

Submission to Joint Standing Committee on the National Broadband Network (NBN)  
20-12-2019

Dear Committee

**Re: Inquiry into the business case for the NBN and the experiences of small businesses (due 17 Jan 2020)**

Thank you for this opportunity to put my personal thoughts on the record (but not representing my employer, Monash University nor ARDC). This is an important Inquiry on important topics with billions of dollars at stake. I intend to comment on, mainly:

- A The economics of the NBN, including operational and financial forecasts in Corporate Plan 2020-23
- F. The NBN Statement of Expectations and adequacy of that Statement (what I call the NBN Vision), in the context of
- How Australia's NBN compares to similar work around the world, but specifically with Australia's main (top 10) trading partners, and ITU/UNESCO's Broadband Commission (2019) work to drive NBNs globally to enable the sustainable development goals.

*"Broadband is the great infrastructure challenge of the early 21st century."* FCC (2010)

**Submission Summary**

The main points of my submission are:

- I am *optimistic* about the NBN's finances - that NBN will cover its costs and repay its loans, and have money left over to upgrade parts of the NBN, over the medium term (5-20 years). However the NBN speed performance compares poorly with both the OECD and our major Top 10 Trading Partners. Shortly in mid-2020, NBN Co will release gigabit services for consumers, which could significantly improve our national standing in comparative speed rankings.

**R1 Recommend** - encourage NBN gigabit services at affordable prices;

- NBN needs an updated Statement of Expectations which provides NBN Co with clear instructions how to spend the cashflow earned by NBN to progressively upgrade the network and to what standard of broadband Australia should aspire.

**R2 Recommend** - an updated bi-partisan Statement of Expectations (SoE) guide upgrading of the NBN network;

- NBN's post-build goals should take account of lessons from other countries; who is doing NBN well and who is doing it poorly? China provides an example of a highly used NBN, with over 250 million fast (over 100 mbps) connections, whereas the United States, with a light touch industry-led approach, has the next largest, but far smaller 30 million fast connections. China commenced its NBN as recently as 2013, but it is already now completed.

**R3 Recommend** - focus NBN Co on encouraging usage of NBN (post-build) ;

- To maximise the impact (value) of the NBN investment, more than speed is required. We need an NBN which is reliable, supported through quality services and ultimately provides high customer satisfaction to end users. The NBN Corporate Plan talks about but does not report on customer satisfaction. The ITU/UNESCO 2025 Broadband goals<sup>1</sup>

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<sup>1</sup> [https://www.broadbandcommission.org/Documents/BD\\_BB\\_Commission\\_2025%20Targets\\_430817\\_e.pdf](https://www.broadbandcommission.org/Documents/BD_BB_Commission_2025%20Targets_430817_e.pdf)

are a significant reference for how broadband is more than just speed - including NBN national network planning, affordability, usage, digital skills-building, digital financial services, and gender equity. Considering these factors will enhance end-user customer satisfaction.

**R4 Recommend** - NBN Co publish customer satisfaction results in its quarterly results, and provide customer satisfaction targets in Corporate Plans (by significant customer groups, including RSPs, rural, by technology such as FTTC, FTTP, FTTN, large businesses and small to medium businesses);

- Finally, the value of the NBN requires comparing Australia to others, but to whom? NBN Co Corporate Plans do not reference what other countries are doing. Our Top 10 Trading Partners account for 70-80% of Australia's exports and imports.

**R5 Recommend** - NBN Co Corporate Plans include a section on international comparisons of NBN plans and performance along key metrics for our Top 10 Trading Partners. Set Corporate Plan targets to reflect shareholder preference (preferably bi-partisan) for relative performance against Australia's Top 10 Trading Partners. See NBN Plans for these partners in Appendix 1.

## My background

I am an Innovation and Value researcher<sup>2</sup> (10% of my current time; 100% 2002-2011), and for the last two years have focussed on understanding the value of the NBN, particularly as a stimulus for national innovation activity. Previously my work in projects (1995 - 2003) and as a Chartered Accountant (1986 - 2003) has made me competent in financial and project analytics. My majority work (90%) is in a national innovation project (ARDC; 2011-19) whose vision is, similar to the NBN, "*to transform digital infrastructure to support leading edge research and innovation*", effectively enabling university and government research to thrive in the era of the internet. This is a part of a multi-billion dollar investment in next generation research infrastructure (NCRIS<sup>3</sup> 2005 - 2028). I previously provided a model<sup>4</sup> of NBN value to this Joint Committee for scenario planning.

