How to Transition the National Broadband Network to Fibre To The Premises

Mark A Gregory
RMIT University

Abstract: NBN Co, the government business enterprise rolling out the National Broadband Network (NBN) adopted the Coalition Government's Multi-Technology Mix (MTM) plan upon receipt of a revised Statement of Expectations following the September 2013 Federal election. The MTM NBN plan included rolling out the outdated Fibre to the Node technology and remediating and upgrading the existing Telstra and Optus Hybrid Fibre Coaxial networks. This paper discusses the migration from the MTM NBN to a Fibre to the Curb or ubiquitous Fibre to the Premises (FTTP) NBN. The paper also discusses the MTM NBN cost blowout, delays and rationale for the MTM NBN to be immediately replaced with a future-proof FTTP NBN.

Keywords: Telecommunications, Wholesale, Broadband, National Broadband Network, Policy, Regulation

Introduction

In an earlier paper (Gregory, 2018) four options were identified for the future ownership of the National Broadband Network (NBN). A decision on future NBN ownership arrangements is expected by the government of the day in mid-2022, if not earlier. It is anticipated that sale arrangements, if this was the option selected by the government, would not be able to be put in place prior to 2024 due to the need for legislative and regulatory changes to reflect the new conditions upon which telecommunications infrastructure would be owned and operated nationally.

NBN Co, the company building and operating the NBN, states (NBNCO, 2019a) that it will complete the NBN rollout by mid-2020 with a "commitment to deliver access to peak wholesale download data rates of at least 25 megabits per second (Mbps) to all premises across the network, and at least 50Mbps peak wholesale download data rates to 90 per cent of the fixed-line network."

http://doi.org/10.18080/jtde.v7n1.182

NBN Co reported (NBNCO, 2019a) that monthly average revenue per user (ARPU) had risen to $45, 8.1 million premises were ready to connect, 4.7 million premises were activated on the NBN and revenue had risen to $1.3 billion for the six months ending on 31 December 2018.

NBN Co's business model remains under pressure prompting calls for a Government debt write-off post-build (Smith, 2018)(Dickinson, 2018).

The Coalition Government's MTM NBN was put to voters in 2016 with promises that the NBN rollout would be completed by 2019 with an ARPU of $51 per month making the NBN cash flow positive. However, rollout delays have caused NBN Co to adjust its targets to over 8 million homes and businesses connected by 2020 and projected ARPU of $51 per month by FY22 (NBN Co,2019b) .

A lower than expected connection rate (NBN Co,2019b) to the NBN, the threat of 5G taking a larger than expected slice of the broadband market and NBN Co's poor financials, partially brought about by the decision to rollout the effectively obsolete fibre to the node (FTTN) and to remediate the Hybrid Fibre Coaxial (HFC) network.

NBN Co has remained mute on how it expects to be able to meet demand for new applications and services that require high bandwidth, low latency, improved reliability. Publicly, NBN Co states that it can meet the demand and performance requirements forecast through to 2026, but the reality is that many consumers are frustrated by the underlying reliability and performance problems with the NBN that go far beyond the daily congestion caused by NBN Co's excessive Connection Virtual Circuit (CVC) charge (essentially a data usage charge).

To meet consumer demand and performance expectations, NBN Co is expected to replace FTTN (Gregory, 2015a) with either Fibre to the Curb (FTTC) (Gregory, 2017) or Fibre to the Premises (FTTP). This paper discusses three options and associated costings.

The NBN is not fit for purpose

In August 2014, the former NBN Co CEO Bill Morrow voiced doubts (Bender, 2014) about the Vertigan panel report that was commissioned by the former Prime Minister Malcolm Turnbull when he was Minister for Communications (Turnbull, 2013). In this report it was predicted that the median Australian household would require 15 Mbps in 2023. Mr Morrow said that he was "curious" about the prediction.

In February 2018, the Bureau of Communications and the Arts Research (BCAR) within the Department of Communications and the Arts released a working paper (BCAR, 2018) that claims that "peak bandwidth demand for the highest usage households is forecast to increase from between 11–20 megabits per second (Mbps) in 2016 to between 20–49 Mbps in 2026. 98 per cent of households are estimated to demand less than this amount of bandwidth in

http://doi.org/10.18080/jtde.v7n1.182

2026—that is, only 2 per cent of households are expected to demand more than 49 Mbps in bandwidth."

It is possible to see a trend here. The Coalition Government is guilty of using every resource at its disposal in an ongoing attempt to justify the unreliable, poor performance and fiscal irresponsibility attached to the MTM NBN.

