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Inquiry into the Business Case for the National Broadband Network (NBN)

This is a personal submission, I hope of relevance to the Joint Standing Committee on the NBN. I am an innovation researcher, and research data analyst, who works at Monash University, on a major innovation project (ANDS.org.au) developing Australia's research infrastructure, with the aim to exploit Australia's data advantage. My PhD (Ferrers 2012) was on adoption of new technology, specifically relating to 3G broadband, but included analysis of NBN documents (such as [McKinsey 2010](#)). My publications relevant to this Inquiry include an analysis of the value of NBN, comparing FTTN* and FTTP approaches ([Ferrers 2016](#)). See more about me at: https://telsoc.org/journal/authors/richard_ferrers). For terms*, See Glossary at foot of document.

Terms of Inquiry into NBN Business Case

The Terms of Inquiry into the NBN Business Case, asks for submissions into NBN's overall long term financial outlook for NBN Co and forecasts in relation to: revenue generation; key financial indicators in the Corporate Plan; competitive risks facing the multi-technology mix; impact of alternative pricing structure; and other relevant matters. In my opinion, the central question that underpins the committee's inquiry is this: *Is NBN a viable business?* To break this down further,: Will NBN generate sufficient revenue to cover its costs, and keep its customers from switching to competitor technologies such as mobile? Does the NBN Corporate Plan give confidence of NBN viability out to 2040? Can NBN structure its prices to be more attractive to consumers and businesses to accelerate usage? Can NBN maintain future profitability to increase the prospects of a future sale?

I sought to find an approach that would contribute to answering the committee's questions. I had been introduced to a new, rapid-prototyping modelling tool, which can instantly create and amend graphs using multiple data levers. I saw the immediate potential for the complexity of NBN's financial and competitive position to be explored visually using the model. as it allows users to play with complex interaction of variables, such as: the timing of replacing FTTN and the likelihood of FTTN users leaving NBN as FTTN approaches the end of its useful life, in order to showcase the financial impact on NBN.

I analysed the NBN Corporate Plan and was able to generate the financial position of NBN at the end of the NBN build in 2021 (see Figure 1; [Ferrers 2018 v1](#)). Then, I could start to create levers which would affect NBN's financial position going forward. For instance, NBN customers switching to mobile.

Here: I realised if I projected NBN's financial result forward twenty years, without any changes in assumptions (*ceteris paribus*), the value of NBN would be the cash balance at the end of NBN at the end of twenty years. This formed the Base Case for

the value of NBN at \$31B. From there, I added variables to the model which could significantly shift the value of NBN. I aimed to have no more than six variables that offered, in combination, potentially a hundred million scenarios of NBN's future. By the time I'd finished, I had seven variables and potentially four billion scenarios. Now I could answer the following questions that impact NBN's financial future:

- what is NBN worth? what is the value of NBN? what is the "overall long term financial outlook" for the NBN?
- what might affect the value of NBN? By a little or a lot? what could go wrong with NBN?
- how might the NBN affect Australia's GDP?
- when will NBN repay its \$20B debt? Could it not repay the debt?

I built a model of NBN's finances after 2021 which reflects on, and calculate answers to these questions. The model ([Ferrers 2018a v5a](#)) predicts NBN's value, by calculating its cash flows or profits (EBITDA) over twenty years of operations ending in 2041 (20 years after finishing the NBN Build; hereafter called Yr 20).

