

**THE COALITION'S PLAN FOR
FAST BROADBAND AND AN AFFORDABLE NBN**

BACKGROUND PAPERS

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HOW DID WE GET HERE?

Finding a strategy to upgrade telecommunications in Australia has been a challenge for both Labor and the Coalition over the past decade. Between 2004 and 2008 governments from both sides of politics were unable to reach a deal with Telstra for an upgrade that would fairly balance the interests of Telstra's shareholders and those of consumers and rival carriers.

After winning the 2007 election promising a \$4.7 billion National Broadband Network to be built in partnership with the private sector, Labor's talks with Telstra reached an impasse by late 2008, prompting an abrupt shift in policy. In April 2009 the Government announced it would set up a new taxpayer-funded company, NBN Co, to build a \$43 billion fibre access network.

THE ROLE OF GOVERNMENT

To put this decision in context, it must be seen against the backdrop of thirty years of governments pursuing the opposite policy – getting out of telecommunications rather than getting back into it.

Communications was once a public monopoly in most nations (including Australia, where from 1901 until 1975 the Postmaster-General's Department was responsible for postal, telephone and telegraph services).

But from the 1980s market-oriented governments around the world began to privatize telecommunications firms (starting with British Telecom in 1984), deregulate markets and encourage competition. This shift in approach reflected a number of insights:

- Private ownership and an open, competitive market create more direct incentives for efficiency and lower prices for consumers.
- A competitive market drives consumer choice and more rapid innovation in products and services.
- Ownership conflicts with government's regulatory role – should regulation emphasize efficiency, competition and consumer welfare, or profits for the public monopoly carrier?
- Private investors are usually better placed than taxpayers to evaluate, fund and bear the risk of new investments in networks or technologies in an increasingly dynamic sector.

ACCESS TO MONOPOLY INFRASTRUCTURE

Even as governments sold off carriers and freed up markets, one key area of regulation became more important and intrusive. Regulators typically required former public monopolies (such as Telstra) to provide their new rivals with access to 'natural monopoly' facilities such as the local access network – the copper wires running between local exchanges and customer homes or businesses.

This was infrastructure that, outside of the most densely populated areas, was neither profitable nor efficient for rival carriers to duplicate because of high capital costs and the powerful economies of scale available to the incumbent network owner.

Instead rivals gained access to the incumbent's existing infrastructure at prices set by regulators. In some markets, including Australia, the price and non-price terms of such access became a fierce battleground between the now privatised incumbent carriers, rival carriers, and regulators.

Striking an optimal balance on access to natural monopoly infrastructure is not easy. Regulators must balance competition (which can be spurred by access rules favourable to non-incumbents) and adequate incentives for incumbents and other carriers to invest (which requires fair returns, stable regulation and assurances the investor's competitors won't be allowed to free-ride by accessing new network infrastructure at a bargain price).

LABOR'S NATIONAL BROADBAND NETWORK

After Kevin Rudd and Stephen Conroy dumped their 2007 broadband policy in 2009, they created NBN Co as a taxpayer-funded government enterprise with a mandate to overbuild Telstra's existing copper network and run fibre to 93 per cent of Australian premises (an estimated 12.2 million homes and businesses by 2021). The NBN would be open access infrastructure available to other carriers.

While Labor initially claimed private investors would contribute to the vast cost of a fibre NBN, this commitment evaporated between April 2009, when NBN Co was unveiled, and March 2010, when a \$25 million Implementation Study explaining how the new policy would work was released.

As the new policy evolved, it became clear Labor intended NBN Co to have a legally and contractually protected monopoly over the access network. Legislation to enable this was passed by Parliament and in June 2011 the Government and NBN Co entered into agreements with Telstra and Optus for both carriers to migrate their customers onto the NBN and decommission their networks.

A costly fibre access network funded by taxpayers, insulated from competition, and overbuilding economically viable infrastructure would never have been the Coalition's preferred strategy for upgrading broadband. Nor would it have been the Coalition's approach to achieving the competition policy objective of separating Telstra's retail services business from its customer access network.

Indeed, the Coalition believes the above-stated arguments for private ownership of telecommunications represent a powerful long-term case for eventual privatization of a properly regulated NBN – a goal to which Labor also claims to be committed.

But Australians (particularly in regional areas) rightly have no tolerance for further delay on broadband. Households and businesses with substandard service have become increasingly impatient since 2007, when Labor promised a NBN finished by 2013.

NBN Co's LIABILITIES & OBLIGATIONS

The large volume of legislation and regulation passed by Parliament that assumes the NBN will be a central player in the telecommunications market is one constraint preventing this.

But equally importantly, Labor has committed future governments to costly open-ended obligations that cannot be discarded without destroying yet more economic value that belongs to taxpayers:

- NBN Co's contracts with suppliers (including disclosed options for extensions) had a face value of more than \$9 billion at the end of 2012.¹

¹ The supplier contracts with highest face value (including extensions) are NBN Co's deals with Silcar (\$1.1 billion for the fibre rollout in NSW, Queensland and the ACT), Corning (\$1.2 billion for fibre optic cable), and Ericsson (\$1.1 billion for the fixed wireless rollout). Other contracts with publicly stated face values exceeding \$100 million include Syntheo, Transfield, Visionstream, Service Stream,

- Ahead of the September election NBN Co is attempting to renew construction deals for reportedly lengthy terms, despite the failure of its contractors to meet the required performance targets.
- The Government must pay NBN Co's wind-up expenses if it ceases operation. The 2012-13 MYEFO revealed contingent termination liabilities of \$2.8 billion in September 2012, a rise of \$1 billion from March. If liabilities keep accruing at this rate they may be \$5 billion by the election.²
- TUSMA, an agency created in 2012 to manage the Universal Service Obligation and other public interest services, has signed a contract paying \$6.4 billion to Telstra between 2012 and 2032 for the USO and other services.³ This is in part consideration the Government agreed to pay Telstra as a result of the Definitive Agreements of June 2011 between the two parties and NBN Co.
- NBN Co has separately signed contracts that involve payments over forty years to Telstra with a face value exceeding \$50 billion if paid in full. These include a 'PSAA' payment of about \$1500 each time NBN Co takes over a premise previously connected to Telstra's networks. The payments compensate Telstra for loss of value arising from its June 2011 agreement to migrate its customers to the NBN, shut its copper and HFC networks, and grant long-term leases to NBN Co over its ducts, exchanges and backhaul infrastructure.
- In June 2011 Senator Stephen Conroy claimed the NBN Co and TUSMA payments to Telstra outlined in the two paragraphs above had a combined value of \$11 billion in after-tax June 2010 dollars. But the true present value (and cost to taxpayers) of these payments is in the range of \$20-25 billion if a 7 per cent discount rate (which more appropriately reflects the very minimal risk of non-payment by the Government and a wholly government-owned company) is used instead of 8-10 per cent. The Coalition's preference for a more honest and accurate estimate of the expense of this deal to the Government and NBN Co does not imply any stance regarding its validity, which was a matter settled by the parties at the time of the negotiation.
- Finally, NBN Co has also agreed to pay Optus/Singtel nominal payments between 2014 and 2020 with a nominal face value of about \$1.7 billion in return for closure of the Optus HFC network and migration of about 500,000 customers to the NBN.

It should be noted that a not-insignificant proportion of these commitments are almost as costly to taxpayers if the NBN is cancelled as if it proceeds.

While Senator Conroy's apparently deliberate efforts to create such liabilities to bind the hands of future governments are an affront to the democratic process, it would be senseless for the Coalition to respond with similarly irresponsible behaviour.

The Coalition has therefore framed its policy to avoid known constraints arising from the actions and decisions of the Labor Government, and to attempt to minimize further delay.

For now this necessitates using a publicly owned NBN Co as a vehicle for the upgrade of the local access network and provision of very fast broadband to all Australians.

Pryzmion, Nokia Siemens, TE Connectivity, Loral, Arianespace, ViaSat, IPStar, Perkins-Cockram, Optimal/OFS, Fujitsu, Emerson Network Power, and Warren & Brown Technologies.

² Australian Government: 'Mid-Year Economic & Fiscal Outlook, 2012-13,' Oct 2012, p.336.

³ See AusTender Contract Notice CN1004881, 1 Nov 2012: <https://www.tenders.gov.au/?event=public.cn.view&CNUUID=B9F8D7AE-A93E-EA32-2DA4A6970E16BE30>

Our long-term position, as articulated in the Coalition's broadband policy, is that NBN Co should be privatized – a view which the Labor party has also explicitly endorsed.

BROADBAND UPGRADES – TECHNICAL AND ECONOMIC TRADEOFFS

Investing efficiently in improved broadband is a complicated objective. It involves technical decisions about the network, economic constraints such as the cost and availability of capital, assessments of current user demand for bandwidth and price sensitivity, and considerable uncertainty about what applications or services households and businesses will require in the future (and how much they will be prepared to pay for the bandwidth required to support them).

COPPER, HFC AND FIBRE OPTIC CABLE

One thing is indisputable: the volume of data crossing the Internet every day is growing extremely rapidly, with video in all its forms increasingly the key driver.⁴

To carry this data, the Internet's backbone has long used fibre optic cables – tiny strands of glass which, with the right electronic equipment at either end, carry vast quantities of data. But at the 'edge' of the network, closest to users, much of the Internet is still carried on copper lines used for telephone calls.

Copper cables have lower capacity, but replacing them with glass (fibre) is very expensive, largely because of the labour costs involved.

In addition, advances in network technologies have increased the amount of data copper can carry by a factor of roughly five thousand over the past 15 years – from dialup's 14 kilobits per second in the 1990s to 100 megabits per second transfer rates over the VDSL2 broadband now being rolled out by private carriers in many markets.