I agree with Minister Fletcher who said recently, introducing the Telsoc NBN Future Forum<sup>5</sup>, Australia needs to "get [from NBN] the maximum social and economic impact from the [large investment] of taxpayer's money... [and work out] "how best to leverage this extraordinary national investment". Further, Shadow Minister Rowland, similarly said we need to "maximise the benefit of [NBN] investment now and in the future." It is great to see bi-partisan thinking on the NBN, and maximising its social and economic impact. To do this we need NBN Co to deliver high quality services to meet customer needs at affordable prices, to maximise NBN's value. This will meet the Statement of Expectations aim to "foster productivity and provide a platform for innovation in order to deliver economic and social benefits for all Australians"<sup>6</sup>. My recommendations argue for a greater focus on reporting NBN customer satisfaction (R4) (beyond Corporate Plan management incentive schemes), launching gigabit services at affordable prices (R1),

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<sup>2</sup> <http://au.linkedin.com/pub/richard-ferrers/27/b1/603>

<sup>3</sup> [https://docs.education.gov.au/system/files/doc/other/national\\_collaborative\\_research\\_infrastructure\\_strategy\\_executive\\_summary.pdf](https://docs.education.gov.au/system/files/doc/other/national_collaborative_research_infrastructure_strategy_executive_summary.pdf)

<sup>4</sup> <https://doi.org/10.6084/m9.figshare.6030926.v6>

<sup>5</sup> <https://telsoc.org/event/nbn-future-forum>

<sup>6</sup> <https://www2.nbnco.com.au/content/dam/nbnco2/2018/documents/Policies/soe-shareholder-minister-letter.pdf>

continuing to invest to enhance the network (R2), encouraging NBN usage (R3) and comparing ourselves to our major trading partner's broadband approaches (R5). I now address these under each of the inquiry items:

*a. the economics of the NBN, including key operational and financial performance forecasts in the Corporate Plan 2020-23;*

The Corporate Plan is a thorough and well argued short term approach for NBN. Based on the current Corporate Plan 2020-23, NBN Co predicts reaching \$5 - 6 billion in annual revenue, enough to generate a cash profit (EBITDA) of \$2-3 billion per annum. This can be spent on interest on their \$20B loan, debt repayments or capital enhancements (CAPEX), even dividends on the governments \$30B investment. The best use of the funds is to maximise the value of the NBN, which is made up of the sales generated by users, and the customer satisfaction those sales generate. These sales will in turn generate productive activity in the economy (GDP), estimated by NBN Co to reach \$10B per annum, significantly more than the financial return (EBITDA) earned by NBN Co.

I have been tracking NBN Corporate Plans over the last few years, and note the considerable uncertainty from one plan to the next. Only in the last plan (2020 vs 2019), was there close alignment with the predictions from the year before. See graphical analysis at Ferrers (2019). The Corporate Plans provide a good level of detail, but lack (1) information about customer satisfaction - an important indicator of future revenue stability and (2) sufficient detail about future products of interest to NBN customers, to inspire customer interest and promote NBN as innovative. Innovation is bringing new services to customers that enhance their lives, and the NBN Corporate Plan as a "platform for innovation" should do more to inspire, for instance through the exciting possibilities of gigabit services, and its applications such as Augmented Reality.

High value is also possible through falling prices, or higher performance. Broadband (and particularly fibre optics) is an example of a technology which has seen an explosion of performance since the 1970s of over 100 million times (Ferrers 2016<sup>7</sup>), while even FTTN has seen large improvements. Mapping a future services roadmap in the Corporate Plan can excite Australians about their NBN, if they can see high value.

**R1 Recommend:** Launch gigabit services at affordable prices - excite customers with high value product roadmap, showing increased performance and falling prices.

**R4 Recommend:** Publish customer satisfaction targets in Corporate Plan and metrics in quarterly reporting.

*b. Current pricing structure, including wholesale pricing, affordability and take-up, particularly as they relate to low-income and rural and regional customers*

Good prices keep customers happy, when they feel they get value for money. I am very happy with my \$60 per month, unlimited data 50mbps (HFC) service, and quite interested in a \$120 retail gigabit service (but my wife would never agree to double our internet bill). I am less interested in an \$800 per month business gigabit service, even though we have a small business at home (\$10,000 annual turnover). NBN is likely affordable for the 75% of customers forecast in the Corporate Plan, but not for the last 25%.

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<sup>7</sup> <http://dx.doi.org/10.18080/ajtde.v4n2.55>

Further to ACCAN<sup>8</sup> submissions, we need low prices to reach the last 25% of customers, such as a HealthCare card 50% discount, on what I am happy to pay, for the same service. There is even an argument for free basic NBN (at least for a trial period) in some places, such as remote communities or disadvantaged communities, as an introduction to the potential of broadband. And we need support for elderly to help them use new technology (consistent with ITU/ UNESCO Broadband 2025 goals), like I help my 90 plus father-in-law. NBN should enable better in-home services, and NBN Co has some responsibility for being a catalyst for that. Enabling an army of tech-savvy teens to help their neighbours would be a virtuous nation-building exercise, should NBN take up the challenge.

**R1 Recommend:** Launch gigabit services at affordable prices, but push down lowest tier prices, for the disadvantaged to experience world-class broadband services.

**R3 Recommend:** Encourage NBN usage, especially for the disadvantaged, the last 25%, the elderly, renters.

*c. Network coverage issues, including reporting of outages planned and unplanned*

The Statement of Expectations requires NBN to “ensure a high quality end user experience... through ongoing service periods” so network reliability goes without saying. An unreliable service is a low value, low use service. NBN should provide a high quality service including fallbacks when network service is interrupted, such as texting or emailing a mobile account to notify of outages, and service resumption, or providing an equivalent web service as used by power providers. Even in the case of natural disasters such as the recent bushfires, NBN Co contingencies should be transparent to customers, who will reward NBN Co with high satisfaction and ongoing revenue.