In 2014, when the Vertigan panel report was released there was public criticism (Gregory, 2014)(Crozier, 2018) of the findings, particularly the low bandwidth demand projection that supported the earlier claims by the Coalition government (RAFC, 2016) that the NBN would provide all Australians with 25 Mbps NBN connections by 2016 for $29.5 billion and that this outcome would be satisfactory for a majority of consumers for about a decade.

Having failed to meet the commitment made during the MTM NBN policy launch in 2013, the Coalition government shifted the goal post to a target of "50 and 100 megabits per second by the end of 2019 in 90 per cent of the fixed line footprint." The 2018 BCAR report can be seen to dovetail nicely with this Coalition government commitment.

In January 2019 at the Consumer Electronics Show the focus was on 8K televisions (News, 2019). In 2020, the Tokyo Olympics organisers plan to stream the games in 8K format. The bandwidth required for a poor quality 8K stream is about 50 Mbps per channel and for an improved quality the bandwidth is 80-120 Mbps. The instantaneous bandwidth required to support fast forward, rewind and other functions can require a 50 per cent short term increase in the average bandwidth requirement (Dow, 2016)(Gregory, 2016).

In addition to many Australians not having broadband infrastructure that will support reasonable congestion free viewing of the Tokyo Olympics in 8K, there are augmented reality and virtual reality applications being developed that require more than 1 Gbps connection speeds.

In Australia, most of the over-the-top application and service providers have remained relatively mute, the reason for this silence remains a task for future research.

One streaming media provider, FoxTel has provided clear guidance on why the Coalition Government's MTM NBN is not "fit for task" today, let alone when 8K media streaming becomes the norm globally over the next couple of years.

FoxTel states online "Don't you hate it when you've maxed out your internet capacity and the speed drops faster than a Walking Dead zombie with a knife to the noggin? Say goodbye to that issue, as satellite will guarantee 4K delivery" (FoxTel, 2018).

Foxtel provides a table titled "Understanding nbn™ speeds" (FoxTel, 2019) that recommends a Plus Speed tier or a Premium Speed tier depending on household demand.

http://doi.org/10.18080/jtde.v7n1.182

The Plus Speed tier *"is ideal for use of the internet by 3-4 people at the same time, for activities like:*

- *Regular uploading & downloading of large files*
- *Online gaming*
- *Streaming in Ultra HD (4K) quality*
- *Moderate simultaneous use of several devices*
- *Included in Foxtel Broadband Unlimited plans"*

The Premium Speed "*is ideal for use of the internet by more than 5 people at the same time, for activities like:*

- *Constant uploading & downloading of large files*
- *Online gaming*
- *Streaming in Ultra HD (4K) quality*
- *Heavy simultaneous use of several devices*
- *Once you've signed up, you can check your eligibility for an upgrade to Premium speed (for an additional fee) by calling xxx xxx"*

FoxTel has provided an indication that the typical evening speed for the Plus Speed tier of 44.6 Mbps and for the Premium Speed tier of 85 Mbps "Based on Foxtel's typical busy Period download speed measurement between 7pm and 11pm, collected from 15/02/2019 - 28/02/2019. Your actual speeds on Fibre to the Basement (FTTB) and Fibre to the Node (FTTN) services will be confirmed once your home is connected."

Rather than demanding improved infrastructure, companies are now "squeezing" the connection speeds and capacity needed to make their applications and services work over FTTN and the end result is poor quality, especially for streamed media, reduced availability, congestion and a poor consumer experience.

Telecommunications is an essential service. Without adequate, reliable telecommunications, Australia's economy is negatively impacted. The introduction of the NBN is having a positive impact on the average fixed broadband connection speeds, but relative to our competitors in the global digital economy, Australia is falling further behind.

The Ookla speedtest global rankings provide a reflection on global broadband penetration and connection speeds that can be used to provide general guidance. Australia was ranked 60th in the latest global speed ranking (Ookla, 2019). Whilst Australia's NBN provides national

http://doi.org/10.18080/jtde.v7n1.182

coverage and some of the nations ranked above Australia do not do so for fixed broadband, these nations have not committed more than $51 billion to complete their broadband networks.

Are Australian taxpayers getting value for the $51 billion committed by the Australian government to the MTM NBN? In respect of most measures the MTM NBN is not fit for purpose. It is not future proof, it does not meet current nor future demand, it is unreliable and has a higher OPEX than that for a ubiquitous FTTP network. It has cost significantly more and taken significantly longer than the Coalition Government argued were prime reasons for adopting the second rate MTM NBN rather than continuing with the FTTP rollout.