Similar advances allow hybrid fibre co-axial (HFC) networks originally rolled out for pay TV (such as the Optus and Telstra HFC networks in parts of Australia) to offer download data rates of 100 Megabits per second. Broadband over HFC provides much of the world's very fast broadband today, and there is a clear upgrade path to 300 megabits per second.⁵

The value of network technologies, which increase data rates over existing networks, is they avert the need to upgrade or replace 'last mile' lines to every home and business. This is expensive because it is both disruptive to residents, businesses and public amenities and labour-intensive; regrettably, Moore's law does not apply to digging holes.

⁴ According to Cisco, video (including TV, rentals, video on demand, over-the-top IPTV and peer-to-peer transfers of video files) will account for 86 per cent of all consumer Internet traffic by 2016.

http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360_ns827_Networking_Solutions_White_Paper.html

⁵ In June 2012, xDSL (DSL-family broadband over copper wires) accounted for 55 per cent of OECD fixed broadband, broadband over HFC cables about 30 per cent, and FTTP/FTTB (fibre to the building – typically a term that refers to fibre running to the basement of large apartment blocks) about 14 per cent. OECD Broadband Portal, June 2012 Update. Separate 2012 figures from the FTTH Council of Europe show about 6 per cent of OECD connections are actually fibre to the premises as currently proposed by NBN Co, rather than to the building.

FIBRE TO THE NODE (FTTN)

The data transfer rates achievable over copper decline with line length. So to shorten the length of the copper wires over which data has to travel, many telecommunications firms have extended fibre optic cable beyond local telephone exchanges to distribution points (or 'nodes') such as street cabinets which are much closer to end users. Here, fibre is connected to the existing copper wires running to premises.

This approach substantially increases bandwidth by dramatically shortening the length of the copper run over which data is transferred.

And since there is no disturbance at the user premises and less digging up of streets, fibre to the node (or FTTN) upgrades in established areas typically cost only 20 to 33 per cent as much as running fibre optic cable all the way to end users ('fibre to the premises' or FTTP).⁶

FTTN results in broadband that supports virtually any current application valued by home users (anyone claiming bandwidth of less than 100 megabits per second is unacceptable should remember a high definition video stream requires just 6-8 megabits per second, according to Cisco and Apple).

Data transfer rates over short copper lines provided by FTTN are already close to 100 megabits per second in any case, and will continue to climb as technology advances.

In the UK, BT has rolled out FTTN. Its 'Infinity' service offers maximum download/upload data rates of 76/18 megabits, with the actual data rates achieved across all users over 24 hours averaging better than 80 per cent of the advertised rates, according to the UK communications regulator Ofcom.⁷

Ofcom found the proportion of BT Infinity users receiving less than 90 per cent of their 24-hour average speed during peak periods was only 2 per cent for users on the top-tier 76/1 Megabit per second plan, and 3 per cent for those on the 38 Megabit per second plan.

FIBRE TO THE PREMISES (FTTP)

The main alternative to leveraging existing copper or HFC lines is 'fibre to the premises' or FTTP. FTTP provides higher maximum bandwidth now and greater potential for even more bandwidth in the future (at the expense of upgrading the electronics at either end). It also has operational advantages that modestly reduce certain costs for network operators – expenditures on repairing faults and the overhead expenses associated with provisioning new or different services are reduced, while energy consumption is also slightly lower.

In truth, however, most of the reductions in operating costs claimed for all-fibre networks are miniscule compared to the interest payments on the extra investment required to construct them.

⁶ Direct accounts from carriers including AT&T, BT, Deutsche Telecom and Chorus without exception note a ratio of 3-5X between FTTN/FTTC and FTTP. Further confirmation is available from numerous published analyses. See WIK Consult: 'Report for the European Competitive Telecommunication Association,' 2008. This report estimated FTTC costs per premise were \$690 in Germany and \$530 in Sweden. Costs for FTTH were roughly four and a half times higher at \$3100 in Germany and three and a half times higher at \$1900 in Sweden. Alternatively, see: Analysys Mason for Broadband Stakeholder Group (2008) 'Final Report for the BSG: The Costs of Deploying Fibre-based Next Generation Broadband Infrastructure,' 8 Sep 2008. This report estimated the cost differential between FTTC/VDSL2 and GPON FTTP at 4-5X in the UK - almost exactly the real figure reported by BT.

⁷ Ofcom, Nov 2012. Average speeds over 24 hours for users on BT Infinity 76 Mbps plans were 61-65Mbps (80-85 per cent of advertised data rates). Average speeds over 24 hours for users on 38 Mbps plans were 33-36 Mbps (85-95 per cent of advertised data rates).

In 'greenfields' settings such as new housing estates, FTTP infrastructure costs only slightly more than copper, leaving it the obvious choice in such areas unless there are specific commercial factors that argue otherwise. But most Australian greenfield developments have not been connected with fibre infrastructure over the past two years, due to NBN Co's bungled 2011 takeover of responsibility for these areas from private infrastructure builders.

In established suburbs, however, costs are far higher. NBN Co's revised Corporate Plan suggests that each of the 12.2 million premises to be served by FTTP will require capex of around \$2800, if 'shared' capital spending is spread pro rata across all premises.⁸

Both anecdotal evidence from contractors and NBN Co's persistent refusal to release any detailed financial information about the total per-premise capex cost of its FTTP rollout so far suggest the cost of taking fibre to every premise is turning out to be even more prohibitive for a non-incumbent.

Analysys Mason noted in 2011 that Australian FTTP construction costs were at that time already the equal most expensive in the world, 1.8 times higher than the equivalent US figure.⁹ As will be discussed further in the costing of Labor's NBN, the reality of FTTP in Australia as constructed by NBN Co shows every sign of being even less affordable.

HEAD TO HEAD: VERIZON (FTTP) AND AT&T (FTTN)

One fairly clear head-to-head comparison of the relative merits of FTTN and FTTP is the parallel network upgrades launched at the turn of the century by the two largest incumbent carriers in the United States, Verizon and AT&T.

Both faced a competitive threat when Comcast and other US cable companies added broadband and voice to their existing pay TV services over HFC networks in the late 1990s. Suddenly, the cable companies could do everything that the phone companies could, but faster.

In response Verizon chose to build an FTTP network (FiOS) that will reach about 18 million US households (or about 54 per cent of Verizon's original copper footprint) once infill of areas where fibre has been only partly rolled out is complete.

The FiOS rollout stopped entering new areas in 2010, when it was halted for financial reasons after capital expenditure of at least \$US23 billion (according to Verizon; Wall Street analysts argue the capital costs were even higher).¹⁰

In mid-2012 Verizon increased prices for most of its approximately 5 million FiOS users by about \$US10-15.¹¹ As a result, Verizon's second quarter 2012 results showed revenue per FiOS customer was up 8.5 per cent year-on-year.

⁸ NBN Co 2012-2015 Corporate Plan, p.75. The plan shows 'fibre and transit' capex by 2021 will reach \$28.5 billion, or \$2400 per FTTP premise passed, while a pro rata share of \$5.7 billion in shared capex is about \$400 per premise.

⁹ Australian FTTP costs per premise in 2011 were estimated at 1.8 times the cost in the US, equal with Norway as the highest in the world, according to Analysys Mason. In contrast countries with high fibre penetration other than the US such as Korea and Japan had cost profiles that were half the US level, due to aerial rollouts. Rupert Wood, Analysys Mason: 'FTTx Rollout & Capex in Developed Economies: Forecasts 2011-2016,' Apr 2011, p.48.

¹⁰ http://usatoday30.usatoday.com/money/industries/telecom/2010-03-26-verizon-fios_N.htm

¹¹ Thomas Gryya, Wall Street Journal: 'Verizon Raises FiOS Prices, Speed,' 18 June 2012. "The New York-based telecom company estimated the move would add about \$10 to \$15 per month to the average customer's data bill...The data bill for Verizon's FiOS

For its part AT&T deployed an FTTN network (uVerse) across a larger proportion of its traditional phone line footprint, which it is continuing to expand. It has 8 million customers and offers very similar 'triple play' bundles of telephone services, broadband and subscription TV to those offered by Verizon (underscoring that the practical services available to consumers over the two networks are directly comparable)

At present both carriers have a similar ARPU (average revenue per user) of around \$US145/month for triple play users on their next-generation networks – a crude indication that US consumers place much the same value on these offerings. But AT&T's upgraded network cost the company only a third as much to build.¹²

BROADBAND INVESTMENT AND WILLINGNESS TO PAY

Telecommunications firms recognize FTTP is a very strong technological solution. But when they extend or upgrade their network they must weigh the technical benefits of fibre and the faster connections it can provide against the higher capital costs and slower construction schedule it entails. Do customers value the higher data transfer rates fibre can provide? And if so, how much extra per month are they willing to pay?

The answer is slightly different for every user. Boosting the data transfer rate of a network has little utility on its own. Rather, bandwidth creates value when it allows users to take advantage of new or more powerful applications, or richer content, or to achieve previously unattainable goals, or to save time.

This is often forgotten in the political debate, where bandwidth tends to be presented as intrinsically valuable - more is more.

Reality is more complex – and a key insight is that utility, or value to the user, doesn't increase linearly with bandwidth. For most individuals or families a 50 megabit per second broadband connection is nowhere near twice as valuable as 25 megabits per second connection. That's because there are very few widely used applications that work for a user with access to downloads at 50 megabits but not for users with access to only 25 megabits.

User returns diminish as bandwidth increases.

Where diminishing returns set in depends on each individual. Still, it's safe to assume most readers of this policy would perceive huge value moving from a 1 megabit per second to a 20 megabit per second broadband plan. It is far less clear most would see a lot of advantage moving from 20 megabits per second to the 50 or 100 megabits per second download rates currently available over HFC cables or fibre connections.

