

## **The End of Australia's National Broadband Network?**

**June 2016**

Lucia Gamboa Sorensen and Andrew Medina

# THE END OF AUSTRALIA'S NATIONAL BROADBAND NETWORK?\*

Lucia Gamboa Sorensen<sup>†</sup>

Andrew Medina<sup>‡</sup>

July 12, 2016

---

\* The views in this paper are the authors' only and do not necessarily reflect those of the authors' fellowship sponsor, TPI, its staff, or its board.

<sup>†</sup> Lucia Gamboa is an MPP student at the LBJ School of Public Policy and a 2016 Google Policy Fellow at the Technology Policy Institute. Contact: [luciagamboa@gmail.com](mailto:luciagamboa@gmail.com)

<sup>‡</sup> Andrew Medina recently received his BA from Harvard University and was a 2015 Google Policy Fellow at the Technology Policy Institute.

## ABSTRACT

Australia's National Broadband Network (NBN) is the largest public sector investment in broadband to replace existing copper infrastructure with fiber. Government decided to build and operate a wholesale network to encourage competition on that retail fixed broadband and achieve faster infrastructure buildout with higher quality and lower retail prices. The NBN aimed to connect 93 percent of Australian households and businesses (13 million premises) to a wholesale fiber-to-the-premises (FTTP) but downgraded to fiber-to-the-node (FTTN) as a result of escalating costs and political change. In further attempts to bring down the cost and adopt a more deliverable strategy, the current administration is considering a gradual sell-off of the NBN network.

Six years after its start the overall outcome has not been positive. This report finds that since NBN implementation coverage and adoption rates have slowed for fixed broadband and mobile broadband growth has remained relatively constant despite increased investment. Australians continue to experience low quality services due to low speeds, higher prices relative to other countries and a slowing rate of price decrease for internet services in the past eight years. Fixed retail market concentration has not changed significantly since the NBN began operation and has slightly increased in the mobile market. Finally, this research suggests that faster mobile connection speeds are changing consumer patterns to perceive mobile as a substitute for fixed broadband.

The Australian case reveals how state owned broadband might not be the best answer to meet full coverage and competition objectives. The NBN is an example of an intrusive policy subject to political pressures that has resulted in inefficiencies that distort consumer patterns and investment decisions without changing the competitive landscape.

## TABLE OF CONTENTS

Abstract	2
<b>INTRODUCTION</b>	<b>4</b>
Incremental Reforms	5
Initial Concerns	7
<b>COVERAGE</b>	<b>8</b>
Figure 1. Changes in Rollout Targets	9
Figure 2. Target vs Actual NBN Coverage	10
Figure 3. Broadband Internet Subscribers by Network	11
<b>QUALITY</b>	<b>12</b>
Figure 4. Fixed Broadband Quality Distribution	12
Prices	13
Figure 5. Internet Service Price Index	14
Speed	14
Figure 6. Actual Download Speeds, OECD Countries, 4Q 2015	15
Figure 7. Broadband Adoption Rates by Speed	16
<b>MARKET CONCENTRATION</b>	<b>17</b>
Figure 8. Retail fixed broadband market shares	17
Figure 9. Mobile Market Concentration vs Subscriber Growth	18
<b>INVESTMENT</b>	<b>18</b>
Figure 10. Connections by Technology	19
Figure 11. LTE Connections by ISP	20
<b>THE FLIGHT TO MOBILE – WHAT DOES IT MEAN FOR THE NBN?</b>	<b>21</b>

## INTRODUCTION

In 2009 Australia allocated AUD 40.7 billion (approximately USD 33 billion) to a National Broadband Network (NBN) to replace its existing copper infrastructure. This amount would have represented the largest public sector investment in broadband infrastructure in the world as a share of GDP and the largest infrastructure project ever in Australia.<sup>1</sup>

The NBN aimed to connect 93 percent of Australian households and businesses (13 million premises) to a wholesale fiber-to-the-premises (FTTP) network with minimum connection speeds of 25Mbps and up to 100Mbps by 2016,<sup>2</sup> and the remaining 7 percent via wireless and satellite. Construction began with a trial rollout in Tasmania on July 2010 with overall project completion initially planned for 2021.<sup>3</sup> By the end of 2015 the average connection speed was 8.2Mbps with only 9 percent of premises ready for service.<sup>4</sup> Only 6.4 percent of broadband subscriptions were fiber connections.<sup>5</sup>

State intervention is justified when market failure exists and the proposed intervention yields benefits that are expected to exceed the costs. Countries have experimented with different intervention models for increased broadband coverage with mixed results. Australia's wholesale government-owned broadband is among the most interventionist while other countries, such as the United States, have opted for a more hands-off approach. Australia chose to have the government build and operate a wholesale network while encouraging retail competition on that network. The government justified its decision to limit competition for the NBN by the size of the country and its relatively low population density, which, it claimed, makes it difficult for more than one fixed telecommunications network to exist.<sup>6</sup>

---

<sup>1</sup> The initial peak equity requirement was estimated at AUD 27.5bn and debt funding estimated at AUD 13.4bn for a total funding requirement of AUD 40.7bn. Allen & Overy, *The Impact of the Australian National Broadband Network on the Communications Sector: A Forensic View*, (2011).

<sup>2</sup> The Coalition's NBN FTTP proposal stated that all premises would have access to 25Mbps to 100Mbps download speeds by the end of 2016, rising to 50Mbps by the end of 2019, for 90 per cent of fixed line users. Liberal Party of Australia (LPA), *'Fast. Affordable. Sooner. The Coalition's plan for a better NBN'*, accessed 14 June 2016.

<sup>3</sup> "NBN Budget Review 2013-14," Parliament of Australia, January 10, 2014, accessed June 10, 2016.

<sup>4</sup> Akamai Technologies, *State of the Internet Q4 2015 Report*, (2016), 8 (4); NBN Co, *Corporate Plan 2016*, (2015).

<sup>5</sup> OECD Broadband Portal, June 2015.

<sup>6</sup> OECD, *OECD Economic Surveys: Australia 2010*, (Paris: OECD Publishing, 2010).

Australia and others who favor extensive government involvement believed that this approach would yield faster infrastructure buildout with higher quality and lower retail prices. Mid-way through its implementation time frame, has the NBN increased coverage rates, stimulated investment and improved Australia's competitive landscape? This paper analyzes internet subscriber growth, changes in prices and speed in fixed and mobile markets, market concentration and investment to answer this question.