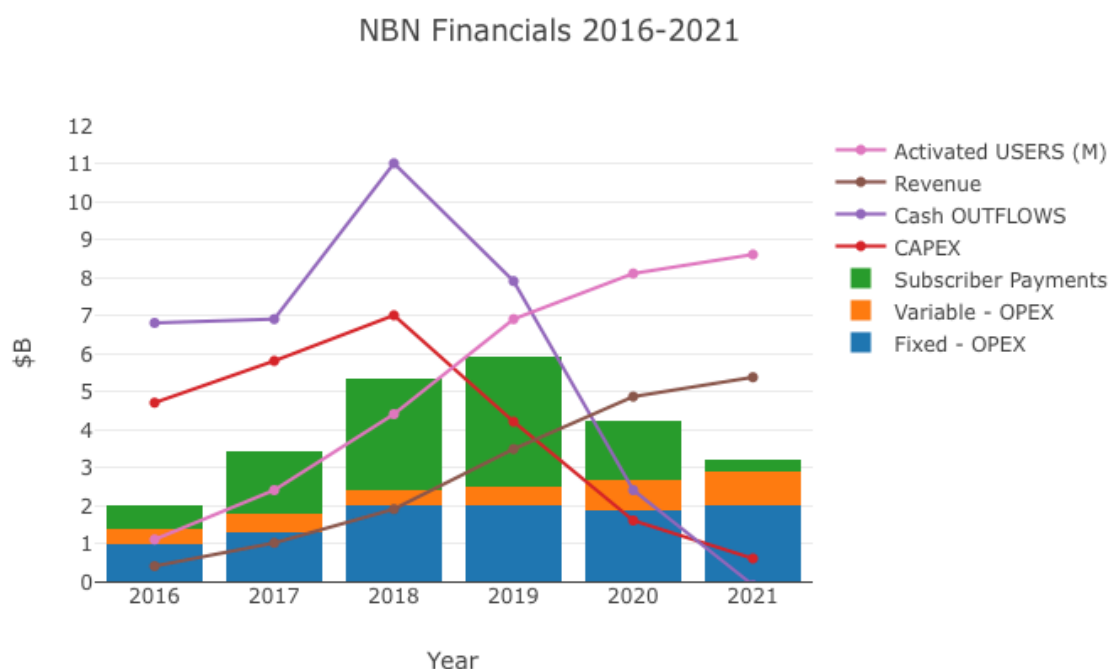


Figure 1. NBN Financials during the NBN Build. Debt \$20B. Cashflow positive in 2021.

What is a model for? What is good about a model? What is left out of the model? What can I do with the model?

A model is a simplification of a complex reality, to try to understand what assumptions and levers can affect the outcome of the model, and by how much. The outcome in this case is the value of the NBN, and the impact on GDP. Of course, NBN

has a complex model in-house, and probably several strategy people who advise the CEO and Board, as well as the Minister and Joint Committee. My model is of interest to compare to and verify the NBN model. If the Committee finds the model useful, I hope that they follow the links and play with the levers to find out about what the value of the NBN is under various scenarios for NBN's future. Click [here](#) to see the (Ferrers 2018) model (and [here](#) for v5 with explanations).

The model is good and useful because it:

- includes a number of levers (around 6), which the Committee, their advisors, the public and other stakeholders can use and / or alter
- immediately calculates NBN value and GDP impact every time a lever changes
- is publicly available on the [www \(Ferrers 2018a v5a\)](#) including all the calculations and assumptions, and
- contains assumptions that can be changed by a user. For instance, the life of FTTN is set at ten years, and FTTC at twenty years. These numbers can be changed to see the impact on the value of the NBN in conjunction with the lever settings. Other assumptions include the NBN financial result in 2021, the opening Debt balance in 2021, the cost per household to install FTTC or FTTP. These can all be easily altered to test the impact on NBN value.

The levers in the model include:

- impact of more NBN customers switching from or to mobile services,
- cost and time to replace FTTN with either FTTC or FTTP (at different times),
- financial impact of not replacing FTTN, and FTTN users leaving NBN as FTTN gets to the end of its useful life
- financial impact of household and business takeup of gigabit services,
- financial impact of changes in NBN customer satisfaction, and
- time to repay NBN's debt, (which has no impact on NBN value).

Issues Highlighted by the Model:

- FTTN can be replaced by FTTC with four years of NBN projected cash profits (at a cost of 4.3M homes times \$2900 per home; approx \$12B)
- FTTN can be replaced by FTTP with six years of NBN projected cash profits (at a cost of 4.3M homes times \$4400 per home; approx \$18B)
- NBN \$20B debt can be repaid fully in eight years, if no money is set aside for replacing the ageing FTTN network
- If NBN debt fully paid before FTTN replacement funds set aside, then FTTN can be replaced after debt repayment without impacting NBN value at Yr 20 (2041;). If repay debt slower, can upgrade FTTN earlier, with slight decrease in NBN value (\$16B), proportional to numbers of consumers leaving raging FTTN network.

Examining the Impact of each Lever in the Model on NBN Value:

- Base case model: values NBN at \$31B (discounted at 5% to \$12.5B), but assumes no changes over 20 years from:
 - customer demand, competing mobile technologies, no impact of FTTN coming to the end of its useful life. This scenario is very unlikely.

NBN Value - Base Case	\$31B
Mobile Users	26.5%
Customer Satisfaction	60%
Gigabit uptake	0%
FTTN leave at End of Life	0%
FTTN Upgrade	0
Debt Repayment (no impact on NBN value)	0

• NBN value is very sensitive (\$1B per 1% change) to customers leaving to become mobile Users. For every loss or gain of 10% households, NBN value moves up or down by \$12B.

NBN Value	\$39B	\$27B	\$14B
Mobile Users	20%	30%	40%
(Loss)/Gain from Base Case	\$8B gain	(\$4B) loss	(\$17B) loss

• NBN value is very sensitive (approx \$50B) to movement in customer satisfaction. At 60-80% level of satisfaction, no change in NBN value, but above 80% then Value jumps to \$52B. Falling below 60%, NBN value drops to \$21B, and below 40% to \$3B.