This is reflected in the modest price premiums and small user numbers high speed plans attract.¹³

customers will be based on the network's speed, as set by the customer. Faster speeds will cost more money...The move also contrasts with the behavior of cable companies, which have long provided increased speeds to customers for free." Verizon's entry price for a 'triple play' (voice, data and cable TV) is \$US110/month.

¹² Market analysts expect both companies to experience flat wireline revenues over the next decade. See, for instance, J.P. Morgan, 'Adjusting estimates for AT&T and Verizon given iPhone strength, wireless weakness,' 8 October 2012, which forecasts AT&T fixed revenues flat near \$US60 billion and Verizon flat near \$US40 billion from 2012 to 2020.

¹³ Telstra and Optus charge \$10-20 a month extra for the highest tier on their HFC networks, depending on a users' other services

Indeed, around the world there is no evidence that many consumers are willing to pay a material premium for 100 megabits per second– and no sign of popular applications other than streaming video that utilize such bandwidth. Rupert Wood of Analysys Mason doubts faster data rates on their own will change this: “There is no clear demand for very high fixed-line bandwidth if a premium has to be paid... Consumers are more willing to focus their telecoms budgets on mobile devices and services.”¹⁴

MORE BANDWIDTH AT WHAT COST?

For network operators, the costs of incremental gains in bandwidth are also non-linear. As discussed, for the past decade data rates have been lifted with upgrades that cost only \$200 or so per premise for the upgraded components at either end of copper or HFC lines.¹⁵

But if squeezing networks in this way is no longer sufficient, supplying the next leap forward in bandwidth will be more costly – as much as several thousand dollars per premise if copper is replaced with FTTP, as Labor’s NBN plan involves.

Around the world pragmatic network owners face this tradeoff. Faced with growing use of bandwidth, but no apparent appetite among consumers to pay increased prices, companies makes choices about their optimal investment strategy, taking into account evolving technologies, willingness to pay, incremental deployment and operational costs, and the time value of money.

Every national market has factors that make it unique. But it is notable that few private network owners in the advanced world are investing aggressively in fibre to the premises at the moment except in greenfields areas, unless they are receiving government assistance to do so.

Forecasts presented to the European Fibre to the Home Council (the private FTTP sector’s industry association) in 2012 noted “overall forecast down significantly on last year” due to “poor progress among many major telcos and municipal projects in western Europe” and “many projects far behind previously published targets and plans”.¹⁶

The very same analysis goes on to admit: “No really compelling application that requires a fiber connection.” This makes the trade-offs telecommunications firms must consider very clear.

UNCERTAINTY OVER FUTURE DEMAND

The time value of money and the value of options are a far more significant factor in the choices about fibre being made by private investors (if not governments) than may appear to be the case.

A frequent feature of the Australian broadband debate is recitation by supporters of the current FTTP NBN of slogans such as ‘do it once, do it right, do it with fibre,’ along claims that investing in an intermediate solution such as FTTN will simply prove to be ‘a waste of money’ if, after a few years, rising demand for bandwidth and a willingness to pay significantly higher prices indicate fibre to the premises may be commercially viable in a significant share of the market (perhaps as much as the 60 per cent or so that in offshore markets is considered ‘commercial’ to upgrade broadband in).

These deceptively simple rationalisations are in fact quite misleading.

¹⁴ Rupert Wood, Analysys Mason: ‘FTTx Rollout & Capex in Developed Economies: Forecasts 2011–2016,’ Apr 2011, p.6.

¹⁵ Robert Kenny & Charles Kenny: ‘Super-fast Broadband, Is It Really Worth A Subsidy?’ Feb 2011, p.16.

¹⁶ Graham Finnie, ‘European FTTH Forecast, 2011-16,’ Feb 2012, p.2.

The greatest uncertainty overhanging investment in next-generation fixed networks is not over costs, despite the mystery that surrounds NBN Co's refusal to be open about the full capex cost per premise of its rollout. It is over revenue and user demand; nobody knows what applications may emerge to use the bandwidth that fibre provides, or what value consumers might place on them.

At the moment the only answer to this quest for a 'killer app' for fibre is more and better television.

In markets such as the US, where cable TV subscriptions are an embedded part of consumer behaviour, this may tip the scales in favour of investment. But relying on TV in addition to broadband and voice to drive revenues is less persuasive in Australia, where subscription TV penetration is lower.

Uncertainty over demand is why many private investors are choosing to defer investment in FTTP and, if they are incumbents or otherwise able, to instead deploy FTTN. FTTN puts less capital at risk.

Deferring an expensive and irreversible investment commitment such as FTTP, to the extent this is possible, is prudent commercial management if it permits more information about actual usage and investment returns on fibre to emerge.

NBN Co's NEED FOR PRICE 'FLEXIBILITY'

Labor in contrast, has made the decision to invest regardless – which is why the commitments Senator Conroy and others have made about pricing on the NBN are, in the end, largely worthless. This can be seen by reading the fine print of the undertakings NBN Co has twice proposed to the ACCC regarding its prices, terms, conditions and revenue constraints over the next three decades – undertakings which the ACCC has now twice rejected.

It is also presumably why NBN Co has pushed so hard for the elimination of rival fixed line networks – these otherwise could potentially constrain its ability to demand regulatory forbearance for use of its market power to recoup whatever costs it can via higher consumer prices, if demand turns out to be far short of that required to support the extraordinary amount of capital being sunk into its network.

Unsurprisingly NBN Co's attempts in its two Special Access Undertakings so far submitted to the ACCC to maximize pricing flexibility, obtain an overly generous regime for calculating its recoverable costs, and minimise the genuinely binding revenue constraints placed upon it has been sharply criticised by both Telstra and Optus, in recent submissions to the ACCC.¹⁷

Telstra and Optus both know that their operating margins and ability to offer competitive prices to their customers will be in the front line if there is a mismatch between investment in the NBN and demand for bandwidth.

¹⁷ Modeling by Optus submitted to the ACCC suggested that under the current Special Access Undertaking proposed by NBN Co significant fixed line price increases were likely, after a long period of falling prices. It modeled the likely price increase at 32 per cent over the next decade. Optus: 'Optus Submission to the ACCC Consultation Paper,' Jan 2013, p.56, online at:

[http://www.accc.gov.au/content/item.phtml?itemId=1099505&nodeId=1a6f2523b5c77adccaa1eb46da666601&fn=Optus%20submission%20-%20SAU%20consultation%20paper%20\(18%20January%202013\).pdf](http://www.accc.gov.au/content/item.phtml?itemId=1099505&nodeId=1a6f2523b5c77adccaa1eb46da666601&fn=Optus%20submission%20-%20SAU%20consultation%20paper%20(18%20January%202013).pdf)

Telstra's submission to the ACCC stated: "Using the more realistic assumption that usage increases by 30 per cent per annum, the CAGR for the basket of AVC and CVC services purchased by end-users is 19 per cent." This lifts the inflation-adjusted price per user across a basket of plans from \$28 in 2013 to \$145 in 2028. Telstra, 'Telstra Submission to the ACCC Consultation Paper,' Jan 2013, pp.67-68, online at:

[http://www.accc.gov.au/content/item.phtml?itemId=1099509&nodeId=9529f1bc961b9371229b6e5a6fecccfa&fn=Telstra%20submission%20-%20SAU%20consultation%20paper%20\(18%20January%202013\).pdf](http://www.accc.gov.au/content/item.phtml?itemId=1099509&nodeId=9529f1bc961b9371229b6e5a6fecccfa&fn=Telstra%20submission%20-%20SAU%20consultation%20paper%20(18%20January%202013).pdf)

At the same time NBN Co has made some startlingly frank confessions during its regulatory process. In particular it has explicitly acknowledged that its current prices do not reflect market demand, its operating and capital costs or the user charges needed to recover its reasonable costs and make the returns for taxpayers promised by Labor.

NBN Co made this clear in a letter to access seekers in January of this year: “The initial prices (as set out in the SAU) were developed in consultation with access seekers so as to enable a smooth transition for end users from legacy networks to the NBN. As such the initial prices are not the result of modelling of NBN Co’s costs and demand and NBN Co has been very clear on this in its consultation with access seekers.”¹⁸

Likewise, the NBN Co has conceded that its existing financial forecasts, bullish as they are, are just one scenario among a wide range of possible outcomes from Labor’s decision to require it to lay fibre to 93 per cent of premises. Even if these forecasts are achieved, they won’t permit NBN Co to completely recover its accumulated losses and investment.

The obvious implications for consumers are that the Government’s frequent assertion that comparable prices for ADSL2+ equivalent services over the NBN will remain at current levels into the future has no basis in economic reality – and NBN Co, if built according to the current plan, may someday have incentives to behave in a quite different manner than is currently assumed by its supporters.

How Does FTTP Now Compare to FTTN Now and FTTP Later?

In this light, reconsider the frequent assertion that investing in FTTN now and then upgrading to FTTP later, assuming this proves necessary, is a false economy – it will lead to greater costs for taxpayers than simply building FTTP now.

Solely by taking into account the time value of money, this proposition can be seen to be false as long as FTTN meets user needs for three years. (Some other considerations, such as the value of retaining flexibility in future decision-making, will be considered in the next section.)

IS IT REALLY CHEAPER TO BUILD FIBRE TO THE PREMISES NOW THAN LATER?