The weight of the evidence suggests that the outcome has not been good. The details, however, are nuanced. Since NBN's implementation, coverage and adoption rates have slowed for fixed broadband while mobile broadband growth has remained relatively constant. Australians experience low quality services due to low speeds that can be associated with a slow fiber-to-the-node (FTTN)/FTTP rollout, higher prices relative to other countries and a slowing rate of price decrease for internet services in the past eight years. Fixed retail market concentration has not changed significantly since the NBN began operation and has slightly increased in the mobile market. Finally, it appears that faster mobile connection speeds are changing consumer patterns as consumers perceive mobile as a substitute for fixed broadband.

The Australian Competition and Consumer Commission (ACCC) believes that the increasing data demand is driving competition and better service offerings.<sup>7</sup> While consumer demand can help encourage entry and result in lower prices, this paper finds that this has not been the case.

## **INCREMENTAL REFORMS**

Australia's telecommunication sector was state-owned until the Telecommunications Act of 1991 introduced limited competition in fixed and wireless services. Telstra was formed in 1992 from the merger of the two largest state-owned telecom providers at the time, Telecom Australia and the Overseas Telecommunications Commission. After 1991, Optus Communications entered both markets to compete against state owned Telstra and Vodafone entered the mobile market.

Telstra's privatization began in November 1997 under a new Telecommunications Act when the government sold 30 percent of its share. In October 1999 it sold a further 16.6 percent,

---

<sup>7</sup> ACCC, *Telecommunications Report 2014-15*, (April 21, 2016), accessed June 10, 2016.

and the final stake was sold in November 2006. Hutchison Australia entered the 3G wireless network in 2003 but merged with Vodafone in 2009, returning to a three operator market.<sup>8</sup>

NBN Co Limited was created as a government-owned entity to design, build, and operate the NBN through a wholesale-only open access network with uniform pricing.<sup>9</sup> The Government entered into an equity arrangement with NBN Co based on the AUD 27.5 billion investment in hope to provide NBN Co and the market with the certainty required to deliver NBN's policy objectives.<sup>10</sup> Wholesale open access is not new to Australia; however, it is to the extent that it is publicly funded and gives NBN Co a virtual monopoly over the provision of wholesale infrastructure.<sup>11</sup>

Mandatory wholesale access is intended to improve retail competition by having the incumbent provide the underlying infrastructure and other companies offering retail service over that infrastructure. If the end is to benefit consumers, the plan must be evaluated in terms of coverage, price, and improved quality to consumers. This paper will analyze how well the NBN has met its policy objectives to increase retail competition and whether that has led to better quality and reduced consumer prices of broadband services.

Incremental reforms resulted in a highly concentrated market, a situation that the NBN has not changed. Broadband market shares reflect Telstra's dominance with 41 percent in the fixed retail market and 51 percent of the mobile broadband market. Greater convergence in broadband markets is further challenging the NBN attempt to increase competition for fixed broadband services. The following sections analyze NBN's performance thus far in terms of connectivity, quality of services and market concentration. First, three overall concerns are outlined.

---

<sup>8</sup> Joshua S. Gans & Stephen P. King, "'Big bang' Telecommunications Reform," *Australian Economic Review* 43, no. 2 (June 2010).

<sup>9</sup> Open access generally refers to mandated, transparent, non-discriminatory and effective wholesale access to broadband network(s) as a condition for being awarded subsidies and is usually used as a synonym of "effective wholesale access".

<sup>10</sup> Minister for Finance and Deregulation and Minister for Broadband Communications and the Digital Economy, *Statement of expectations*, Commonwealth of Australia, 17 December 2010, accessed 9 June 2016.

<sup>11</sup> OECD, *Broadband Networks and Open Access*, (March 2013), accessed June 10, 2016.

## INITIAL CONCERNS

### Structural separation of Telstra and Optus

In 2011 Australia migrated Telstra and Optus fixed line traffic to the National Broadband Network to create a wholesale network. Structural separation,<sup>12</sup> in this case via the NBN Co., eliminates infrastructure competition by creating a monopoly in access under the assumption that the benefits of increased retail competition will exceed the costs of lost infrastructure competition. The NBN Access Act 2011 states that all NBN Co services are subject to oversight by the ACCC and that NBN Co must supply its services on a nondiscriminatory basis. Countries that have implemented unbundled regimes, however, generally believe structural separation to be too intrusive, generally preferring functional separation – although the European Commission sees even functional separation as a “last resort” remedy. Mandated structural separation for FTTN networks is unique to Australia, New Zealand, and Singapore with sub optimal results.<sup>13</sup>

### Delays and cost overruns

The AUD 40.7 billion Labor Party estimate was revised in 2013 and increased to an expected investment of 44.9 billion, although the opposition argued that the plan could cost up to AUD 94 billion. Despite the increasing estimates of total expenditures over the life of the project, actual expenditures had been less than expected due to slow network rollout.

The defeat of the Labor Party and the formation of the Liberal/National coalition in 2013 resulted in reducing the NBN’s scale to avoid escalating costs. After initial reviews to fully downgrade from FTTP to FTTN,<sup>14</sup> an alternative multi-technology mix with hybrid fiber coaxial (HFC) connectivity in the last mile was adopted with estimated savings of AUD 20 to 30 billion when compared to the full FTTP rollout.<sup>15</sup> The cost of the mixed plan is estimated between AUD 74 and 84 billion. Even with the downgrade, plans to achieve 25Mbps for all Australians by 2021

---

<sup>12</sup> Structural separation requires an operator to separate its network infrastructure from retail service on that infrastructure.

<sup>13</sup> Bronwyn Howell, “Structural Separation and Technological Diffusion,” 2014, accessed July 12, 2016.

<sup>14</sup> FTTN involves installing fiber to a local cabinet, with the “last mile” of connectivity to homes and businesses delivered using copper infrastructure.

<sup>15</sup> NBN Co, (2015) *op. cit.*, 39.



are unviable; according to the 2016 NBN Corporate Plan full FTTP rollout will not be completed until 2026-28.

In further attempts to bring down the cost of the NBN and adopt a more deliverable strategy, the current administration is considering a gradual sell-off of the NBN network.<sup>16</sup> What sections of the network are sold, the bidding process and the political climate will be critical for the future of Australia's telecom market and the country's economic competitiveness.

### Tracking Progress

The ACCC introduced rules in October 2014 requiring the NBN to report the number of services in operation on its network and the amount of capacity purchased by retail service providers. Data gathering is crucial for monitoring the rate and level of take-up of different NBN access services and the resulting market shares by retail service providers.<sup>17</sup> Before the ruling the ACCC had no tools to monitor the effects of the NBN on competition. This data, however, is not public.

The NBN rollout has suffered from political and design obstacles that has made it impossible for Australia to reach its targets in the estimated timeframe. To evaluate NBN's achievements mid-way through its planned rollout phase an analysis of broadband coverage, connection quality, market concentration and investment follows next.