**R4 Recommend:** Publish customer satisfaction targets in Corporate Plan and metrics in quarterly reporting by major customer groups.

*d. the delivery of the business segment strategy, including to enterprise and government customers and small to medium businesses*

*e. The experiences of small and medium businesses in relation to the utilisation, accessibility, customer service and affordability of the NBN;*

While NBN may argue, they do no control the entire consumer experience (as some responsibility rests with retailers) or must remain secret (commercial-in-confidence) yet is a key top level aspect of management STI (short term incentives, per Corporate Plan, Annual Report), NBN according to the Statement of Expectations “requires a high degree of transparency.” NBN is a national project with \$50 billion of public taxpayer funds who have over six million customers, many whom are unhappy, even from the first seven submissions to this Committee. Therefore, NBN Co must bite the bullet and report, even if in aggregate, even if de-identified, levels of customer satisfaction, including businesses, including quotes about levels of service and problems, for the nation to consume.

**R4 Recommend:** Publish customer satisfaction targets in Corporate Plan and metrics in quarterly reporting by major customer groups.

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<sup>8</sup> <https://accan.org.au/our-work/1655-urgent-need-to-address-broadband-affordability-accan>

*f. Compliance with the NBN Statement of Expectations and the adequacy of that statement;*

The Statement of Expectations (SoE) has served NBN well during the build phase, but now has three deficiencies moving forward. First, the SoE does not guide the NBN how to spend its profit it earns from lots of satisfied customers, nor the balance of returning profits to owners or paying down debt or upgrading the network. The NBN goal to “lift the digital capability of the nation” (NBN Co Corporate Plan 2020-23, p.4) similarly does not guide the choice. Secondly, the SoE does not provide an end target, post-build, for the NBN to aspire to, besides “ensuring that all Australians have access to very fast broadband.” Thirdly, the SoE is not bi-partisan, so after an election the SoE could change, distracting from secure medium to long term NBN network planning.

A possible approach is to benchmark our NBN against other countries, such as our major trading partners. In Appendix 1, I list the NBN Plans for our major trading partners. In Appendix 2, I report a comparison of Australia’s NBN to the OECD and in Appendix 3, our major Trading Partners. Completing the NBN will lift us from close to the bottom, to mid-range, according to the latest OECD (2018)<sup>9</sup> broadband reporting. However, the monthly Speedtest reporting (Ookla 2019), ranks us nearly at the bottom of current download speeds, except for India, amongst our major Trading Partners (see Appendix 4). The good news is the introduction of gigabit services in mid-2020, if paired with affordable prices (see Appendix 5) can easily bring us up alongside New Zealand (who already has 10% gigabit usage), Japan (who already has 99% fibre coverage) or China (who has 77% of users on over 100 megabit services; some 250 million fast broadband users).

**R2 Recommend:** Continue to invest to enhance the network, according to a clear (preferably bi-partisan) plan, agreed in a new post-build SoE.

**R5 Recommend:** Comparing NBN performance and targets to our major trading partner's broadband approaches, and shareholders (preferably bi-partisan) preference for our position amongst those peers, and report that analysis in annual Corporate Plans.

**Afterword.** Comparing US and China - China has a vast number of fast broadband users

Perhaps the biggest shock in this international comparison analysis is how China has rushed ahead in the last few years pursuing an aggressive fibre rollout, and how this compares to the US approach. China and the US have similar availability of fast (over 100Mbps) broadband with around 90% access to these speeds (FCC 2019<sup>10</sup> p.21, CNNIC 2019<sup>11</sup>, p.11). What is noticeably different is the usage of these services. Using the latest 2018 OECD results, US has 10 subscriptions to fast broadband per 100 people. China has now close to double that figure in 2018 (18 per 100 people) and even more in its latest report (21 per 100 people). Australia in contrast has close to 0%<sup>12</sup> of connections over 100Mbps.

US growth in fast broadband has now exceeded Japan and South Korea (who reported last in 2016), with close to 30M connections over 100Mbps. But when you add in China,

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<sup>9</sup> <http://www.oecd.org/internet/broadband/broadband-statistics/>