	COST PER PREMISE		Net Present Cost	FTTP	FTTN + FTTP
	Capex	Opex/Year		-\$3755	-\$3633
FTTN	-\$900	-\$90	Year 0	-\$3600	-\$900
FTTP	-\$3600	-\$60	Year 1	-\$60	-\$90
Discount Rate	8%		Year 2	-\$60	-\$90
Capex Reused	50%		Year 3	-\$60	-\$3240

¹⁸ NBN Co, (2013), “NBN Co Special Access Undertaking”, online here: [http://transition.accc.gov.au/content/item.phtml?itemId=1097798&nodeId=74050df7815c2c03116ed42b59af5d51&fn=Letter%20from%20NBN%20Co%20-%20Response%20to%20Optus%20on%20request%20for%20financial%20data%20\(14%20January%202013\).pdf](http://transition.accc.gov.au/content/item.phtml?itemId=1097798&nodeId=74050df7815c2c03116ed42b59af5d51&fn=Letter%20from%20NBN%20Co%20-%20Response%20to%20Optus%20on%20request%20for%20financial%20data%20(14%20January%202013).pdf)

Consider a simple model of cash outflows, which are the cost per premise of building and operating an FTTP network, compared to those of an FTTN network that is later upgraded to FTTP. These negative cash flows can be discounted and measured as two alternative 'net present costs' (in the same way positive future cash flows collapse into a net present value).

We can estimate 50 per cent of the capex required for FTTN is later applicable to FTTP (which overseas carriers and expert reports alike state is an accurate estimate) and reduces its cost accordingly.¹⁹ The cost of FTTN upgraded to FTTP after three years of operation (less than a third of its probable lifespan) measured in current dollars is \$3633 per premise, while FTTP built immediately measured on the same basis costs \$3755 per premise.

Comparison of the same two scenarios over the probable decade-plus lifespan of FTTN shows starting with FTTN rather than FTTP it has an even more pronounced financial advantage.

The cost of FTTN upgraded to FTTP after ten years of operation measured in today's dollars is \$2963 per premise, while FTTP up front measured on the same basis costs \$4003. Applied uniformly across the 12.2 million premises Labor's NBN proposes to pass by June 2021, the savings in today's dollars from deferring FTTP for a decade would total \$12.7 billion.

Use of a higher discount rate (such as the 10 per cent Labor chose to use in calculating its publicly claimed after-tax value for more than \$50 billion of pre-tax payments NBN Co agreed in June 2011 to make to Optus and Telstra) tilts the advantage toward FTTN even more strongly.

So does any allowance for the strong likelihood that the cost of physical components such as the electronics used in FTTP and FTTN will continue to decline in real terms on a quality-adjusted basis.

THE VALUE OF OPTIONS

In addition, the calculation above takes no account of the option value of deferring FTTP. But in networking as much as any other part of the ITC sector, technologies are advancing rapidly, consumer preferences are continually shifting, and many (although not all) costs are coming down. Uncertainty and change enhance the value of keeping options open.

Consider the example of the availability and widespread deployment of active electronics that support fast broadband over both fibre (GPON) and copper (VDSL) from a single node.

Plainly this was a development that was not anticipated by the Government's advisors and expert panel when they vehemently advised in 2008 that all capex spent on FTTN would be wasted if there were a later upgrade to FTTP.

To instead argue, as Labor and supporters of the Labor NBN often do, that we should invest today to support needs and uses that we cannot foresee but guess may (or may not) emerge in the future and may (or may not) generate positive externalities for our economy or society is to make errors on both sides of any realistic cost/benefit analysis.

¹⁹ The 50 per cent figure for FTTN capex applicable to FTTP is precisely the estimate made by Analysys Mason in a report for the UK Broadband Stakeholder Group. Analysys Mason, 'Final Report for the BSG: The Costs of Deploying Fibre-Based Next-Generation Broadband Infrastructure,' 8 Sep 2008. This report placed the nominal dollar cost of FTTN + FTTP at 109 per cent of the cost of FTTP alone (p.82). That figure suggests a payback of just over one year, even shorter than the example above.

Not only does a large and irreversible investment today in a specific variant of a single technology (GPON FTTP) involve higher financial costs than a similar investment in the future, due to the time value of money, it also has additional downside linked to its large scale and irreversible nature.

The loss of flexibility that results from such a commitment reduces or even extinguishes the benefit of 'optionality' - the value of keeping options open for as long as possible, and being free to change course if that proves to be necessary (or advantageous).

Given such huge uncertainty over future usage of (and willingness to pay for) high-speed bandwidth, curtailing optionality carries an even higher cost than usual in this case.

NBN'S PERMANENTLY HIGHER CAPEX COSTS

In closing this discussion of some of the technical and economic considerations involved in broadband upgrade, it should be noted the very high capital costs of Labor's FTTP NBN commitment don't stop with 'completion' of the rollout.

As close study of a graphic illustrating capex after 2021 on page 74 of NBN Co's 2012-2015 Corporate Plan makes clear, the three NBN networks are forecast to require no less than \$10.5 billion of capex in the six years after the NBN is 'finished'.²⁰

Only \$4.5 billion appears to be for extending the NBN's coverage to newly built premises (assuming the forecast 1.3 million of these between 2021 and 2028 cost the same, on average, to serve as NBN Co forecasts for the 13.2 million it will have passed or covered by 2021.)

So what exactly does the other \$6 billion of capex over six years represent? At face value, it appears an additional \$1 billion of investment will need to be invested in the NBN each year on an ongoing basis - presumably to upgrade active electronics used in the FTTP network and the various elements of the fixed wireless and satellite networks.

Supporters of Labor's NBN are fond of claiming the gradually rising maintenance costs for the copper network (currently estimated to be around \$750 million a year, although Telstra does not disclose this figure) are a compelling reason to shift to FTTP. Sometimes it is even claimed savings from copper maintenance on their own virtually pay for the upgrade.

On the contrary, TUSMA's \$6.4 billion commitment to Telstra for the USO preserves the copper network serving the most remote 7 per cent of premises in Australia until 2032 - by far the most costly part of the copper to maintain will be in service and maintained at taxpayer expense for at least another twenty years.

And on top of that, close scrutiny of the NBN Co financial forecasts reveals an additional \$1 billion of ongoing annual capex after the NBN is 'completed' - a materially larger sum than the \$750 million currently spent on copper upkeep.

Together, these two realities demonstrate the utter falsehood of claims that a key economic gain from the NBN is money saved from not having to maintain the copper.

²⁰ NBN Co 2012-2015 Corporate Plan, p.74

Box: How Many Australians Have Substandard Broadband?

The current state of Australia's fixed broadband infrastructure is not easy to quantify. While perhaps 60 or 70 per cent of the nation's roughly 10 million residential and commercial premises have fair to excellent fixed broadband there are four cohorts of consumers and businesses where an upgrade is needed:

- The 2010 McKinsey/KPMG NBN Implementation Study identified 1.2 million 'pair gain' or 'RIM' lines where broadband using ADSL2+ was constrained or impractical. ²¹
- The Implementation Study also identified 0.4 million premises in regional or remote areas where DSLAMs (machines in exchanges that provide xDSL) had in 2010 not been deployed. ²²
- A large but poorly quantified group of households and businesses are in areas where ADSL2+ is available but new services can't be added because of space or port constraints at the exchange; ADSL2+ is degraded by technical factors; or the copper run between the exchange and user is too long to deliver decent performance (ADSL2+ data rates deteriorate with distance).
- Finally, another poorly quantified group of households and businesses has acceptable existing broadband, but performance that is increasingly inadequate for bandwidth-intensive applications. Two key constraints are distance (63 per cent of ADSL2+ users are over 2km from the exchange) and contention (when users sharing infrastructure use it at the same time, slowing throughput).

In total, then, there are up to 2 million premises with pressing need for upgraded service (although Telstra's recent deployment of Top Hat devices has improved service for a significant number) and a substantial further group whose current fixed broadband connections are adequate but will cease to be so within a few years.

²¹ McKinsey/KPMG for DBCDE: 'Implementation Study for National Broadband Network,' Mar 2010, p.190.

²² McKinsey/KPMG for DBCDE: 'Implementation Study for National Broadband Network,' Mar 2010, p.282.

COSTING LABOR'S NATIONAL BROADBAND NETWORK

While questions of technology or the rollout dominate political discussion of broadband, the majority of the important questions about the National Broadband Network eventually come down to economics.

- What is the NBN going to cost?
- How will it be priced and paid for?
- What are the consequences for take-up and user charges?
- And are there additional benefits or costs (including both directly measureable effects and indirect externalities or 'spillover' effects) associated with particular policy choices?

From the outset these have been challenging questions to answer about Labor's NBN. This reflects Labor's bizarre decision in early 2009 to commit itself to an immensely costly multi-decade project – the largest single infrastructure project in the nation's history – without at any point articulating the question the NBN was intended to answer, or evaluating the alternative options for reaching the desired objective.

No cost-benefit analysis was ever undertaken to check whether Labor's chosen policy was economically efficient, commercially viable or represented a prudent use of taxpayers' funds.

But with the benefit of hindsight it is clear that the currently specified NBN, which will run fibre to 93 per cent of households and businesses, is neither commercially viable nor prudent. Even a cursory analysis of the available financial projections suggests they will not be met, as will be discussed.

This background material deals with the likely cost of Labor's currently proposed FTTP NBN and models realistic changes to some of the key financial assumptions underlying the current NBN Co Corporate Plan.

A 'FAIR RETURN' FOR TAXPAYERS?

One of the most frequent claims from advocates of Labor's FTTP NBN is that the project is financially viable and will turn a profit on funds used to build it, as demonstrated by the NBN Co Corporate Plan.

Both versions of the Corporate Plan so far claim to show NBN Co generating an internal rate of return of 7 per cent on equity provided by taxpayers, apparently after the NBN is privatized around 2040.

But the public has never been provided with any explanation of the basis for this assertion. There has been no disclosure of what assumptions about capital structure, NBN Co operating margins, end user behaviour and charges, NBN Co privatization date and terminal value are required to make it add up.