### COVERAGE

Availability and adoption in Australia compared to other countries before and after NBN suggests that Australia performed worse under the NBN. In 2010 Australia ranked 19<sup>th</sup> in fixed broadband penetration across OECD countries. By 2015 it ranked 24<sup>th</sup>. It also lagged in speed, ranking 27<sup>th</sup>, out of 30 measured OECD countries in 2010. By 2015 it ranked second to last, only behind Greece.<sup>18</sup>

---

<sup>16</sup> "What Now for Australia's Broadband Plan?", The Economist Intelligence Unit, December 11, 2015, accessed June 16, 2016.

<sup>17</sup> "ACCC & AER Annual Report 2014-15," October 30, 2015, 135.

<sup>18</sup> In terms of average advertised speed. "Telecommunications and Internet Statistics," OECD iLibrary, accessed July 1, 2016.

Within Australia, availability and adoption during the NBN suggests that the trend in fixed and mobile subscriptions is positive but fixed broadband rollout targets have not been met. In 2010, when the NBN's implementation began, 24.9 per 100 people subscribed to fixed broadband and 56 to mobile broadband. By Q2 2015 fixed broadband per 100 people had increased to 28 percent and mobile to 114 percent.<sup>19</sup> The NBN aimed to connect 13 million premises to fiber by 2021. As Figure 2 shows, by June 2016 it had connected 2.9 million, 3.6 million less than the 2011 Corporate Plan expectations for that year. Figure 1 shows how initial targets have been reduced both for premises ready for service (PRS) and activated premises with the publication of subsequent Corporate Plans.

*FIGURE 1. CHANGES IN ROLLOUT TARGETS*

PREMISES PASSED / READY FOR SERVICE <sup>20</sup> TARGETS (IN THOUSANDS)				NUMBER OF PREMISES CONNECTED/ACTIVATED <sup>21</sup> TARGETS (IN THOUSANDS)			
	2011 Plan*	2012 Plan	2016 Plan		2011 Plan*	2012 Plan	2016 Plan
FY 2011	223	183	N/A	FY 2011	35	.8	N/A
FY 2012	495	213	N/A	FY 2012	150	13.5	N/A
FY 2013	1,715	661	N/A	FY 2013	566	92	N/A
FY 2014	3,256	1,681	N/A	FY 2014	1,691	551	N/A
FY 2015	4,943	3,664	1,093**	FY 2015	2,767	1,615	481**
FY 2016	6,460	5,532	2,632	FY 2016	3,844	3,181	955
FY 2017	7,974	N/A	5,442	FY 2017	4,893	N/A	2,320
FY 2018	9,468	N/A	9,062	FY 2018	5,906	N/A	4,395

\* Different targets are included in this Plan, numbers from Exhibit 6.1 on page 77 are used.

\*\* Corporate Plan 2014-17 estimate.

Note: Corporate Plan for 2014-16 did not state any changes.

SOURCE: NBN CO 2011-13, 2012-15, 2014-17 & 2016 CORPORATE PLANS.

The first 2011-13 Corporate Plan is the only Plan that explicitly sets coverage targets,<sup>22</sup> subsequent Plans adjusted targets with no explicit mention and are published as estimates. Targets were set

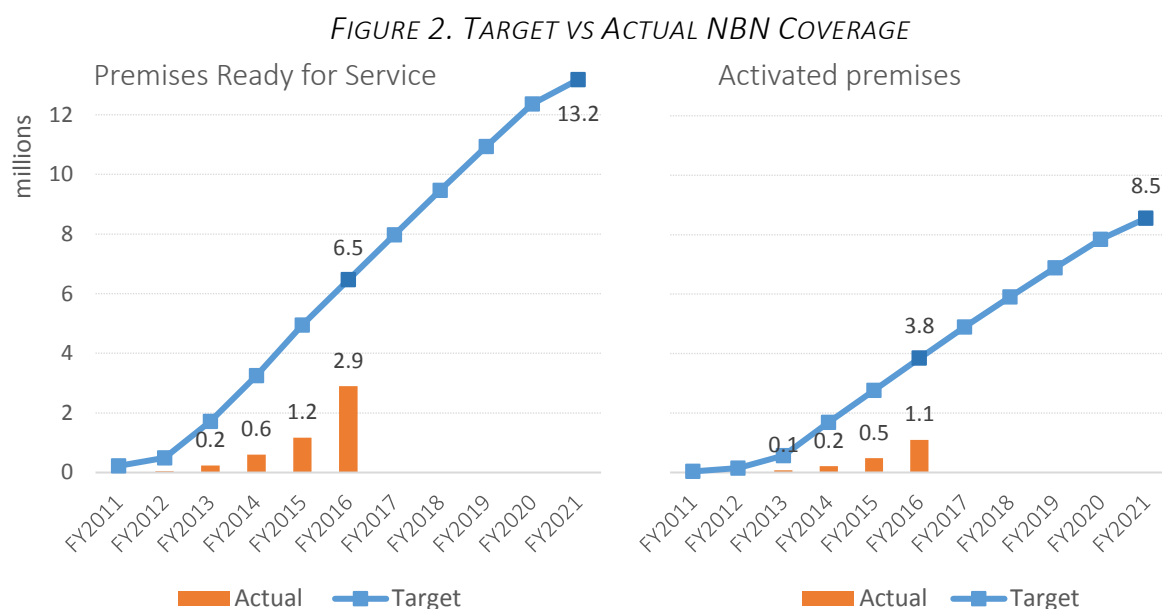
<sup>19</sup> OECD Broadband Portal, 2016, accessed June 13, 2016.

<sup>20</sup> Premises passed by the NBN network include premises activated and those which cannot yet access a service. A Rollout Region is Ready for Service (RFS) when NBN is ready to begin activating premises in that Rollout Region, which is when the NBN network has passed at least 90% of the premises in the NBN footprint. Before 2014 terms were used interchangeably.

<sup>21</sup> Refers to premises which have an active service installed. Premises are activated after receiving and provisioning a service order from a Retail Service Provider to install a new service at the premises.

<sup>22</sup> Targets are also referred to as deployment schedules or estimates.

to achieve full deployment by 2021 subject to the availability of existing infrastructure.<sup>23</sup> Changing targets and unclear reporting has inhibited proper monitoring and evaluation. Figure 2 shows the difference between 2011 Corporate Plan targets and actual NBN rollout for RFA and activated premises. The difference between activated premises and PRS indicates that 1.8 million premises can connect to the NBN through a retail carrier but have not.