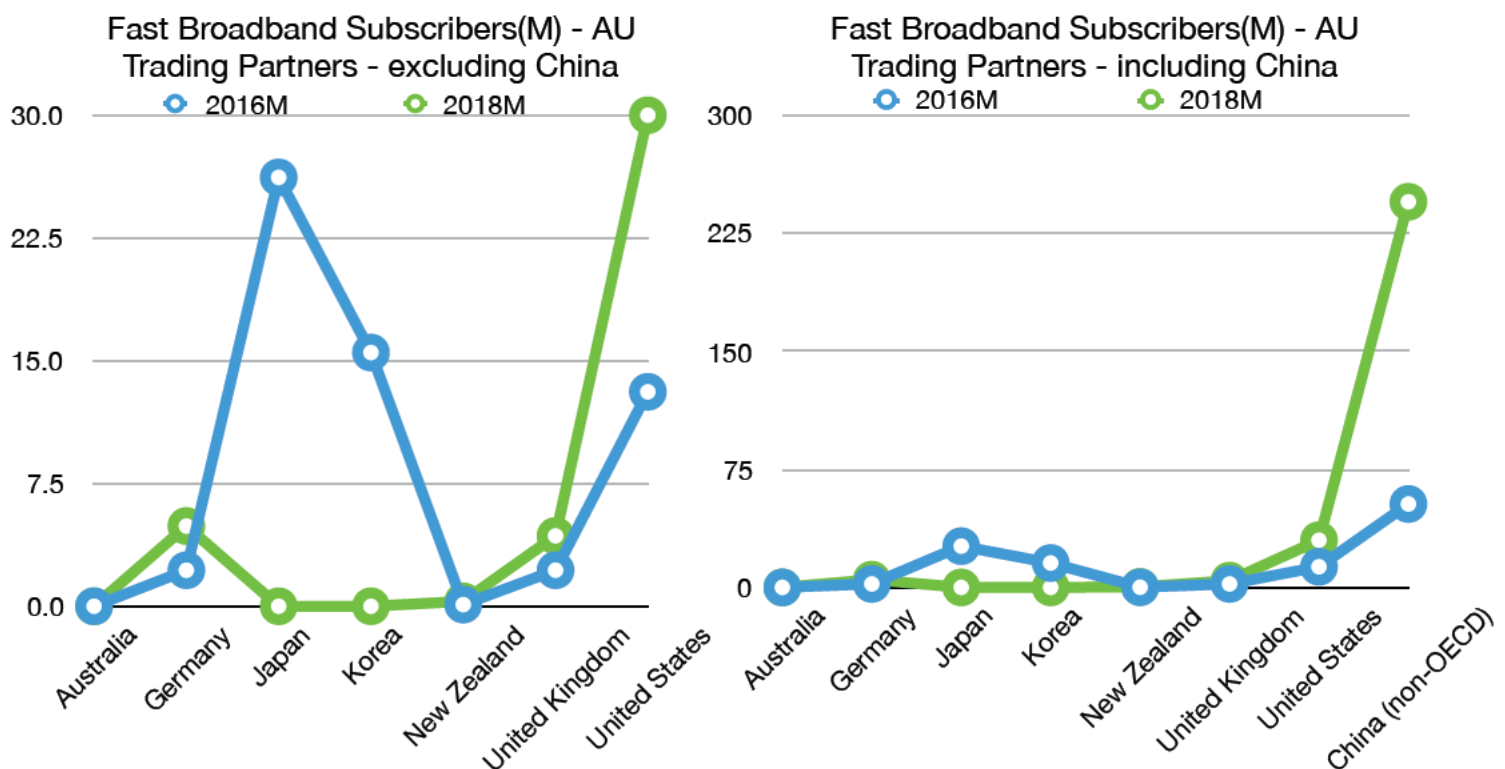
<sup>10</sup> <https://docs.fcc.gov/public/attachments/FCC-19-44A1.pdf>

<sup>11</sup> <https://cnnic.com.cn/IDR/ReportDownloads/>

<sup>12</sup> <https://twitter.com/ValueMgmt/status/1148379091206205440>

the other Australian trading partners are dwarfed by the substantial number of fast broadband users there. Some 396M fibre connections, China reports<sup>13</sup> in 2019, are now in use, with 77% of users, accessing at or over 100Mbps. A total fast broadband user base, now in China, in excess of 250M subscriptions, while the US has 30M and the rest of the OECD less than 50M (with the majority in Europe - about 40M).

NBN Co need to run a high value, affordable, reliable, customer satisfying network which as the SOE says “foster[s] productivity and provide[s] a platform for innovation.” We cannot let a \$50 billion investment sit idle, where only 10 out of 100 people use the network to its best capacity. We must take the necessary steps to engage Australia, to train Australia, to lift Australia into a better fast broadband future.



**Figure 1a, b:** OECD 2016, 2018, CNNIC 2019 - Fast ( $\geq 100$ mbps) broadband subscribers - Australia's major trading partners. China now vastly outnumbers US and others for fast broadband users. NB: Japan and Korea data not available for 2018.

**R3 Recommend:** Encourage NBN usage, as the SEO says, of “economic and social benefits for all Australians”.

*g. any other related matters.* Nil

For the summary of my recommendations, see the front of this submission. Thank you for this opportunity to contribute, and I am happy to respond to any questions you might have. And thank you to the Telsoc NBN Futures Project for their NBN conversations and feedback on the international analysis.

Richard Ferrers | @valuemgmt | Melbourne | January 2020

<sup>13</sup> <https://cnnic.com.cn/IDR/ReportDownloads/>

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OECD (2018) Broadband Portal. Viewed online at: <http://www.oecd.org/internet/broadband/broadband-statistics/>. Also at: <https://doi.org/10.6084/m9.figshare.8116079.v5>.