NBN Value	\$3B	\$31B	\$52B
Customer Satisfaction	40%	60%	80%
(Loss)/Gain from Base Case	(\$28B) loss	Nil	\$21B gain

• NBN is less sensitive (approx \$10B) to Gigabit upgraders than customer satisfaction; at 20% uptake, NBN value increases from Base Case \$31B to \$37B, at 40% uptake \$44B, at 60% \$50B.

NBN Value	\$37B	\$44B	\$50B
Gigabit takeup	20%	40%	60%
(Loss)/Gain from Base Case	\$6B gain	\$13B gain	\$19B gain

• When FTTN comes to the end of its useful life, some FTTN customers may walk away from NBN. The impact on NBN value, if FTTN is not replaced, means NBN value falls by \$4B to \$14B, from the Base Case. The Base Case assumes no FTTN customers leave.

NBN Value	\$27B	\$22B	\$17B
FTTN leave at End of Life	20%	50%	80%
(Loss)/Gain from Base Case	(\$4B) loss	(\$9B) loss	(\$14B) loss

- When FTTN is replaced (before debt paid), NBN value rises slightly from the Base Case at 30% Gigabit uptake to: \$32-38B, at 70% uptake to \$54 - 59B. Effectively, FTTN replacement pays for itself, once 30% of network use is at gigabit speeds. These results stand regardless of who leaves FTTN when at end of its useful life. The model makes no distinction beyond quality of or faster than gigabit services, so upgrading FTTN to FTTC is better than FTTP, since it is cheaper to install.

NBN Value, when:			
1.FTTN replaced with <u>FTTC</u> , no debt repayment	\$21B	\$38B	\$59B
Gigabit takeup	0%	30%	70%
(Loss)/Gain from Base Case	(\$9B) loss	\$7B gain	\$28B gain
2.FTTN replaced with <u>FTTP</u> , no debt repayment	\$16B	\$32B	\$54B
Gigabit takeup	0%	30%	70%
(Loss)/Gain from Base Case	(\$15B) loss	\$1B gain	\$23B gain

In Conclusion: I commend this model (Ferrers 2018a) to you, the Committee, to consider the many possible futures of the NBN, and to NBN Co to compare against their internal models. The projected position in 2021 looks strong but the path forward from there, especially over the next 20 to 40 years has many possible pathways. The model allows the Committee to explore some of those possibilities.

What I take away from closely looking at the NBN numbers is cause for a lot of optimism about the future of NBN. There is money to repay debt, and replace FTTN, but NBN will have to take care to keep customers satisfied (or risk \$50B impact on value), and not lose customers to mobile or other competitive alternatives (at a cost of \$1B per 1% customer loss). NBN has opportunity to upgrade customers to gigabit services (with potential \$10B gains). At the same time, NBN needs over the next 20 years to upgrade FTTN (costing \$12B for FTTC; \$18B for FTTP), to avoid FTTN loss of revenue (up to \$15B). The FTTN upgrade can only increase NBN value, if NBN can convince 30% of NBN ex FTTN customers to upgrade to gigabit services - quite a challenge.

Disclaimer:

The model contains no interest paid or earned, no taxation, no price rises and no inflation, so is a model of 'real' prices. Discounting future cashflows is assumed to offset equal interest earned and NBN price rises, leaving the NBN value as a real un-inflated value. Adding an annual interest payable component would be a useful next step to the model, to add costs to delaying action. See further in Disclaimer comment in V5 of the model on this topic. NB: Repaying NBN Debt has no impact on the value of NBN, since the debt and cash are considered part of the NBN value.

In the brief time to create the model, some things have been left out (such as inflation, taxation), customer satisfaction by technology type, upgrading FTTC and HFC to FTTP. These enhancement can be added if the Committee needs it. More details summarising impact of each model variable on NBN value can be found at: Figshare Ferrers (2018b) NBN Submission V2.

References

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Glossary

CEO - Chief Executive Officer
EBITDA - Earnings before Interest, Tax and Depreciation
FTTN - Fibre to the Node
FTTP - Fibre to the Premises
FTTC - Fibre to the Curb
GDP - Gross Domestic Product
HFC - Hybrid Fibre Coax network
NBN - National Broadband Network

Appendices:

https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/

How_to_make_a_submission

The best submissions:

- clearly address some or all of the terms of reference—you do not need to address each one
- are relevant and highlight your own perspective
- are concise, generally no longer than four to five pages
- begin with a short introduction about yourself or the organisation you represent
- emphasise the key points so that they are clear
- outline not only what the issues are but how problems can be addressed, as the committee looks to submissions for ideas to make recommendations
- only include documents that directly relate to your key points
- only include information you would be happy to see published on the internet.