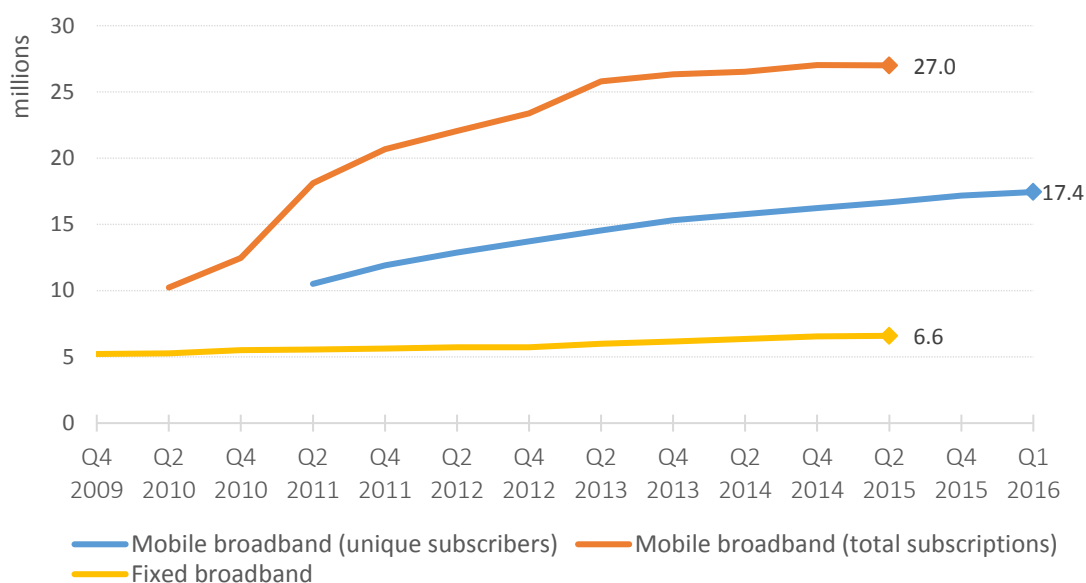
SOURCE: NBN CO, *CORPORATE PLAN 2011-13* AND NBN CO, *ROLLOUT INFORMATION - WEEKLY SUMMARY*, (2016).

Coverage within Australia suggests that subscriptions have grown but at a slower rate relative to other countries and without meeting NBN targets. Figure 3 shows fixed and mobile broadband growth for the past six years.<sup>24</sup>

<sup>23</sup> NBN Co, *Corporate Plan 2011-13*, (2010), 78.

<sup>24</sup> Data before the NBN is not available.

FIGURE 3. BROADBAND INTERNET SUBSCRIBERS BY NETWORK



SOURCE: GSMA INTELLIGENCE, OECD ILLIBRARY.

In 2014, 21 percent of adult Australians were mobile-only internet users, meaning they did not have a fixed internet connection and accessed internet only through mobile broadband. Of the mobile-only internet group, 73 percent used the internet at home.<sup>25</sup> While the evidence is limited, these numbers suggest that for many Australians mobile broadband is becoming a substitute for fixed broadband.

Households in other countries are becoming mobile-only as well. In 2015, 20 percent of households in the United States relied exclusively on mobile for internet access.<sup>26</sup> Why these users are connecting through mobile broadband at home is key to this analysis. In particular, has the NBN helped cause this increase in mobile broadband use? For example, have people begun to switch to mobile because of NBN underperformance or because the private sector has diverted investment from fixed to mobile? Or is the switch unrelated to the NBN?

Others have already suggested that the compensation for decommissioned copper and cable networks increased investment in 3G and LTE networks providing an alternative to households with low internet demands.<sup>27</sup> This paper compares changes in quality and prices

<sup>25</sup> Australian Communications and Media Authority (ACMA), *Communications Report 2014-15*, (2015).

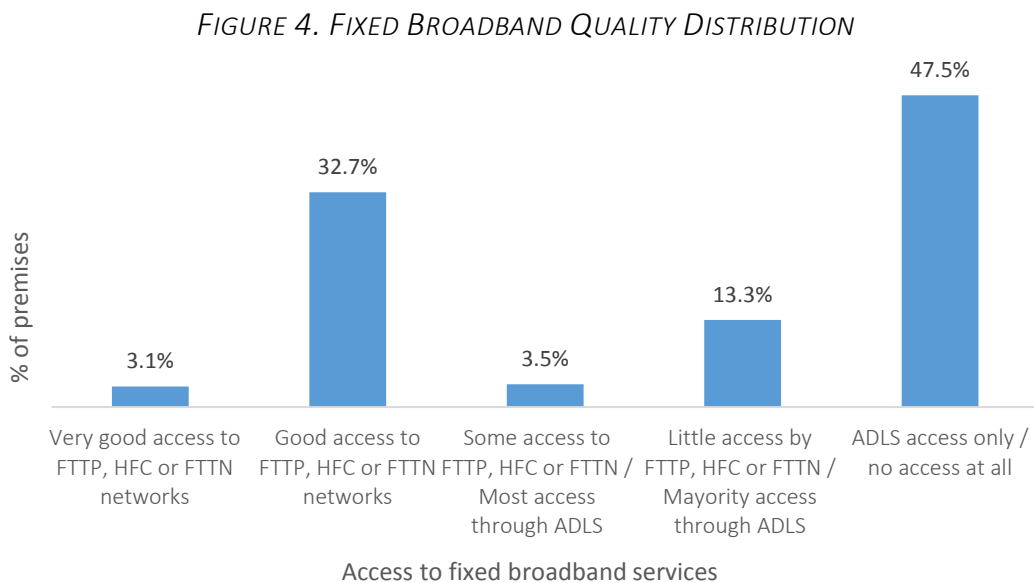
<sup>26</sup> NTIA, "Evolving Technologies Change the Nature of Internet Use," accessed June 8, 2016.

<sup>27</sup> Bronwyn Howell, "Government-Subsidized Fiber: Careful What You Wish for," TechPolicyDaily.com, March 26, 2014, accessed July 12, 2016,

among services to see if users have incentives to favor mobile connectivity as a result of the institutional framework.

## QUALITY

An analysis of the overall quality and availability of broadband in December 2013 by the Australian Department of Communications found that 28 percent of premises had access to download speeds between 25 Mbps and 110 Mbps while 65 percent had access to download speeds of less than 24 Mbps over the copper network. Six percent of premises (about 0.7 million) had no access to a fixed broadband service.<sup>28</sup> Figure 4 displays the percentage of premises according to fixed broadband quality.<sup>29</sup> Areas where a high proportion of premises have full access to FTTP are represented in the highest quality band (left), while areas with limited access to high speed platforms (FTTP, HFC and FTTN) are represented in lower quality bands (right).