Ookla (2019). Speedtest Global Index. Viewed online at: <https://www.speedtest.net/global-index> (Dec 2017; <https://web.archive.org/web/20180122151833/https://www.speedtest.net/global-index>)

## Appendix 1 - Australia's Major (Top 10) trading partners, National Broadband Plans

Country	NBN Plan
<b>Australia</b>	All Australians have access to very fast broadband to as soon as possible, at affordable prices, and at least cost to taxpayers. NBN Co (2019) "At least 25mbps to all premises and at least 50mbps to 90% of fixed line premises" <a href="#">NBN Statement of Expectations 2016</a>
<b>China</b>	By 2020, 70% of urban have 50mbps, 50% at 100mbps, plus some gigabit. CNNiC (p.56) - <a href="#">2013 China Broadband Strategy and Implementation Plan</a>
<b>Germany</b>	100% coverage with 50mbps by 2018. <a href="#">EU Digital Economy and Society Index</a> (p.37) By 2025, nationwide expansion with gigabit networks "in every region, and every municipality, if possible directly to the house" Coalition Agreement 2018.
<b>India</b>	Universal coverage at 50mbps by 2022, plus connecting 250,000 villages (Gram Panchayat) to 1Gbps (2020, multi-gigabit by 2022). India - <a href="#">National Digital Communications Policy 2018</a> (p.6)
<b>Japan</b>	Currently has 98% full-fibre coverage. Fig 1.26, Ofcom <a href="#">International Broadband Scorecard 2018</a>
<b>New Zealand</b>	75% of population access to fibre at 100mbps by 2019 - Ultra-Fast Broadband (UFB+ expanded coverage to 87% by 2022) and Rural Broadband Initiative, to bring 5mbps to 86% of rural customers by 2016. <a href="#">Wikipedia</a>
<b>South Korea</b>	Aim to have 50% coverage to multi-gigabit (10gbps) by 2022. Currently has 99% full fibre coverage. Fig 1.26, Ofcom <a href="#">International Broadband Scorecard 2018</a> Ultra Broadband Convergence Network (2009) 1Gbps for wired premises, 10mbps for mobile.
<b>Thailand</b>	Cities to have min 100mbps by 2020, plus broadband to 95% by 2020 "with standard quality and affordable fee" <a href="#">Thailand 4.0 National Broadband Policy 2015</a>
<b>United Kingdom</b>	"Full fibre rollout to 15 million premises (about 55%) by 2025, and 100% fibre coverage by 2033" <a href="#">EU Digital Economy and Society Index</a> (p.37)
<b>United States</b>	100M households (about 80%) to have affordable access to 100mbps by 2020, plus "fastest most extensive wireless of any nation" plus "every American community should have affordable access to at least 1gbps to ... schools, hospitals and government buildings" p.xiv. FCC (2010) <i>Connecting America Report</i> .
<b>UNESCO / ITU Broadband Commission</b>	<a href="#">2025 Targets</a> - Meaningful Universal Connectivity "Broadband adoption that is not just available, accessible, relevant and affordable, but also connectivity that is safe, trusted, empowering users and leading to positive impact." 1. By 2025, all countries should have a funded National Broadband Plan or strategy 2. By 2025, entry-level broadband should be made affordable.. at less than 2% GNI (about AUD80 per month) 3. By 2025, broadband internet penetration should reach a) 75% worldwide... 4. Digital literacy. 5. Digital Financial Services 6. Getting business online. 7. Gender equality

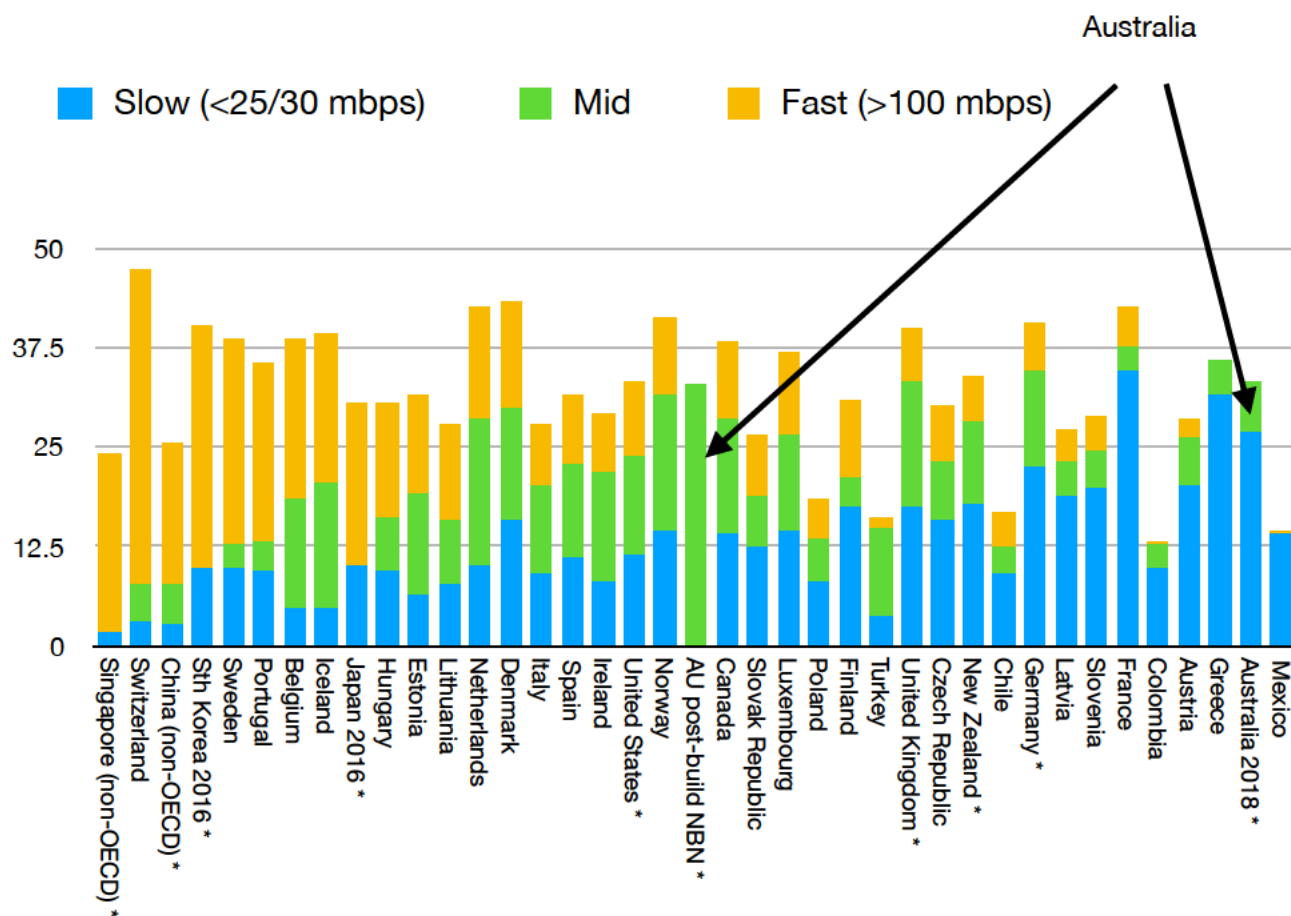
**Table 1:** National Broadband Plans for Australia's Major Trading partners