Technology upgrade

A decision to carry out a technology upgrade should be based on criteria including demand, performance, CAPEX, OPEX, capital availability and the effect of the upgrade on NBN Co's business model.

In this section the options available to NBN Co are explored with the assumption that NBN Co would remain a single entity, either government owned or privatised, possibly through an amalgamation with a recently separated and listed InfraCo (Telstra's current infrastructure division) (Irving, 2018).

In New Zealand, Chorus, the largest broadband wholesale provider, carried out a comparative analysis of technologies that could be used to upgrade the existing FTTN network and selected FTTP, thereby providing the nation with a future proof, reliable, low latency broadband network.

NBN Co reports (NBNCo, 2019a) that the cost per premises (CPP) for FTTN is $2,259, HFC is $2,466, FTTC is $3,058 and FTTP is $4,403. In the text, NBN Co states that "As the deployment of this technology continues to scale, it is anticipated that cost synergies will be realised."

In 2017, NBN Co estimated that the FTTC CPP could fall to about $2,800 as the deployment to more than 700,000 premises progressed (Keisler, 2017). NBN Co's estimated CPP savings for FTTC are in line with international (Chorus, 2018) and local experience for national telecommunications rollouts.

The CPP for FTTP is anticipated to fall to about $3,800 or lower, a figure that includes the estimated $700 leasing cost payable to Telstra. In New Zealand, Chorus has reported a 44 per cent drop in the CPP for FTTP as the UFB rollout has proceeded (Gregory, 2015b).

http://doi.org/10.18080/jtde.v7n1.182

In 2018, Chorus reported (Chorus, 2018) the cost per premises as NZ$1,568 (cost per UFB1 premises passed) and NZ$1,037 (cost per UFB1 premises connected).

NBN Co's reported CPP for FTTP reflects the initial rollout costs prior to September 2015 for about 900,000 premises connected.

A search of the literature has not found any indication of a NBN Co estimate of the final or average CPP for FTTP if the FTTP rollout had continued through to the completion of the NBN.

FTTP technology improvements over the past decade have resulted in improvements in the FTTP technology available in the mass-market for network rollouts and in terms of design intelligence and experience gained through global deployments to date.

Examples of FTTP technology improvements include below ground fibre distribution pits, Figure 1, and more flexible approaches to installation of drop lines into premises, including micro-trenching, aerial and armoured fibre cable negating the need for conduit into premises.

Figure 1. Chorus UFB underground fibre distribution

NBN Co's Corporate Plan 2019-2022 (NBN Co, 2018) provides guidance that the technology split by 2020 is expected to be:

- FTTP Brownfields 1.1 million
- FTTP Greenfields 0.8 million
- FTTN/B 4.7 million
- FTTC 1.4 million
- HFC 2.5 million
- Fixed Wireless 0.6 million
- Satellite 0.4 million

In the following sections three options are provided for an upgrade program to a ubiquitous FTTP fixed access network. The costings are estimates based on figures identified in a review

http://doi.org/10.18080/jtde.v7n1.182

of statements made during Senate Estimates by members of the NBN Co senior management team, NBN Co publications, and Chorus publications.

Option 1 Upgrade by NBN Co

Option 1 is for an upgrade program carried out by NBN Co to replace the FTTN/B/C and HFC footprints with FTTP.

The average CPP to upgrade to FTTP is estimated to be:

- FTTN/B $1,500 ($7.05 billion)
- FTTC $600 ($0.84 billion)
- HFC $3,000 ($7.5 billion)

The cost projections include:

1. Layer 2 - $100 per premises
2. FTTN upgraded to Fibre Premises Passed (FPP) - $900
3. HFC upgraded to FPP - $2,400
4. Cost per Fibre Premises Connected (CFPP) - $500 (lead-in)

The total cost of this option is estimated to be $15.39 billion or with a 10 per cent variance approximately between $14 billion and $17 billion. A 10 per cent variance in costings is provided as a guide to highlight the estimated cost range.

Option 2. Upgrade by NBN Co and RSP

Option 2 is for NBN Co to upgrade FTTN/B and HFC to FPP and for RSPs to absorb the CFPP cost in the broadband plan offering.