In reality, the NBN's revised 2012-2015 Corporate Plan, released in August 2012 with claims it was virtually identical with the original December 2010 plan, is in considerable part fiction. It is built on a series of unjustified, unsourced and highly optimistic or entirely implausible assumptions, all of which are favourable for NBN Co and several of which are at odds with opinion across the remainder of the telecommunications industry.

PEAK FUNDING VS. CAPITAL EXPENDITURE

Before examining the Corporate Plan, it should be noted that there are two ways to approach measuring the total cost of the NBN:

'Required funding' represents the sum that NBN Co needs to raise from taxpayers or investors to pay for its network and any operating losses it incurs while the network is built, up until the time that NBN Co becomes cash flow positive and financially self-sufficient.

'Capital expenditure' or capex is money spent by NBN Co on enduring fixed assets such as equipment, structures or buildings. Capex is what most taxpayers would think of as 'investment' in the NBN and the associated infrastructure to support it (e.g. computers and IT to manage the network).

Labor claims the required funding required for its NBN is \$44.1 billion and the capex to 'finish' the NBN is \$37.4 billion²³ Both of these figures appear to be a lot higher if quite moderate and realistic changes are made to the assumptions in the financial forecasts put forward by NBN Co.

Such an analysis is carried out below, and leads to the following summary results.

LABOR'S NBN – WHAT WILL IT REALLY COST?

	2011-2013 CORP PLAN	2012-2015 CORP PLAN	COALITION ANALYSIS
<i>Date</i>	<i>Dec 2010</i>	<i>Aug 2012</i>	<i>Apr 2013</i>
FUNDING REQUIRED	\$40.9 billion	\$44.1 billion	\$94 billion
REVENUE, FY2011 TO FY2021	\$23.7 billion	\$23.1 billion	\$15 billion
OPEX, FY2011 TO FY2021	\$23.2 billion	\$26.4 billion	\$26 billion
CAPITAL EXPENDITURE	\$35.9 billion	\$37.4 billion	\$71 billion

REVISED CORPORATE PLAN – KEY WEAKNESSES

There are a series of areas where the 2012-2015 Corporate Plan is questionable:

- The Plan projects rapid and sustained real growth in the amount consumers will pay for services obtained over the NBN. Fixed line revenues per user, which in Australia have been flat in nominal terms for a decade, are forecast to grow at double-digit rates between 2011-12 and the mid-2020s (and indeed at a 20 per cent nominal rate per year over the next four years). Adjusted for inflation, revenue per user more than doubles between 2012 and 2021.
- In the revised 2012-2015 Corporate Plan, NBN Co's ten-year estimate of its 'indirect' operating expenses (salaries, lawyers and consultants, IT, corporate travel, office space, advertising and similar non-network overheads) during the ten years the network is being constructed were an

²³ NBN Co 2012-2015 Corporate Plan, pp78-80.

extraordinary \$4.2 billion (or 114 per cent) higher than the original Corporate Plan. NBN Co's estimate of these costs rose from \$3.7 billion in December 2010 to \$7.9 billion in August 2012. The blowout was not just prospective, but actually happened in 2010-11 and 2011-12.²⁴ It defies belief that a seasoned management could be wrong by a factor of two in their estimate of the headcount and payroll needed to achieve an unchanged goal. And spending a staggering \$1.5 billion on salaries and overheads while NBN Co earns its first \$20 million in revenue from selling bandwidth is indicative of a reckless disregard for cost control.

- The revised Corporate Plan makes an explicit commitment to run fibre to every premise in Multi-Dwelling Units (e.g. apartments in high-rise blocks or medium-density townhouses). Such premises account for 34 per cent (roughly 4 million) of the homes and businesses NBN Co intends to extend its fibre network to by 2021. Yet by December 2012 NBN's fibre network was available to only 231 premises in MDUs – and it was not until that same month that NBN Co signed its first two contractors to service such premises. This is extraordinary neglect of a third of its market. Of equal concern, the revised Corporate Plan includes no estimate whatsoever of the cost of the MDU commitment or the strategy for delivering it. Yet there is widespread agreement in the telecommunications sector that this may be the most costly and difficult part of the rollout of all. In the HFC cable rollouts of the late 1990s Optus (with vastly more telecoms experience than the current team at NBN Co) eventually was forced to cede MDUs in their entirety to Telstra.
- Labor appears to be allowing NBN Co to build up huge cash reserves. The revised plan combined with the equity investment scheduled in the 2012-13 Budget leaves NBN Co with over \$2 billion cash on hand as at June 2013. One bizarre consequence of this is that not until 2014 does revenue earned by NBN Co from selling communications services exceed interest on its cash at the bank.

- Even though NBN Co is several quarters behind schedule and did not meet any of its milestones between 2010 and 2012, the revised Corporate Plan predicts all of the lost ground will be made up after 2015 – fortuitously allowing construction to finish almost on time in June 2021, only six months later than the originally predicted December 2020. The unlikely (and unachieved) acceleration in the rollout forecast in the original 2011-13 Corporate Plan has steepened in

NBN CO'S FIBRE ROLLOUT, PREMISES PER DAY
(Assumes 250 working days/year)

	2011-2013 PLAN	2012-2015 PLAN	CHANGE
2010-11	232	73	-69%
2011-12	1036	83	-92%
2012-13	3808	1207	-68%
2013-14	5768	3864	-33%
2014-15	5848	6423	+10%
2015-16	5896	6850	+16%

the revised version: after passing 72,600 premises with fibre from late 2009 to late 2012, NBN Co predicts it will run fibre past 1 million premises in 2013-14, on the way to a peak of 1.7 million premises in each of FY2016 and FY2017. While NBN Co passed only 28 new premises per working day with fibre in the first ten weeks of 2013, the Corporate Plan now envisages fibre being extended

²⁴ NBN Co 2011-2013 Corporate Plan, p.135.

to a startling 6850 premises each working day (and a comparable number of customers being migrated by RSPs onto NBN Co daily). Given the original projected peak rate of construction was neither credible nor attained, the same criticism applies with even greater force to the new peak.

Of all these questionable financial claims, the 2012-2015 Corporate Plan's prediction of an even steeper acceleration in the so-called 'volume rollout' than in the discredited original 2011-2013 Corporate Plan is the most difficult to accept.

While Verizon in the US and NTT in Japan achieved similar daily totals at the peak of their FTTP rollouts, there are vast differences. Both rollouts were carried out by huge vertically integrated telecommunications carriers, with vast standing workforces, and in much bigger, deeper economies than Australia. Both companies owned the existing network and had the pre-existing customer relationships. In addition, both used primarily aerial fibre drops.²⁵

It defies belief NBN Co can achieve a similar volume – and it is equally unbelievable it has built its entire current business case on such a scenario.

NBN Co 2012-2015 CORPORATE PLAN – BASELINE

Not every apparent weakness in NBN Co's 2012-2015 Corporate Plan can be easily modelled. This analysis will make a small number of modest, grounded adjustments to the baseline forecasts that are set out in that Plan and summarized in the table below.

NBN CO 2012-2015 CORPORATE PLAN

(\$ million)	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021
REVENUE	\$0	\$2	\$18	\$120	\$529	\$1,346	\$2,281	\$3,221	\$4,200	\$5,167	\$6,175
OPEX	-\$337	-\$521	-\$1,093	-\$1,777	-\$2,904	-\$3,628	-\$3,394	-\$3,350	-\$3,201	-\$3,037	-\$3,151
EBITDA	-\$337	-\$519	-\$1,075	-\$1,657	-\$2,375	-\$2,282	-\$1,113	-\$129	\$999	\$2,130	\$3,024
CAPEX	-\$463	-\$888	-\$3,190	-\$3,946	-\$5,016	-\$4,920	-\$4,224	-\$3,986	-\$3,760	-\$3,611	-\$3,354
CASHFLOW	-\$729	-\$1,154	-\$3,715	-\$5,290	-\$7,210	-\$7,454	-\$5,797	-\$4,770	-\$3,479	-\$2,361	-\$1,390
FUNDING	-\$829	-\$1,983	-\$5,698	-\$10,988	-\$18,198	-\$25,652	-\$31,449	-\$36,219	-\$39,698	-\$42,059	-\$43,449
ARPU (\$/month)		\$22.46	\$28.44	\$31.10	\$40.72	\$46.76	\$49.50	\$52.17	\$55.19	\$58.46	\$62.12
REAL ARPU (\$2012)		\$22.46	\$27.75	\$29.60	\$37.81	\$42.36	\$43.75	\$44.98	\$46.43	\$47.98	\$49.75

Note: Excludes interest, working capital and taxes. EBITDA = earnings before interest, tax, depreciation and amortization. ARPU = average revenue per user per month. Real ARPU is in FY2012 dollars and assumes CPI of 2.5 per cent

WHAT IF REVENUE GROWS MORE SLOWLY THAN FORECAST?

A feature of the Corporate Plan is extremely rapid growth in Average Revenue per User (ARPU) between FY2012 and FY2021. Wholesale ARPU starts at \$22.46 per month (slightly below the

²⁵ A figure on p.38 of the 2012-2015 Corporate Plan compares the NBN's revised peak rollout to deployment rates achieved by other network rollouts. It should be noted the NTT and Verizon fibre rollouts (and the Telstra/Optus HFC rollout of the 1990s) were primarily aerial, whereas NBN Co proposes to use aerial cabling for only 25 per cent of drops. Verizon and NTT were vertically integrated incumbents able to leverage extensive existing infrastructure and large workforces: in 2012 Verizon had 24 million fixed line services in operation and 193,000 staff, while NTT had 36 million fixed line services in operation and 219,000 staff.

wholesale prices for NBN Co's products) but rises to \$62.11 by 2020-21 and the end of the build (assuming construction is completed on schedule).

(Note ARPU throughout this discussion refers to revenue divided by year-average users.)