**Source: International NBNs** - UNESCO/ITU Broadband Commission - [https://broadbandcommission.org/Documents/ITU\\_BroadbandPlans\\_2019.pdf](https://broadbandcommission.org/Documents/ITU_BroadbandPlans_2019.pdf)

**Source:** Australia's Top 10 Trading Partners - <https://oec.world/en/profile/country/aus/>



## Appendix 2 - Comparing Australia's broadband to OECD (2018).



**Figure 2:** OECD 2018<sup>14</sup> (latest) Reported Internet Usage Speeds - Fixed broadband subscriptions per 100 population. Many countries have fast broadband (over 100mbps), but not Australia. Post-build NBN moves Australia to middle of OECD broadband speeds. Sorted by average speed - fast left, slow right.  
NB: Top 10 Trading Partners indicated by \* (asterisk).  
(Data Source: - OECD Broadband Portal, Singapore and China government reporting)

In Figure 2, Australia's broadband speeds reported to the OECD in 2018 rank second last (Ave 21mbps) in the OECD, only ahead of Mexico. Australia has no measurable fast users (over 100mbps), while nearly all other OECD countries do, significantly lifting their average speed. When NBN is completed, then nearly all premises will have access to mid speed services (over 25mbps), bringing its average closer to 50mbps. Just looking at Australia's OECD major trading partners (Figure 3, Appendix 3), Australia in 2018 remains at the bottom by average speed. After NBN completion Australia moves to middle of the pack with an all green 50mbps average.