The cost to NBN Co now becomes:

- FTTN/B $1,000 ($4.7 billion)
- FTTC $100 ($140 million)
- HFC $2,500 ($6.25 billion)

The total cost of this option is estimated to be $11.09 billion or with a 10 per cent variance approximately between $10 billion and $12.21 billion. If this option was to include a shift of the Layer 2 connection cost to the RSP then the total cost of this option is reduced by $860 million.

http://doi.org/10.18080/jtde.v7n1.182

Option 3. Upgrade by NBN Co and Consumer

Option 3 is for NBN Co to upgrade FTTN/B and HFC to FPP and for consumers to self-install the lead-in (CFPP).

The cost to NBN Co now becomes:

- FTTN/B $1,000 ($4.7 billion)
- FTTC $100 ($140 million)
- HFC $2,500 ($6.25 billion)

The total cost of this option is estimated to be $11.09 billion or with a 10 per cent variance approximately between $10 billion and $12.21 billion. For this option, NBN Co posts out a free self-install lead-in kit to consumers, however, this approach necessitates the Layer 2 connection cost.

Consumers benefit by not having the lead-in charge added to RSP broadband plans, however, consumers would be required to install the lead-in to their premises.

Self-installation is an approach that has been utilised in Europe (FastInternetBlog, 2016)(Gigaclear, 2016). A more recent trend among service providers, driven by competitive market forces, has meant that the lead-in installation costs are absorbed by the service providers and the activation cost is offered for free to consumers that select premium plans.

In Australia, self-installation of customer premises modems and devices has become commonplace, e.g. Telstra (Telstra, 2019) has utilised the self-install approach for NBN modems and Fixed Wireless devices.

Self-installation of the lead-in from pit to premises currently does not require a cabling license but may require Government to provide regulatory approval for consumer access to pits for the purpose of self-installation of the lead-in.

The provision of guides and videos, similar to those released in Europe, should be sufficient for consumers to complete the task. One option is for street parties or community days, where people work together to install the lead-ins.

Conclusions

This paper has presented options for upgrading the fixed access portion of the NBN from the MTM NBN to an all fibre NBN. The motivation for NBN Co to complete the ubiquitous FTTP fixed access network has been discussed. Of the three options, the third option provides the lowest cost to NBN Co because it does not have to complete the pit-to-premises lead-in installation.

http://doi.org/10.18080/jtde.v7n1.182

References

Bender, A. (2014). Vertigan broadband demand forecast leaves NBN Co CEO 'curious'. Computerworld. IDG. 28 August 2014. Retrieved from https://www.computerworld.com.au/article/553475/vertigan_broadband_demand_forecast_leaves_nbn_co_ceo_curious_/

BCAR. (2018). Demand for fixed-line broadband in Australia. Bureau of Communications and Arts Research. Department of Communications and the Arts. 27 February 2018. Retrieved from https://www.communications.gov.au/publications/demand-fixed-line-broadband-australia

Chorus. (2018). FY18 Full Year Result. Chorus. 27 August 2018. Retrieved from http://nzx-prod-s7fsd7f98s.s3-website-ap-southeast-2.amazonaws.com/attachments/CNU/322831/285411.pdf

Crozier, R. (2018). NBN Co chief gets frank about copper's problems. Itnews. 27 April 2018. Retrieved from https://www.itnews.com.au/news/nbn-co-chief-gets-frank-about-coppers-problems-489788

Dickinson, E. (2018). What if Telstra acquired the NBN?. ARN. IDG. 13 November 2018. Retrieved from https://www.arnnet.com.au/article/649042/what-telstra-acquired-nbn/

Dow, C. (2016). The case for 100 Mbps (or more...). Chorus. 20 June 2016. Retrieved from https://www.chorus.co.nz/blog/the-case-for-100mbps-or-more

FastInternetBlog. (2016). Gigaclear – Installation & Review. FastInternetBlog. 12 September 2016. Retrieved from https://www.fastinternetblog.uk/?p=348

FoxTel. (2018). 4K TV: Why You Should Switch to Satellite. FoxTel. 24 August 2018. Retrieved from https://www.foxtel.com.au/whats-on/foxtel-insider/foxtel/iq4k/satellite-vs-internet.html

Foxtel. (2019). Foxtel Broadband Bundles for existing customers. FoxTel. 30 March 2019. Retrieved from https://www.foxtel.com.au/shop/upgrade/broadband-bundles/bundles/nbn.html

Gigaclear. (2016). Ultrafast Fibre from Gigaclear Networks. Gigaclear. Retrieved from https://www.gigaclear.com/homebroadband