In nominal terms, ARPU growth over this nine-year period will average 12 per cent. If inflation is assumed to be 2.5 per cent, ARPU increases at an annual rate of just over 9 per cent in real terms.

Is this rate of growth realistic? It is clearly out of line with recent experience and there are many other data points that suggest it is doubtful:

- Nominal spending on fixed line telecommunications services in Australia has hovered between \$10 and \$11 billion since just after the turn of the century – indeed, there is a chart clearly illustrating this in the original NBN Co Corporate Plan.²⁶
- More recent data confirms that from 2010-11 to 2011-12 industry-wide fixed-line nominal revenues fell by 0.4 per cent.²⁷
- If the Australian economy grows at its trend of about 3.5 per cent over the next decade, and inflation is around 2.5 per cent, the revenue projections claimed by NBN Co would increase the share of GDP (or wallet) going to fixed line telecoms by between 60 and 70 per cent!
- NBN Co's view of its potential market by the 2020s is substantially larger than financial analysts envisage. In October 2012 Deutsche Bank analyst Vikas Gour released research forecasting four RSPs (Telstra, Optus, TPG and iiNet) with 96 per cent of the Australian retail market would pay \$3.8 billion in access fees to NBN Co in FY2024. Yet a smooth line between NBN Co's published revenue forecasts of \$6.2 billion in FY2021 and \$9.8 billion in FY2028 (or the graph on page 74 of the revised Corporate Plan) indicates NBN Co expects to have revenues of about double the Deutsche Bank estimate in FY2024.²⁸
- Likewise, a JP Morgan report recently projected that in 2020, Telstra will pay NBN Co \$1.7 billion for access and have a retail share of 39 per cent. That implies access revenue for the entire market of about \$4.4 billion – but NBN Co projects revenues of \$5.2 billion for that year.²⁹
- There is no evidence that retail prices for FTTP broadband offerings in Europe and Asia-Pacific attract premiums. On the contrary, intense competition with HFC networks is cutting prices in Korea and Taiwan, and LTE wireless services are having a similar effect in Japan, where some prices have fallen 30 per cent for NTT East and NTT West.³⁰

In summary, as analyst Robert Kenny recently wrote: "They [NBN Co] expect consumers to be willing to pay substantially more to get higher speeds, with a result that the typical user increases their spend by

²⁶ NBN Co 2011-2013 Corporate Plan, p.35.

²⁷ JP Morgan: 'Australian Telecom Sector in FY2012,' p.51.

²⁸ Vikas Gour, Deutsche Bank: 'Telecommunications: Leaders and Laggards in an NBN Environment', 13 Oct 2012, p.15.

²⁹ JP Morgan: 'Telstra Corporation,' 13 Dec 2012.

³⁰ UK Broadband Stakeholders Group: 'Demand for Superfast Broadband,' Nov 2012, p.42-44. Characterising East Asian markets: "We have already highlighted that there is only a small premium if one is charged at all for superfast broadband services."

about 70% over the next decade. While it is intuitive that consumers might pay more for higher speeds, as we have seen historically they haven't had to.”³¹

One consequence of higher required investment than past network upgrades may be that consumers do have to pay slightly higher prices for more bandwidth and new services this time. In addition, NBN Co has stated its early customers are showing a greater tendency to choose or move to higher speed (and higher cost) plans than expected. But this claim is based on a relatively narrow base of evidence.

A more realistic assumption about revenue growth for services that will offer new capabilities to most users compared to current offerings, within the context of a market which has not been growing, is to hold revenue per user constant as a share of wallet (i.e. grow real ARPU at an annual 3.5 per cent, about the same as the economy).

While FTTP and FTTN will both provide consumer value beyond current broadband and telephone services, it's implausible to imagine the share of wallet captured as wholesale fixed line revenue could rise as sharply as NBN Co expects, or that wholesale fixed line spending will grow strongly as a share of consumption; virtually all the evidence suggests otherwise.

REAL REVENUE PER USER GROWS AT 3.5 PER CENT PER YEAR

(\$ million)	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021
REVENUE	\$0	\$2	\$16	\$100	\$379	\$903	\$1,504	\$2,091	\$2,682	\$3,243	\$3,806
OPEX	-\$337	-\$521	-\$1,093	-\$1,777	-\$2,904	-\$3,628	-\$3,394	-\$3,350	-\$3,201	-\$3,037	-\$3,151
EBITDA	-\$337	-\$519	-\$1,077	-\$1,677	-\$2,525	-\$2,725	-\$1,890	-\$1,259	-\$519	\$206	\$655
CAPEX	-\$463	-\$888	-\$3,190	-\$3,946	-\$5,016	-\$4,920	-\$4,224	-\$3,986	-\$3,760	-\$3,611	-\$3,354
CASHFLOW	-\$729	-\$1,154	-\$3,717	-\$5,310	-\$7,360	-\$7,897	-\$6,574	-\$5,900	-\$4,996	-\$4,285	-\$3,759
FUNDING	-\$829	-\$1,983	-\$5,700	-\$11,010	-\$18,371	-\$26,268	-\$32,842	-\$38,742	-\$43,738	-\$48,023	-\$51,782
ARPU (\$/month)		\$22.46	\$24.64	\$25.84	\$29.11	\$31.35	\$32.60	\$33.86	\$35.22	\$36.69	\$38.26
REAL ARPU (\$2012)		\$22.46	\$24.03	\$24.58	\$27.01	\$28.36	\$28.77	\$29.14	\$29.56	\$30.03	\$30.54

As can be seen, holding revenue per user constant as a share of GDP (equivalent to annual growth of 3.5 per cent in inflation-adjusted terms) adds \$8.3 billion to required funding for Labor's NBN. This is the same revenue assumption used in modelling a Coalition NBN.

WHAT IF FIBRE TO THE PREMISES COSTS ARE HIGHER THAN FORECAST?

A second key variable in Labor's costing of the NBN which increasingly seems at odds with reality is the per premise cost of the fibre rollout – a key indicator for the rollout's economic viability.

There is every sign that this cost per premise has already blown out at Labor's NBN. NBN Co has repeatedly refused to make public any detailed per premise estimate of FTTP capital expenditure, even after passing over 72,000 households and businesses. Third parties such as contractors involved in the rollout without exception consider costs per premise are materially higher than budgeted for by NBN Co – with most informed estimates suggesting the blowout is 40 to 100 per cent over budget.

³¹ Robert Kenny: 'NBN Co's Bold Assumptions on Australians' Willingness to Pay' Nov 2011, online at: <http://commstought.blogspot.co.uk/2012/11/nbn-cos-bold-assumptions-on-australians.html>

According to the 2012-2015 Corporate Plan, the average fibre capex for each of the 12.2 million premises passed by the fibre network is around \$2400 (while fixed wireless/satellite capex for each of the million premises covered by the fixed wireless and satellite networks is around \$3200).³² If \$5.7 billion of 'shared' capex is spread equally across all premises, it amounts to a further \$400 each.

NBN Co's plan assumes FTTP costs decline over time, presumably due to scale economies and learning, and as upfront investment in assets such as the transit network is amortized across more users. The FTTP average breaks down into higher costs in established areas and lower costs (generally estimated at roughly half those in 'brownfield' areas) in 'greenfield' estates such as new housing developments.

In the absence of concrete data or any public explanation from NBN Co of what it has learned from the 72,000 premises it has passed with fibre so far, it is obviously impossible to know what the context is for any blowout, or how significantly capex may have deviated from the average budgeted across the rollout as a whole.

The only certainty is that if the FTTP rollout was on budget, NBN Co would be saying so.

But it is concerning that costs so far (whatever they are) clearly do not yet include the potentially heavy expense of work in Multi-Dwelling Units (MDUs) to deliver on NBN Co's extraordinary commitment to take fibre to every single apartment. This may turn out to be the most expensive and resource-intensive part of the rollout.

Likewise, the high costs of 'non-standard' premises within the fibre rollout area (premises unusually distant from the street or difficult to reach with fibre for some other location-specific reason) or premises in the least economic parts of that zone are unlikely to figure prominently yet.

Equities research published in January 2013 by Macquarie Bank on the possible cost of an altered NBN rollout if the Coalition is elected assumed an average capex cost of \$4000 for the stock of FTTP premises that might be inherited.³³ Telstra has not made the per-premise cost of its South Brisbane FTTP rollout public, but industry reports suggest this may have also been in the \$3000-4000 range.

For the purposes of modelling higher than anticipated costs across the FTTP rollout, this analysis uses Macquarie's notional \$4000 per premise FTTP capex figure.

After subtracting \$400 for each premise's share of common capex, to be consistent with NBN Co's capex breakdown, and allowing for lower FTTP costs in greenfields areas, this assumption amounts to a 40 per cent blowout in budgeted costs.

³² NBN Co 2012-2015 Corporate Plan, p.75. The combined \$2800 capex per FTTP premise (\$2400 fibre plus \$400 shared) lumps greenfields and brownfields premises together, and ignores geographic variations in the cost of FTTP illustrated by the cost curve in the McKinsey/KPMG 2010 NBN Implementation Study. If \$2800 is the average, the McKinsey data suggests FTTP costs (presumably for established and greenfield premises) average \$1900 in the first 30 percentiles, \$2800 in the next 30 percentiles, \$3700 in the third 30 percentiles, and \$5900 in the 90th to 93rd percentiles.

³³ Andrew Levy, Macquarie Bank: 'Telstra Corporation – NBN, Mobiles the key focus still in '13,' 22 Jan 2013, p.10.