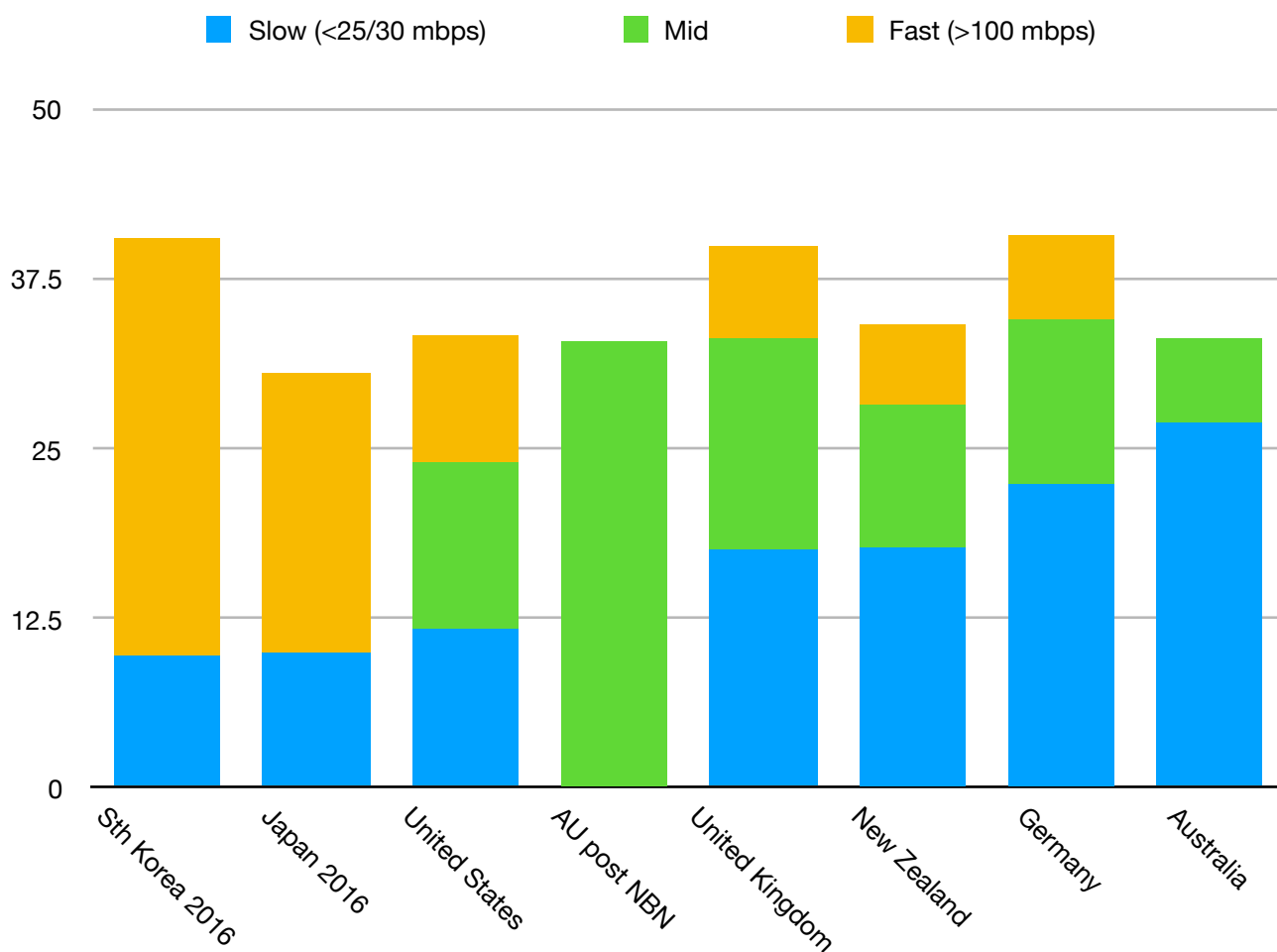
<sup>14</sup> <https://doi.org/10.6084/m9.figshare.8116079.v5>

### Appendix 3 - Comparing Australia's NBN to Top 10 Trading Partners - OECD.

BB2018-OECD-byspeed - Fixed Broadband per 100 people

Who	>1.5/2 Mbps Slow	>10 Mbps Slow	>25/30 Mbps Mid	>100 Mbps Fast	Slow	Mid	Fast	Avg
Sth Korea 2016	9.8	0	0	30.7	9.8	0	30.7	77.0
Japan 2016	10.0	0	0	20.6	10	0	20.6	69.0
United States	5.3	6.3	12.4	9.4	11.6	12.4	9.4	51.3
AU post-build NBN	0	0	33	0	0	33	0	50.0
United Kingdom	1.2	16.4	15.6	6.8	17.6	15.6	6.8	44.9
New Zealand	0.3	17.4	10.6	5.8	17.7	10.6	5.8	42.8
Germany	6.5	15.9	12.2	6.1	22.4	12.2	6.1	38.6
Australia 2018	9.2	17.8	6.2	0.0	27.0	6.2	0.0	21.4

**Table 2:** OECD broadband speeds - Australia's major OECD Trading Partners



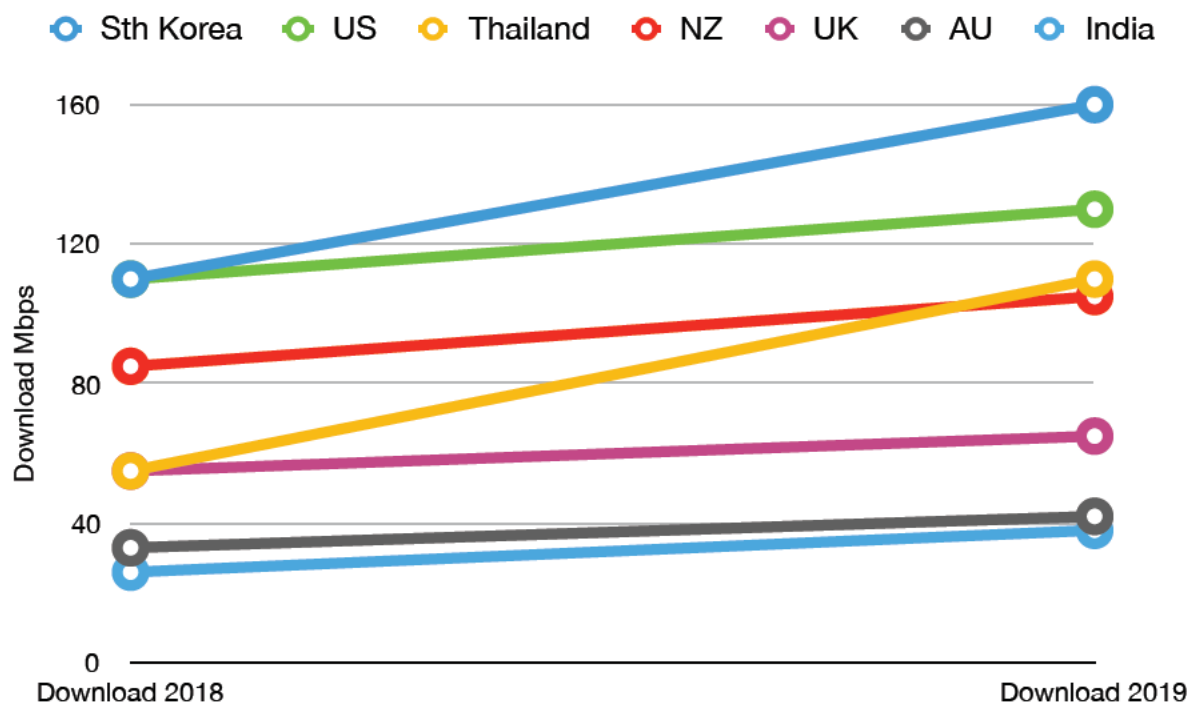
**Figure 3:** OECD 2018 Reported Internet Usage - Subscriptions per 100 - Australia's OECD Major Trading Partners. Sorted by average download speed (left fast, right slow).