Gregory, M. (2014). Why the NBN's cost-benefit analysis is flawed on arrival. The Australian. News Corporation. 18 September 2014. Retrieved from https://www.theaustralian.com.au/business/business-spectator/why-the-nbns-costbenefit-analysis-is-flawed-on-arrival/news-story/dbc280971aec94ceb18ac44e211d18be

http://doi.org/10.18080/jtde.v7n1.182

Gregory, M.A. (2015a). "Why the NBN can do without fibre-to-the-node". *The Australian*. News Limited. 10 April 2015. Retrieved from https://www.theaustralian.com.au/business/business-spectator/why-the-nbn-can-do-without-fibretothenode--/news-story/29215a9c2b4c2d0cb904326283887f64

Gregory, M. (2015b). How much do FTTP NBN connections really cost? The Australian. News Corporation. 18 September 2015. Retrieved from https://www.theaustralian.com.au/business/business-spectator/how-much-do-fttp-nbn-connections-really-cost/news-story/74dadb937448c9efefecde5e7d6f56b2

Gregory, M. (2016). Can NBN withstand the pressure test? The Australian. News Corporation. 10 March 2016. Retrieved from https://www.theaustralian.com.au/business/business-spectator/can-nbn-withstand-the-pressure-test/news-story/8fbcb3b208f9638242784a0c0585246c

Gregory, M. (2017). Is it time for NBN Co to make fibre-to-the-curb the default option?. The Australian. News Corporation. 15 February 2017. Retrieved from https://www.theaustralian.com.au/business/technology/opinion/is-it-time-for-nbn-co-to-make-fibretothecurb-the-default-option/news-story/6c1938a6a48da2c74743ee939b5e226c

Gregory, M. (2018). Australian Wholesale Telecommunications Reforms. Journal of Telecommunications and the Digital Economy, 6(2), 1-34. https://doi.org/10.18080/jtde.v6n2.155

Irving, W. (2018). Establishing a standalone infrastructure business unit. Telstra Wholesale. Telstra Exchange. 20 June 2018. Retrieved from https://exchange.telstra.com.au/establishing-standalone-infrastructure-business/

Keisler, K. (2017). Setting the facts straight on Fibre-to-the-Node. NBN Co. 8 March 2017. Retrieved from https://www.nbnco.com.au/blog/the-nbn-project/setting-the-facts-straight-on-fibre-to-the-node

NBNCO. (2018). Corporate Plan 2019. NBN Co. August 2019. Retrieved from https://www.nbnco.com.au/corporate-information/about-nbn-co/corporate-plan/corporate-plan

NBNCO. (2019a). NBN Co half-year report FY19. NBN Co. 18 February 2019. Retrieved from https://www.nbnco.com.au/corporate-information/about-nbn-co/corporate-plan/financial-reports.html

NBN Co. (2019b). NBN Co scales towards 2020. NBN Co. 18 February 2019. Retrieved from https://www.nbnco.com.au/corporate-information/media-centre/media-statements/nbn-co-scales-towards-2020

News. (2019). 8K is here this year, but there's no rush to upgrade. News.com.au. News Corporation. 13 January 2019. Retrieved from https://www.news.com.au/technology/home-entertainment/tv/8k-is-the-new-frontier-in-tv-technology-but-you-really-dont-need-it/news-story/4d5f6f1d93ad5820bcaccfe5300c718f

Ookla. (2019). Speedtest Global Index. January 2019. Retrieved from https://www.speedtest.net/global-index

RAFC. (2016). Promise Check: Deliver minimum broadband speeds of 25 mbps by 2016 and 50 mbps to 90pc of fixed line users by 2019. RMIT ABC Fact Check. Australian Government. 8 May 2016. Retrieved from https://www.abc.net.au/news/2014-07-27/nbn-speeds-promise-check/5543512

Smith, P. (2018). NBN write-down 'inevitable': Damning S&P report. Australian Financial Review. Fairfax Media. 25 July 2018. Retrieved from https://www.afr.com/technology/web/nbn/sp-nbn-20180724-h132tf

Telstra. (2019). How To. How do I set up my devices on nbn™ Fixed Wireless? Telstra Corporation. 22 March 2019. Retrieved from https://www.telstra.com.au/support/category/broadband/nbn/how-do-i-install-my-fixed-wireless-equipment

Turnbull, M. (2013). "Panel of Experts to conduct cost-benefit analysis of broadband & review NBN regulation". Ministers for the Department of Communications and the Arts, Government of Australia. 12 December 2013. Retrieved from http://www.minister.communications.gov.au/malcolm_turnbull/news/panel_of_experts_to_conduct_cost-benefit_analysis_of_broadband_and_review_nbn_regulation#.WxIOQEiFNaQ

http://doi.org/10.18080/jtde.v7n1.182