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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 (such as FTTN and FTTP), see the glossary at the foot of this document.

This submission introduces an online model which describes financial scenarios of NBN's business over the next 20 years; including replacing FTTN with FTTC/FTTP, repaying debt, upgrading to gigabit services and the potential fallout of not replacing FTTN, to calculate NBN's financial value under these different possible futures.

Terms of the Inquiry into the 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. The central question that underpins the committee's inquiry is this: *Is NBN a viable business?* 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?

In seeking to answer the committee's central question, I developed a model to explore NBN's financial and competitive position. My model is based on a new, rapid-prototyping modelling tool, which can instantly create and amend graphs using multiple data levers. I saw the immediate potential for the model to be used, to allows users to explore the complexity of NBN's financial and competitive position, to play with a complex interaction of variables, visually. The model allows users to adjust, for instance: the timing of replacing FTTN and the likelihood of FTTN users leaving NBN as FTTN approaches the end of its useful life, and instantly calculate the financial impact on NBN's value, and see the resulting cashflows.

I analysed the NBN Corporate Plan and was able to generate the financial position of NBN Co at the end of the NBN build in 2021 (see Figure 1; Ferrers 2018 v1). 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 NBN Co's cash balance at

the end of twenty years. This formed the Base Case for the value of NBN at $31B. From there, I added lever variables to the model which could significantly shift the value of NBN; for example, per cent of households using mobile broadband rather than NBN. I aimed to have no more than six levers that offered, in combination, potentially a hundred million scenarios of NBN's future. By the time I'd finished, I had seven levers and potentially billions of 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?
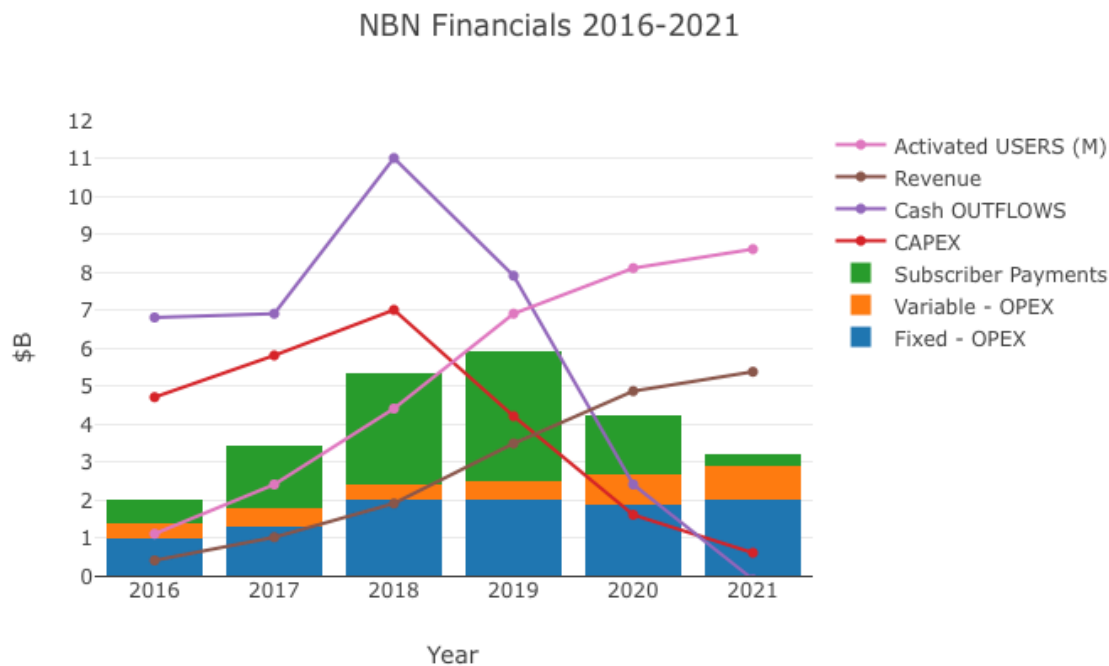**The model**

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

I built a model of NBN's finances after 2021 which reflects on, and calculates 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).