#### Appendix 4 - Comparing 2019 - 2018 Download speeds - Top 10 Trading Partners.

Ookla Average Download speeds (Mbps) - Australia major trading partners

Country	Download Dec 2018 (Mbps)	Download Dec 2019 (Mbps)	Growth% (rounded)	Growth Jump (Mbps)
1.Singapore (^)	200	190	0	0
2.Sth Korea	110	160	50*	50
3.US	110	130	20	20
4.Thailand	55	110	100	55
5.NZ	85	105	20	20
6.Japan (^)	100	105	0	0
7.China (^)	85	100	20	20
8.Germany (^)	65	80	20	20
9.UK	55	65	20	10
AU	33	42	30	10
10.India	26	38	50	10

**Table 3:** Download averages 2018-19 - Australia's Major Trading Partners - Ookla Global



**Figure 4:** Australia (selected) Trading Partners - average download speed - growth 2019 vs 2018

**Source:** Ookla Global Index (2019)

NB: (^) Some countries excluded for simplicity, Singapore/Japan (0% growth), China, Germany( close to New Zealand, all had a 20mbps jump).

NB\*: South Korea fell in 2017 from 130mbps, so two year growth was only 10%.

What Table 3 and Figure 4 show is that Australia is towards the bottom with slower average download than all our major (Top 10) Trading Partners, except for India. However some countries can accelerate quickly. For example, Thailand's average speed grew 100% over the 2018-19 year, while South Korea and India 50%, while Australia grew 30%. Australia can quickly catch up through adding gigabit services, which are due to launch in the first half of 2020.

## Appendix 5 - Impact on Australian Speed Rankings of Usage of Gigabit Services.

Impact of Gigabit services on NBN average speed - Subs per 100 pp

Scenario	Slow	Mid	Fast	Very Fast (Gbps)	Avg (Mbps)	Ookla Rank 2019 - AU Top 10 trading partners	OECD 2018 rank
<b>Australia 2018</b>	27	6.2	0	0	21.4	10 / 11	35 / 36
<b>AU post NBN</b>	0	33	0	0	50	10 / 11	18 / 36
<b>5% gigabit</b>	0	31.35	0	1.65	97.5	7th=	1 / 36
<b>10% gigabit</b>	0	29.7	0	3.3	145	3rd	1 / 36
<b>20% gigabit</b>	0	26.4	0	6.6	240	1st	1 / 36

**Table 4:** Adding Gigabit services, significantly increases national average speeds and Ookla ranking (Table 3, Appendix 4), impact on OECD (2018) ranking (Figure 2, Appendix 2).

With the launch of affordable gigabit service, in mid-2020, for around 50% of the NBN (FTTP, FTTC, HFC), Australia potentially can leap forward, if you measure performance based on national average speed. Averages (even national ones) are sensitive to addition of high performing gigabit services which can significantly shift average speeds. With 10% of users taking up gigabit services, Australia's average speed would jump to around 145mbps (moving Australia to 3rd equal of 10), close to the top of speeds of our Trading Partners (Appendix 4, Table 3), and with 20% of users taking up gigabit, average would surge to over 200mbps, the top of the table (1st of ten major trading partners), even though 80% of users did not change their speed. Since gigabit is so much faster than the next speed with any material number of users (100mbps), only a quite small number of users significantly shifts the national average.

A 10% take-up of gigabit services is the current usage level in New Zealand (MBIE 2019<sup>15</sup>, p.6), so is not unrealistic for Australia, even within one to two years of availability of service. Thailand's recent 100% rise in average download speeds suggest release of something like a gigabit service. An Australian take-up of only 5% of gigabit services would see a similar 100% rise in average download speeds to a national average close to 100mbps, similar to NZ, Thailand, China and Japan (4th equal of ten trading partners), even though 95% of NBN users did not change their service. A 5% take-up in Australia is about 400,000 users, a figure quite possible if gigabit services were priced attractively.

<sup>15</sup> <https://www.mbie.govt.nz/assets/quarterly-connectivity-update-1-july-to-30-september-2019.pdf>