SOURCE: DEPARTMENT OF COMMUNICATIONS, *BROADBAND AVAILABILITY AND QUALITY REPORT*, (2013).

In terms of mobile broadband, approximately 81 percent of premises had access to an effective 3G mobile broadband service and 59 percent to a 4G service. Even though approximately 318,000

<sup>28</sup> Department of Communications, *Broadband Availability and Quality Report*, (2013).

<sup>29</sup> The infrastructure most often used to provide broadband includes ADSL technology over the copper access network, 3G and 4G mobile networks, HFC originally rolled out for subscription television, FTTN and FTTP networks.

premises fall outside the asymmetric digital subscriber line (ADSL) footprint –the most common type of fixed broadband access– they can access a 3G or 4G service.<sup>30</sup>

Premises with no access to fixed broadband or with speeds below 25Mbps within a 3G or 4G service zone (with peak download speeds of 3.1 Mbps and 10Mbps respectively) may have incentives to prefer mobile-only connectivity if mobile broadband prices are competitive with fixed broadband.

## PRICES

Fixed broadband comparisons before and after NBN suggest that prices have increased relative to other countries. In 2009 average fixed broadband monthly prices per Mbps were USD 11.82, above the OECD average but similar to those in Finland (USD 10.46) and Canada (USD 11.85).<sup>31</sup> By Q1 2016 a global comparison of residential broadband<sup>32</sup> prices found only nine out of 84 countries with higher entry level prices than Australia.<sup>33</sup> While comparing prices across countries—and even across services within countries—is difficult due to the large number of available options, bundles, and special offers, the data suggests that residential prices in Australia are high.

Broadband price changes within Australia before the NBN are not available. Prices after NBN adoption have declined and data allowances increased, but NBN services still make up a small share of internet services;<sup>34</sup> therefore, the NBN does not appear to drive these price changes. The ACCC’s internet service price index<sup>35</sup> shows that overall prices have decreased continuously since 2007 but the rate of change has narrowed (see Figure 5). Real prices of internet services supplied over the NBN decreased by 3.5 percent from 2014-15 after an increase of 4.6 percent the previous year.<sup>36</sup>

---

<sup>30</sup> Department of Communications (2015), *op. cit.*

<sup>31</sup> OECD (2010), *op. cit.*

<sup>32</sup> Includes copper, cable and fiber networks in U.S. dollars adjusted for PPP.

<sup>33</sup> Point Topic, “Broadband Tariff Country Scorecard—Q1 2016.”

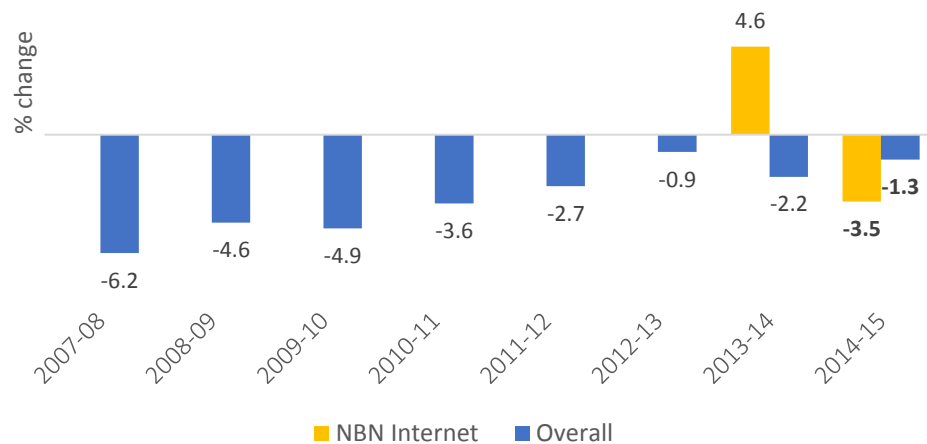
<sup>34</sup> ACCC, *Price changes for telecommunications services in Australia 2014–15*, (2015).

<sup>35</sup> Excludes data services available through mobile handsets.

<sup>36</sup> ACCC, *Price changes for telecommunications services in Australia 2014–15*, 2015, 75.

According to the ACC, the majority of NBN providers maintained the same plans from the beginning of the reporting period, with the same or similar nominal price.

FIGURE 5. INTERNET SERVICE PRICE INDEX



Note: Overall category includes Wireless, DSL, Cable and NBN Internet services.

SOURCE: ACCC (2015).

In terms of mobile broadband, while data allowances almost doubled from 2011 to 2015, the associated price decrease has not benefited everyone. Disaggregating data allowances by pre-paid and post-paid services shows that pre-paid allowances remained relatively constant since 2011.<sup>37</sup> In addition, the claim that increased data allowances make consumers better off despite price increases depends on how much they consume and spend.

An important limitation of this analysis is the absence of data on prices per Mbps over time for fixed and broadband markets. The evidence is nuanced and we cannot assert what the NBN's overall effect on prices has been except that in terms of international comparison it continues to rank poorly.

## SPEED

Speed comparisons to other countries suggests that Australia is in the lower performing end. According to the OECD, in 2014 Australia's average and median advertised speeds for fixed broadband were 33.37Mbps and 20Mbps respectively. The average speed is the lowest among OECD countries, behind only Greece, while the median – which can be a more accurate measure due to the presence of very low speed offers – is below the OECD average of 30Mbps.<sup>38</sup> In terms

<sup>37</sup> *Ibid.*, 89.

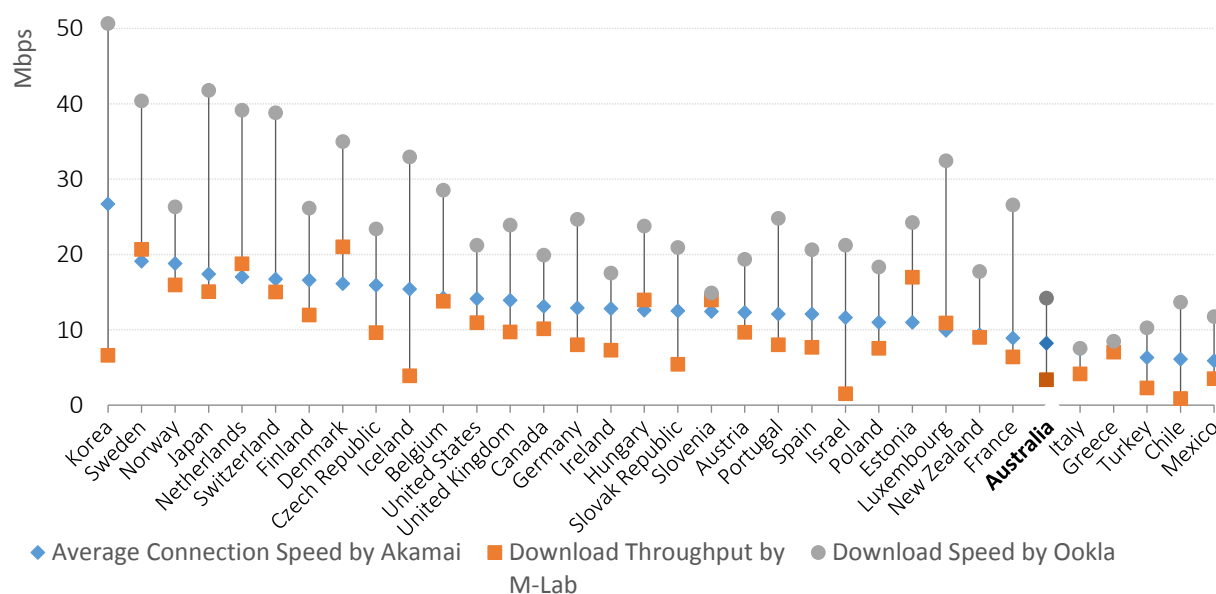
<sup>38</sup> OECD Broadband Portal, 2016, accessed June 13, 2016.