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.

How is the model useful

The model is useful because :
- it includes a number of levers, which the Committee, their advisors, the public and other stakeholders can use or alter.
- it immediately calculates NBN value and GDP impact every time a lever changes.
- it is publicly available on the www (Ferrers 2018a v5a) including all the calculations and assumptions, and
- it 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.
• time to replace FTTN with either FTTC or FTTP.
• financial impact of not replacing FTTN; that is 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, but wth a reduction in NBN value at Yr 20 to $20B.

Examining the Impact of each Lever in the Model on NBN Value
The 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, and no impact of FTTN coming to the end of its useful life. This scenario is very unlikely. The following tables show first the model settings for the Base Case and then the impact on NBN value of each lever, in order of most to least impact, and lastly the impact of FTTN replacement under several gigabit uptake scenarios.

NBN Value - Base Case	$31B
Mobile Users	26.5%
Customer Satisfaction	60%
Gigabit uptake	0%
FTTN leave at End of Life	0%
FTTN Upgrade / Debt Repayment	$0

Table 1 - Summary of Model setting for NBN Base Case.

Lever 1. Mobile only (non-NBN) **Customers**. NBN value is <u>very sensitive </u>to customers leaving to become <u>mobile-only broadband users</u>. For every loss/gain of 10% households, NBN value moves up/down by $12B. (approx. $1B per 1% change impact)

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

Lever 2. Customer Satisfaction. NBN value is <u>very sensitive </u>to movement in <u>customer satisfaction</u>. At 60-80% level of satisfaction, there is 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. (approximately $50B range of impact)

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

Lever 3. Gigabit Uptake. NBN is <u>less sensitive</u> to <u>Gigabit upgraders than customer satisfaction</u>; at 20% uptake, NBN value increases from Base Case $31B to $37B, at 40% uptake $44B, at 60% $50B. (possible up to $19B NBN value impact)

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

Lever 4. FTTN end of life abandoners. 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. (approx. $10B range of impact)

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

Lever 5. FTTN replacement. 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 its 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. (approximately $40B range of NBN value impact)

NBN Value, when:			
1.FTTN replaced with FTTC, 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 FTTP, no debt repayment	$16B	$32B	$54B
Gigabit takeup	0%	30%	70%
(Loss)/Gain from Base Case	($15B) loss	$1B gain	$23B gain

In Conclusion: The model (Ferrers 2018a) and its more documented version (Ferrers 2018b) that I have outlined in this submission allows interested users (the Committee, their advisors, the public and other stakeholders) to consider the many possible futures of the NBN, taking into account the impact of multiple levers that impact on the NBN business. The projected position for NBN in 2021 looks strong but the path forward from there, especially over the next 20 to 40 years, has many possible progressions.

Looking closely at the NBN numbers using the model, from a Base Case NBN value of $31B, I found that there is a lot of cause for 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 a range of up to $50B impact on NBN value), and not lose ground to mobile or other competitive alternatives (at a cost of $1B per 1% customer loss).

NBN has an opportunity to upgrade customers to gigabit services (with potential up to $19B gains of NBN value) with existing technologies (FTTP, FTTC, HFC). 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 loss of NBN value), from customers abandoning, FTTN near the end of its useful life. But the model suggests, the FTTN upgrade can only increase NBN value, if NBN can convince 30% of NBN customers to upgrade to gigabit services - quite a challenge.

The model doesn't show the likely value of NBN, only the NBN value given the setting of a number of levers. Your choice of moving the levers indicates NBN value in that scenario. The model does show which levers affect the NBN value more and which levers affect the NBN value less.

Disclaimer:

The model does not account for interest paid or earned, taxation, price rises or 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 (Ferrers 2018c) 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 (2018c) NBN Submission V2.

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Glossary

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