FTTP COSTS ARE 40 PER CENT OVER BUDGET AT \$3600/PREMISE

(\$ million)	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021
REVENUE	\$0	\$2	\$18	\$120	\$529	\$1,345	\$2,280	\$3,221	\$4,201	\$5,169	\$6,180
OPEX	-\$337	-\$521	-\$1,093	-\$1,777	-\$2,904	-\$3,628	-\$3,394	-\$3,350	-\$3,201	-\$3,037	-\$3,151
EBITDA	-\$337	-\$519	-\$1,075	-\$1,657	-\$2,375	-\$2,283	-\$1,114	-\$129	\$1,000	\$2,132	\$3,029
CAPEX	-\$463	-\$888	-\$3,954	-\$5,150	-\$6,661	-\$6,676	-\$5,879	-\$5,574	-\$5,223	-\$5,065	-\$4,701
CASHFLOW	-\$729	-\$1,154	-\$4,479	-\$6,494	-\$8,856	-\$9,211	-\$7,453	-\$6,358	-\$4,941	-\$3,813	-\$2,732
FUNDING	-\$829	-\$1,983	-\$6,462	-\$12,957	-\$21,812	-\$31,023	-\$38,476	-\$44,834	-\$49,775	-\$53,588	-\$56,320

NBN Co's forecasts are very sensitive to FTTP costs, which dominate capex. Assuming fibre capex of \$3600/FTTP premise in established areas adds \$12.9 billion to funding needs and capex. This emphasizes the need for NBN Co transparency on these costs. In modelling the Coalition NBN, FTTP costs to 2014 are also assumed to be \$3600/premise.

WHAT IF MORE HOUSEHOLDS GO WIRELESS ONLY THAN FORECAST?

The NBN Co 2011-2013 Corporate Plan estimated take-up in the fixed line footprint would be 68 per cent in 2021 and 70 per cent in 2028. By the 2020s, the 30 per cent of non-NBN premises were assumed to include 12.5 per cent vacant, 4.5 per cent customers of 'non-NBN networks' (Optus HFC and others) and 13 per cent wireless-only (consisting of zero per cent of business premises and 16 per cent of residential premises).³⁴

The assumption of 16 per cent wireless-only households was based on modelling work undertaken for NBN Co by Ovum.

In the revised NBN Co 2012-2015 Corporate Plan estimated take-up was lifted to 70 per cent in 2021 and 74 per cent in 2028, largely on the basis of fewer users of 'non-NBN' networks (due to the deal to shut down the Optus HFC network, which is used by about 5 per cent of the market). The proportion of households assumed to be wireless-only was still stated to be 16 per cent in the 2020s; this apparently translated into 13.5 per cent of all premises.

Wireless broadband is seen as complementary to fixed line broadband. But analysts have warned for the past few years that for some customers in some circumstances – particularly where faster fixed broadband came slowly to market or was overpriced – 4G wireless such as LTE could be a competitor: "Operators need to focus on time to market as much as cost. LTE is a real threat to fixed broadband because it could offer ADSL2+-type services. Fixed operators need to be able to differentiate from it, but they need to do so quickly because LTE is already appearing."³⁵

A review of NBN Co's business plan for the Government in 2011 by investment advisors Greenhill Caliburn cited "mobile centric" broadband services as a potential source of pressure for the network's

³⁴ NBN Co 2011-2013 Corporate Plan, pp.116-117. Note that these figures were based on a reconciliation of ABS data with GNAF address data, which may substantially overstate the number of legitimate premises. The forecasts assumed 88 per cent of premises were residential, with the other 12 per cent businesses.

³⁵ Rupert Wood, Analysys Mason: 'FTTx Rollout & Capex in Developed Economies: Forecasts 2011–2016,' Apr 2011, p.9. LTE offers bandwidth roughly similar to ADSL2+ albeit at higher costs for the download volumes typical of fixed line usage.

economics over time, and said the prevalence of wireless-only premises should be “carefully monitored”.³⁶

Since the current version of the NBN was announced, the number of mobile broadband subscribers in Australia has increased from 1.4 million to 5.9 million, overtaking fixed broadband subscribers in 2012. In the same period fixed broadband subscriptions have risen from 5.3 to 5.7 million.³⁷

In March 2013 correspondence with the ACCC, NBN Co conceded it faced a competitive threat from LTE at certain price points, and that the proportion of wireless-only premises could increase to 30 per cent of the market if it increased its prices by the maximum permitted amount under its proposed SAU.

For this analysis, the non-NBN proportion of all premises is estimated at 23.5 per cent in 2021, a third as much again as the 17.5 per cent in the revised Corporate Plan (representing wireless only but also incomplete migration to the NBN) and at 20 per cent in 2028 (half as much again as the 13.5 per cent in the revised Corporate Plan). The latter translates to about one in four residential premises. The resulting NBN take-up rates are 64 per cent in 2021 and 67.5 per cent in 2028.

This is a plausible approach; according to surveys and anecdotal evidence wireless-only households in Australia are already 10-15 per cent today.³⁸ In the US substitution of wireless for fixed telephony had lifted the share of households without a landline to 36 per cent by early 2012; of course many such households still had cable television, however, and hence potentially cable broadband.³⁹

BY 2028 25 PER CENT OF HOUSEHOLDS ARE WIRELESS ONLY

(\$ million)	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021
REVENUE	\$0	\$2	\$17	\$112	\$488	\$1,239	\$2,098	\$2,962	\$3,863	\$4,752	\$5,680
OPEX	-\$337	-\$521	-\$1,093	-\$1,777	-\$2,904	-\$3,628	-\$3,394	-\$3,350	-\$3,201	-\$3,037	-\$3,151
EBITDA	-\$337	-\$519	-\$1,076	-\$1,665	-\$2,416	-\$2,389	-\$1,296	-\$388	\$662	\$1,715	\$2,529
CAPEX	-\$463	-\$888	-\$3,190	-\$3,946	-\$5,016	-\$4,920	-\$4,224	-\$3,986	-\$3,760	-\$3,611	-\$3,354
CASHFLOW	-\$729	-\$1,154	-\$3,716	-\$5,298	-\$7,251	-\$7,561	-\$5,979	-\$5,028	-\$3,816	-\$2,776	-\$1,885
FUNDING	-\$829	-\$1,983	-\$5,699	-\$10,997	-\$18,248	-\$25,808	-\$31,788	-\$36,816	-\$40,632	-\$43,408	-\$45,293

The financial impact of a 50 per cent higher share of wireless-only residential premises in 2021 and 2028 is greatest after the network is completed. Nevertheless, holding everything else unchanged and increasing wireless-only households adds \$1.9 billion to required funding by 2021.

WHAT IF THE NETWORK TAKES 50 PER CENT LONGER TO FINISH?

According to Labor the remaining 98 per cent of the fibre rollout, the bulk of fixed wireless deployment and replacement of NBN’s interim satellite service with two permanent satellites will occur between June 2013 and June 2021. Given NBN Co has not met any major deadline so far this seems improbable.

³⁶ Greenhill Calburn, ‘Review of NBN Co’s Corporate Plan,’ Jan 2011, p.6.

³⁷ Australian Bureau of Statistics, ‘ABS 8153, Internet Activity, Australia, June 2012,’ released 9 Oct 2012.

³⁸ In February 2011 Telstra CEO David Thodey estimated the number of wireless-only households at 12 per cent.

³⁹ US National Center for Health Statistics, ‘Wireless substitution: Early release of estimates from the National Health Interview Survey, Jan–Jun 2012,’ Dec 2012. At: <http://www.cdc.gov/nchs/nhis.htm>.

Modelling the cost impact of further delays is more complex than the other assumptions considered. This is because it's not clear what proportion of NBN Co expenses are tied to actual construction or premises with service, and what proportion are insensitive to the rollout.

Spending in the latter category includes transit network lease payments to Telstra under the ISA, and NBN Co's substantial 'indirect' expenses (salaries and corporate overheads). A third area that could be burdensome if the schedule slips is 'shared' capex to the extent it includes replacing active electronics and other short-lived elements; part of capex is modelled here as analogous to the 'replacement' line in the original Corporate Plan. Stretching out the construction period also results in partial inclusion of a capex upswing in the mid 2020s related to upgrade of satellites or fixed wireless.

The following analysis assumes the remaining NBN rollout planned for 2013-2021 runs 50 per cent over schedule and instead takes place over 2013-2025.

The target of passing or covering 13.9 million premises in 2025 to complete the network is derived from between NBN Co's published forecasts for 2021 and 2028. Revenue per user is assumed to grow in line with the Corporate Plan, but with a very slight lag reflecting slower gains in scale and market share.

ROLLOUT COMPLETION IS DELAYED BY 4 YEARS

(\$ million)	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
REVENUE	\$0	\$2	\$13	\$74	\$285	\$645	\$1,124	\$1,754
OPEX	-\$337	-\$521	-\$1,226	-\$2,112	-\$2,302	-\$2,461	-\$2,850	-\$3,006
EBITDA	-\$337	-\$519	-\$1,212	-\$2,037	-\$2,017	-\$1,816	-\$1,726	-\$1,253
CAPEX	-\$463	-\$888	-\$1,468	-\$3,044	-\$3,264	-\$3,093	-\$3,609	-\$3,763
CASHFLOW	-\$729	-\$1,154	-\$2,130	-\$4,768	-\$5,100	-\$5,161	-\$5,796	-\$5,671
FUNDING	-\$829	-\$1,983	-\$4,113	-\$8,881	-\$13,981	-\$19,142	-\$24,938	-\$30,609
ARPU (\$/month)		\$22.46	\$28.42	\$31.09	\$40.66	\$46.73	\$49.44	\$52.15
REAL ARPU (\$2012)		\$22.46	\$27.72	\$29.57	\$37.72	\$42.27	\$43.63	\$44.88

(\$ million)	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025
REVENUE	\$2,532	\$3,353	\$4,179	\$4,990	\$5,867	\$6,802	\$7,802
OPEX	-\$3,171	-\$3,264	-\$3,439	-\$3,524	-\$3,621	-\$3,722	-\$3,828
EBITDA	-\$639	\$89	\$740	\$1,466	\$2,246	\$3,079	\$3,975
CAPEX	-\$3,981	-\$4,072	-\$4,262	-\$4,486	-\$4,683	-\$5,032	-\$5,733
CASHFLOW	-\$5,338	-\$4,863	-\$4,582	-\$3,970	-\$3,387	-\$2,903	-\$2,708
FUNDING	-\$35,947	-\$40,810	-\$45,392	-\$49,362	-\$52,749	-\$55,652	-\$58,360
ARPU (\$/month)	\$55.16	\$58.48	\$62.12	\$65.14	\$68.16	\$71.19	\$74.21
REAL ARPU (\$2012)	\$46.30	\$47.86	\$49.59	\$50.74	\$51.78	\$52.74	\$53.63

A four-year delay in completion of the rollout has substantial costs. Required funding rises \$14.9 billion to \$58.4 billion. Capex rises because of more premises, sharply increased shared (replacement) outlays, and the start of a replacement cycle for the satellite/fixed wireless. The NBN is still bleeding cash in 2025.