of mobile broadband advertised speed, Australia performs better offering maximum speeds of 87Mbps, although still below the OECD average maximum speed of 114 Mbps.<sup>39</sup>

Average and advertised speeds have important limitations. Average speed is a combination of available speeds and the preferences of consumers, who tend to choose lower speeds than the maximum they could get. On the other hand, advertised speeds do not reflect the distribution of consumers among speed tiers. While neither metric is an accurate measure of the network capacity, they provide some information of the available options to consumers and the stark difference between fixed and mobile broadband offers.

To better understand service quality experienced by consumers, a comparison of actual broadband download speeds through different measurement approaches (see figure 6) still ranks Australia in the lower performing end of OECD countries.

FIGURE 6. ACTUAL DOWNLOAD SPEEDS, OECD COUNTRIES, 4Q 2015



\*DATA FOR OOKLA 1Q2014.

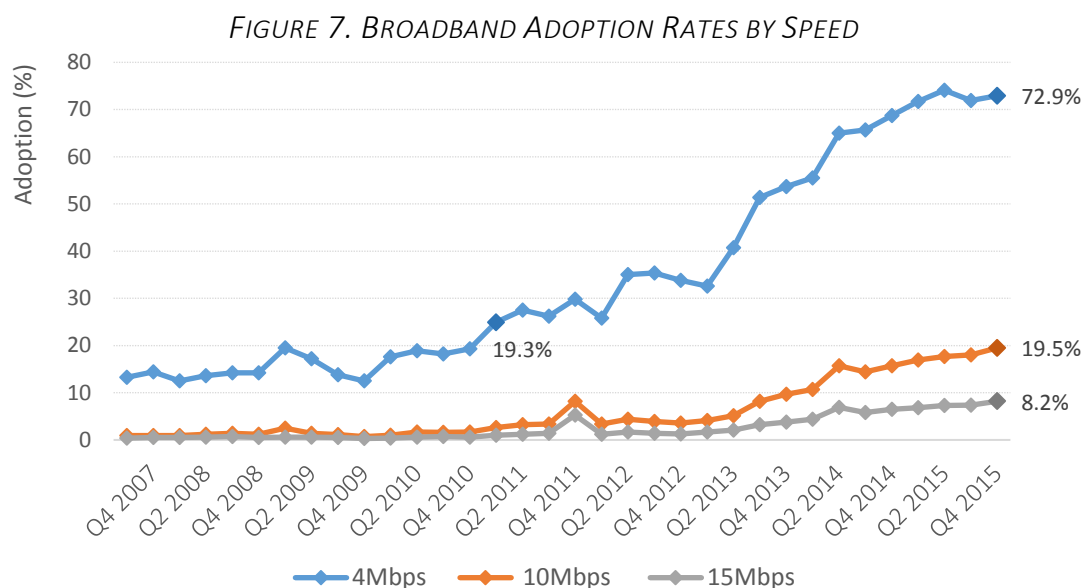
SOURCE: DERIVED FROM DATA IN AKAMAI (2015), OECD (2015).

<sup>39</sup> Data for September 2014. OECD, *OECD Digital Economy Outlook 2015*, OECD Publishing, Paris.



Akamai reports an average connection speed<sup>40</sup> of 8.2Mbps, below the OECD average of 12.9Mbps while M-lab reports a median download throughput speed<sup>41</sup> of 3.34Mbps for Australia and Ookla whose measurement excludes mobile applications of 14.18Mbps. The Australian Bureau of Statistics reports that 82% of Internet subscribers have advertised speeds higher than 8Mbps; however, they do not provide disaggregated data of speeds above 8Mbps making it hard to evaluate differences within this large subgroup. Figure 6 indicates that while average fixed broadband speeds are higher than mobile, Australian consumers are experiencing low quality services in relation to other countries of similar development.

Within Australia the proportion of users with access to high speed broadband has not improved since 2007. Figure 7 shows the percentage of unique IP addresses making connections to Akamai by average connection speed thresholds. The percentage of connections with 4Mbps speeds grew substantially from 2007 to 2015 from 13 percent to 73 percent but with experienced slower adoption for higher quality connections.



Note: The graph shows the percentage of unique IP addresses making connections to Akamai from Australia with an average connection speed threshold above 4 Mbps, 10 Mbps and 15Mbps.

SOURCE: DERIVED FROM DATA IN AKAMAI (2016).

<sup>40</sup> Average of all of the connection speeds calculated during the quarter from the unique IP addresses in a specific country/region.

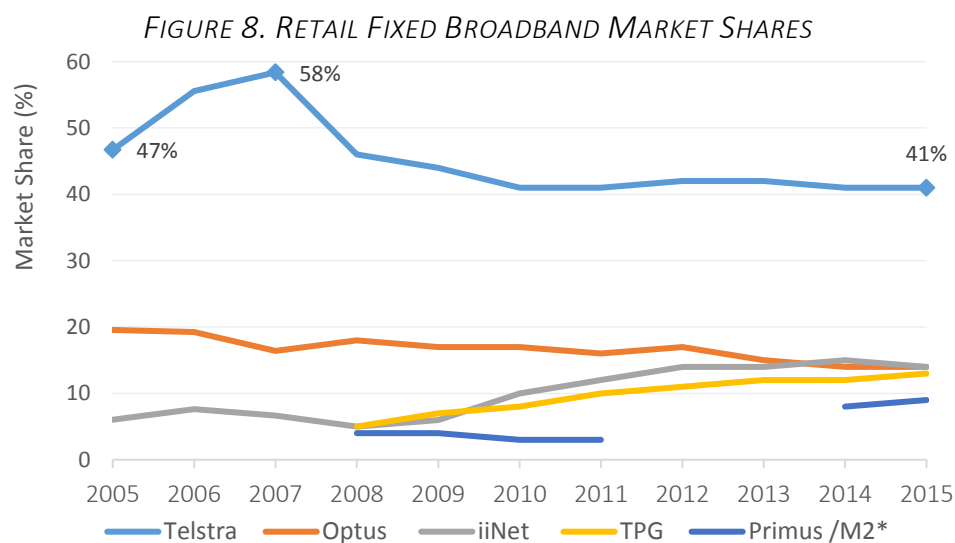
<sup>41</sup> Throughput speed is the actual data transferring speed; it is affected by website's individual speeds and the number of people using a website at a given time.

