing regime would not be acceptable to Optus and Vodafone, and they would likely not seek to activate access.

Infrastructure competition in mobiles is only viable because the number of base stations required is determined by the traffic volume rather than just physical coverage. That is, the criteria for a natural monopoly (that all output can be produced more cheaply by one provider than by two or more) doesn't apply.

The only way to extend regional coverage to ensure equitable access to the regional infrastructure is to acknowledge that there are geographic areas in which it is not feasible to operate two networks. That is, in regional areas, mobile coverage is a natural monopoly.

The same issues of the inadequacy of access regimes (competitors buying access to part of the service that they compete against the monopoly provider for) arose in fixed-line services. The remedy was to construct a structurally separated fixed-line network, the NBN.

The same solution now needs to be implemented in mobiles. The Government should create a fourth mobile network operator that it owns that will be a monopoly provider in the identified 'regional' zone.

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[33] https://www.accc.gov.au/regulated-infrastructure/communications/mobile-services/domestic-mobile-roaming-declaration-inquiry-2016

The entity will acquire the mobile assets of all the existing operators and merge these into one network. This network will not sell services to consumers but will only offer a roaming service to all three mobile operators on the same access terms.

There are additional coverage benefits in this model. The cost of individual base stations has declined dramatically over recent years, and the prospect for a land-holder to deploy mobile coverage across their property is now viable. This is similar to building owners and road tunnel owners investing in mobile coverage extension into their spaces. However, those tend just to be signal relaying investments, not bespoke infrastructure. This infrastructure can be utilised for voice and internet access and Internet of Things applications.

> **Recommendation 7: The Committee recommend that the Government resolve the regional coverage issue by building a monopoly regional mobile network that will provide roaming to all three retail networks.**

Summary and Conclusions

This, the fifth Regional Telecommunications Review, has the opportunity to break the cycle of reviews that have made little enduring impact on the framework of regional communications. The combination of the practical completion of the NBN, the recognition that the structure of mobile telecommunications will only be three providers without competing infrastructure in regional areas and the advent of new constellations of LEOs provide exciting opportunities for another bold step in improving regional communications.

The recommendations in this submission provide the framework for this opportunity. In summary, they are:

> **Recommendation 1: The Committee thoroughly review the needs for and benefits of communications services in regional Australia in this review.**
>
> **Recommendation 2: The Committee revisits the Glasson Review proposal for a new framework for ensuring service standards.**
>
> **Recommendation 3: The Committee detail expectations for the revitalisation of the development of communication delivered services such as telehealth and online learning.**
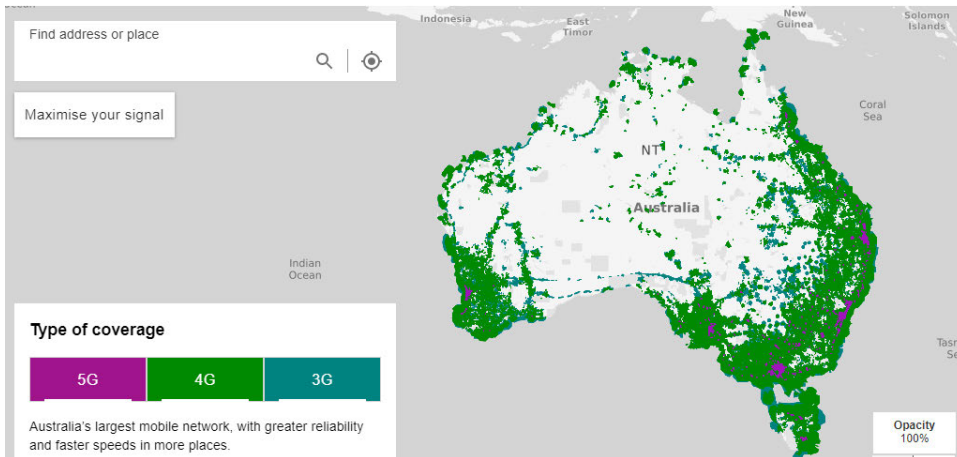>
> **Recommendation 4: The Committee include in its report a requirement that the NBN Co Statement of Expectations (SOE) be rewritten to specify a date by which all fixed-line premises can attain speeds of at least 500 Mbps. In addition, the SOE should include an expectation of an additional number of premises to be added to the brownfields coverage. Finally, the SOE should require the use of a four-port NTU.**
>
> **Recommendation 5: The Committee recommend that the privatisation provisions for the NBN be amended to prohibit any privatisation over the next twenty years, noting that such legislative change could be further amended in the future.**
>
> **Recommendation 6: The Committee research the prospect of a tender for broadband services from the LEO constellation providers. Depending on the outcome, consider recommending that such a tender process commence.**
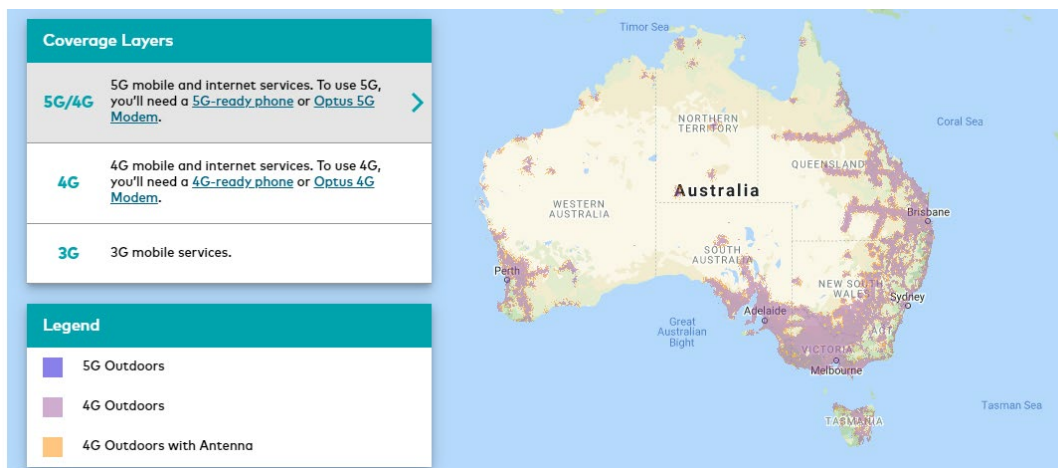>
> **Recommendation 7: The Committee recommend that the Government resolve the regional coverage issue by building a monopoly regional mobile network that will provide roaming to all three retail networks.**
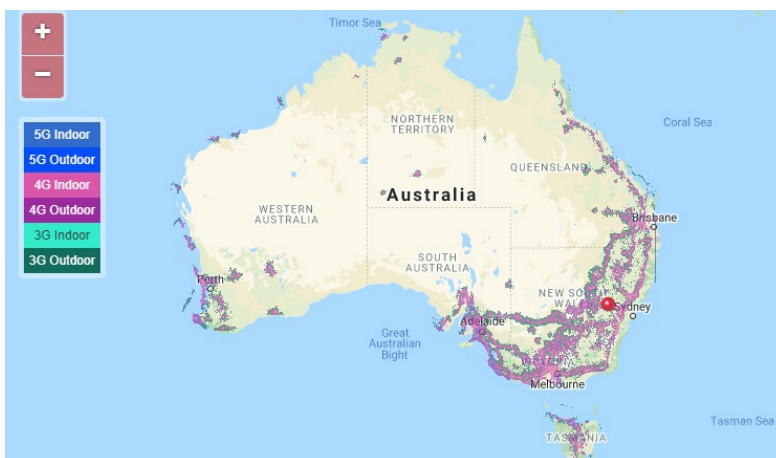
Appendix 1 –Mobile Network Coverage Maps

Telstra (Map Data © MapData Services Pty Ltd (MDS), PSMA)

https://www.telstra.com.au/coverage-networks/our-coverage

Optus (Map data ©2021 Google, INEGI) https://www.optus.com.au/about/network/coverage

Vodafone (Map data ©2021 Google, SK telecom) https://www.vodafone.com.au/network/coverage-checker