Speed changes within Australia and compared to other countries suggests that the NBN is performing under its 25Mbps minimum speed target and performing worse than its OECD counterparts. The NBN still has six years under its initial completion deadline and continues to add premises to the network, however, as rollout continues and consumers migrate to the network competition issues arise. We look at market concentration next to gauge whether the costs associated with the creation of a virtual monopoly at the wholesale level resulted in larger benefits through increased competition at the retail level.

## MARKET CONCENTRATION

A key advantage of separating broadband infrastructure from the retail side of the business is to encourage competition in the retail market and, hopefully, reduce prices to consumers. The market does not appear to have developed that way in Australia as the fixed broadband retail market remains relatively concentrated.<sup>42</sup>

Telstra's retail share has remained constant since the NBN began even though it had been falling in the few years prior to the NBN. All other ISPs are far smaller than Telstra, and while several had increased their market share, that growth appears to have come from what was the second-largest provider, Optus, rather than from Telstra (Figure 8).

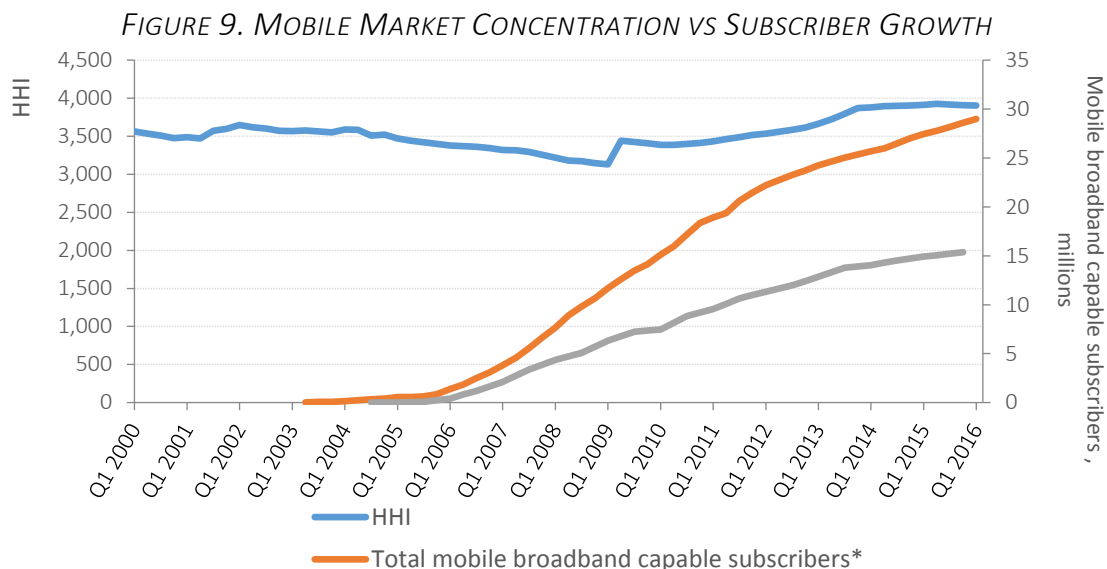


\*Primus was acquired by M2 Telecommunications in June 2012.

<sup>42</sup> ACCC (2016), *op. cit.*

SOURCE: DERIVED FROM DATA IN ACCC TELECOMMUNICATIONS REPORTS, 2007-08, 2009-10, 2014-15.

Additionally, mobile market concentration measured by the HHI<sup>43</sup> has not decreased since the implementation of the NBN in 2010. Figure 9 illustrates the evolution of the HHI since 2000 and the growth in mobile capable subscribers. While the number of subscribers has grown significantly, by 92 percent since 2010, market concentration has not changed.



\*Net additions, excluding cellular M2M

SOURCE: DERIVED FROM DATA IN GSMA INTELLIGENCE.

As Figures 5 and 6 show, the premise that open access to wholesale broadband would promote competition in the fixed and mobile markets does not hold. The ACCC stated in its latest competition assessment that it “expect[s] that mobile services will place increasing competitive pressure on fixed broadband services”<sup>44</sup>; however, subscriber growth in the mobile market does not appear to have had that effect thus far.

## INVESTMENT

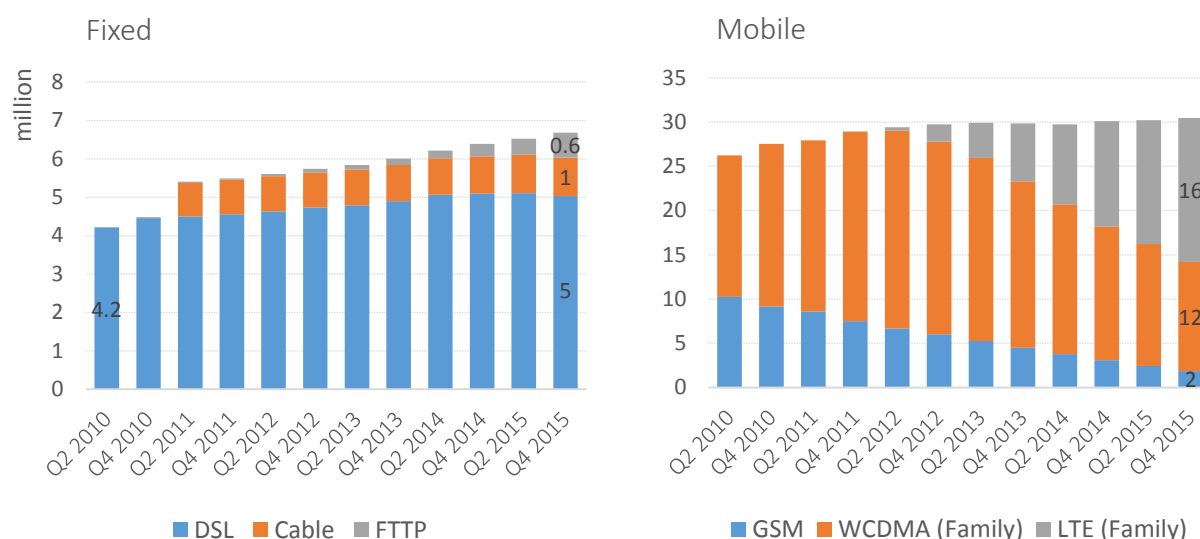
Private investment in specific parts of the network is hard to measure directly and it is difficult to compare among operators even when data is available. In this case, we use connections by

<sup>43</sup> A commonly accepted measure of market concentration, represented on a scale of 0 (evenly distributed competition) to 10,000 (no competition).

<sup>44</sup> ACCC (2016) *op. cit.*, 8.

technology as a proxy for investment. Figure 10 shows that older technologies are being phased out in the mobile market but the same cannot be said for the fixed market where 75 percent of connections –five million– are through DSL and .1 percent through FFTP by 2015. While fixed connections are inherently lower as one connection to a premise can provide access to more than one user, the key takeaway is the slow growth of FFTP connections and the growth of LTE connections within the mobile broadband group. This evidence further indicates that mobile connectivity is substituting fixed broadband in Australia.

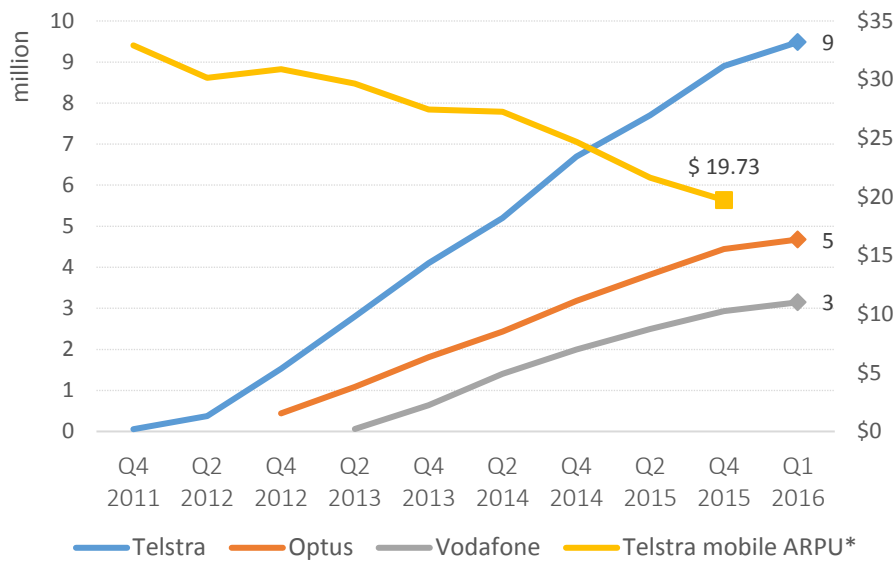
FIGURE 10. CONNECTIONS BY TECHNOLOGY



SOURCE: DERIVED FROM DATA IN GSMA INTELLIGENCE.

While data for connections by operator is not available for fixed broadband, the market share distribution (see Figure 8 above) and growth of LTE connections (Figure 11) by the main three operators indicates they are investing in mobile infrastructure instead of fixed broadband. Of the 16.2 million LTE connection additions in Q4 2015, 55 percent corresponded to Telstra 27 percent to Optus and 18 percent to Vodafone.

FIGURE 11. LTE CONNECTIONS BY ISP



\*mobile broadband capable connections.

SOURCE: DERIVED FROM GSMA INTELLIGENCE.

Telstra's declining Average Revenue per User (ARPU)<sup>45</sup> for mobile broadband capable connections may reduce its incentives to invest if it can increase its market share with its current infrastructure. While it would be best to compare mobile broadband ARPU in respect to fixed broadband, the fact that FTTP connections have not grown at the same rate as mobile –particularly LTE connections– and Telstra's dominance in this market can lead to diminished incentives to invest in fixed broadband.

<sup>45</sup> Revenue per connection.

## THE FLIGHT TO MOBILE – WHAT DOES IT MEAN FOR THE NBN?

The increasing use of mobile Internet access has implications for infrastructure deployment decisions. Wholesale fiber networks do more than just service homes and businesses through fixed broadband retailers. They also are necessary for providing backhaul for mobile carriers. While both mobile and fixed data traffic are expected to increase, mobile data traffic is predicted to nearly five-fold by 2020 while fixed data traffic is expected to grow by 180 percent by 2019.<sup>46</sup> Perhaps the NBN should consider whether its deployment strategy can properly accommodate mobile data demand by prioritizing resources in towers and antennas and radio frequency spectrum allocation.

While mobile and fixed broadband were not originally perceived as substitutes, faster mobile connection speeds may be changing consumer patterns. With LTE technology, which can potentially reach maximum download speeds up to 450 Mbps (given enough radio spectrum), consumers may transition at faster rates towards mobile-only Internet access. By the end of 2015 Australia ranked among the fastest LTE download speeds at 24Mbps with users experiencing LTE coverage 75 percent of the time<sup>47</sup> – a performance way above fixed broadband offers for the majority of premises.

The trend towards mobile-only internet use in Australia should be further evaluated in light of how much it is influenced by the NBN's failure to deliver quality fixed broadband. Regardless of past performance, technological advances and LTE's potential to reach download speeds above those of fixed broadband presents an opportunity to rethink the NBN.

Although the evidence is nuanced and measurement differences make it hard to draw hard conclusions, the above analysis suggests that the NBN has not only failed to achieve its targets but stagnated fixed broadband adoption. In addition, the NBN has not changed Australia's competitive landscape in the mobile broadband market. While the evidence is not robust, the above analysis suggests that investment has occurred mainly in the mobile broadband market at expense of the fixed broadband market.

---

<sup>46</sup> ACMA, *Beyond 2020 –A spectrum management strategy to address the growth in mobile broadband capacity: Discussion paper*, (2015), 15-17.

<sup>47</sup> OpenS, "The State of LTE February 2016." April 2015, accessed June 14, 2016.

Future concerns associated with NBN's poor performance include incentives for operators to preference their own traffic over that of other operators given the increase in data demand and decreased service quality, or price increases, that can disproportionately affect lower income segments.

Government's role and its continuous attempt to 'catch up' in a sector characterized by its dynamism should be reevaluated. This case study illustrates how large scale public infrastructure projects in the telecommunications sector take decades to roll out, are subject to political pressures and result in little or no value to consumers.