WHAT IF ALL FOUR ASSUMPTIONS TURN OUT TO BE CORRECT?

None of the replacement assumptions described in the preceding section are unreasonable. In three of the four cases they arguably offer a significantly better representation of likely reality than NBN Co's existing overly optimistic forecasts. A possible exception is the sharply higher rate of wireless-only

households, given it is too early to be certain next-generation wireless will be the threat to fixed line broadband that some industry experts believe.

We can model the effect, in combination, of all four assumptions:

- Real (inflation-adjusted) wholesale revenue per user grows at an annual 3.5 per cent rather than 9.2 per cent per year between FY2012 and FY2021.
- About one in four households is wireless-only by 2028.
- NBN Co's FTTP rollout incurs fibre capex of \$3600 per premise in established areas, 40 per cent higher than budgeted for in the Corporate Plan. Shared capex per premise is unchanged at \$400.
- The remaining NBN rollout, scheduled to take 8 years, actually takes 12 years. This results in higher capex due to replacement of short-lived network elements and more premises to serve, and a much slower ramp in revenues than the best-case scenario in the Corporate Plan.

ALL FOUR ASSUMPTIONS PROVE TO BE CORRECT

(\$ million)	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
REVENUE	\$0	\$2	\$11	\$58	\$189	\$400	\$684	\$1,050
OPEX	-\$337	-\$521	-\$1,226	-\$2,111	-\$2,297	-\$2,449	-\$2,828	-\$2,971
EBITDA	-\$337	-\$519	-\$1,214	-\$2,053	-\$2,108	-\$2,049	-\$2,144	-\$1,921
CAPEX	-\$463	-\$888	-\$1,937	-\$4,243	-\$4,507	-\$4,381	-\$5,245	-\$5,460
CASHFLOW	-\$729	-\$1,154	-\$2,602	-\$5,983	-\$6,433	-\$6,682	-\$7,849	-\$8,036
FUNDING	-\$829	-\$1,983	-\$4,584	-\$10,567	-\$17,001	-\$23,683	-\$31,532	-\$39,568
ARPU (\$/month)		\$22.46	\$24.65	\$25.86	\$29.15	\$31.40	\$32.66	\$33.93
REAL ARPU (\$2012)		\$22.46	\$24.04	\$24.60	\$27.05	\$28.41	\$28.82	\$29.20

(\$ million)	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025
REVENUE	\$1,490	\$1,939	\$2,372	\$2,832	\$3,330	\$3,860	\$4,428
OPEX	-\$3,119	-\$3,193	-\$3,348	-\$3,416	-\$3,495	-\$3,575	-\$3,659
EBITDA	-\$1,628	-\$1,254	-\$976	-\$584	-\$165	\$285	\$769
CAPEX	-\$5,741	-\$5,806	-\$6,062	-\$6,353	-\$6,620	-\$6,706	-\$7,446
CASHFLOW	-\$8,087	-\$7,940	-\$8,098	-\$7,887	-\$7,734	-\$7,371	-\$7,628
FUNDING	-\$47,655	-\$55,595	-\$63,693	-\$71,579	-\$79,313	-\$86,684	-\$94,312
ARPU (\$/month)	\$35.29	\$36.76	\$38.35	\$40.21	\$42.07	\$43.94	\$45.80
REAL ARPU (\$2012)	\$29.62	\$30.09	\$30.61	\$31.32	\$31.96	\$32.56	\$33.10

Combining four reasonable, plausible assumptions (which better reflect consensus opinion about the competitive and commercial conditions NBN Co will face than the optimistic assumptions its Corporate Plan is built upon) turns out to be catastrophic for the network's purported economic viability.

- The funding from taxpayers (or guaranteed by taxpayers) required to bankroll the NBN through to the date construction of its networks finishes soars to \$94 billion.
- It would be highly misleading to depict this as the point when NBN Co becomes financially self-sufficient – it is still haemorrhaging in excess of \$5 billion a year of cash in 2025.
- Revenues simply grow too slowly to keep up with the huge quantity of capital invested in the network, and NBN Co's expense burden of salaries and overheads.

- The capital expenditure needed to complete and maintain the three NBN networks almost doubles to \$71 billion, reflecting the interaction of schedule delays, more premises to pass and/or cover, rising replacement capex, and higher FTTP costs.
- Even if the most contestable of the four assumptions modelled (a doubling of NBN Co's expected 2028 rate of wireless-only households) is set aside, NBN Co's funding needs are still \$90 billion.

This is a simple model. It is subject to the normal uncertainties of any such analysis, but it is in the Coalition's view a much more likely forecast than that contained in the NBN Co 2012-2015 Corporate Plan. The analysis exposes how sensitive Labor's NBN is to a handful of key assumptions, particularly regarding revenue growth, construction timetable, and take-up. There is no evidence whatsoever as yet for optimism on any of these factors, as demonstrated by the NBN Co's repeated changes to its business plan.

It should be noted this model does not account for the cost of equity capital provided to NBN Co, and assumes the on-balance-sheet debt under a Labor NBN remains at \$13.7 billion.

COSTING A COALITION NATIONAL BROADBAND NETWORK

This is an indicative costing of the changes to the NBN rollout the Coalition will propose if elected to government. The Coalition is not privy to the contractual obligations, work in progress, or financial status of NBN Co. NBN Co has significantly revised its rollout and financial forecasts on multiple occasions since 2010. Any estimate of the scale or cost of alternatives to Labor's NBN also requires attempting to forecast how much progress the current rollout will achieve by a given point in time. For all of these reasons, while Coalition's statements about costs and other financial matters are made in good faith, they remain conditional on full disclosure of NBN Co's situation and on the Pre-Election Economic and Fiscal Outlook (PEFO).

PLANNED ROLLOUT OF ALTERNATIVE NBN

The table provides a summary of the results of an NBN rolled out according to the budget and over the timeframe envisaged by the Coalition if the Coalition wins government in late 2013.

THE COALITION NBN AT FINISH OF ROLLOUT IN 2019		
Fibre to the Premises (FTTP)	2,802,000	22%
Fibre to the Node (FTTN)	8,968,000	71%
Fixed Wireless	572,000	4%
Satellite	372,000	3%
TOTAL PREMISES	12,712,000	100%

As can be seen, the rollout would be completed in 2019. The bulk of premises are served by FTTN, which accounts for 71 per cent of the total. Fibre to the node (including fibre to the basement of MDUs) accounts for 94 per cent of fixed line rollout in established areas after 2014 (when NBN Co's existing contracts for FTTP and work in progress run off or are varied to switch resources to FTTN).

Premises in newly developed or 'greenfield' areas account for more than 1.6 million of 2.8 million premises which are connected directly with fibre. Excluding MDUs, about 9 per cent of premises are connected using FTTP in the period 2014-2019. These premises are assumed to be in areas with the poorest quality or most maintenance-intensive copper networks.

ASSUMPTIONS UNDERPINNING FORECASTS

This is a list of the key assumptions or simplifications that factor into the Coalition's costing model:

- The Coalition is elected to office in late 2013.
- It takes approximately 4 quarters for activity at NBN Co to fully reflect changed policy. This reflects supplier commitments in place and the general proposition that in most instances value for taxpayers will be best served by finishing work in progress.
- It will take time to vary contracts so they are deliverable in ways that align with Coalition policy.

- Rollout of Fibre to the Node does not begin at scale until late 2014. There will be pilot deployments in parallel with the runoff of contracts and FTTP work in progress.
- By June 2014 the current FTTP rollout reaches 50 per cent of its revised target for that date – about 565,000 premises in established areas and 134,000 in greenfield areas have been passed.
- Thereafter, FTTP is largely focused on greenfields areas, which account for 60 per cent of FTTP premises in 2019. The re-introduction of private sector builder/operators clears the backlog and results in a proportion of greenfields FTTP premises being served by privately financed and operated infrastructure.
- Brownfield FTTP is restricted to areas with degraded or maintenance-intensive copper. A combination of less gold-plated specifications, choice of sites more effective handling of contractors lowers per-premise costs from \$3600 up to 2014 to \$2700 from 2015-2019 (still 10 per cent higher than the FTTP estimate in the revised Corporate Plan).
- Satellite and wireless costs and schedule are assumed to be as articulated in the revised Corporate Plan. FTTx costs are assumed to be 25 per cent of NBN Co's pre-2014 FTTP cost – the same ratio as in the US/UK and higher than the 20 per cent ratio in NZ.
- Real revenues per user are assumed to grow at 3.5 per cent per year (i.e. remain unchanged as a share of GDP/wallet). This assumes some success for NBN in obtaining small premiums for some services, but is well short of the current assumption of a 9.2 per cent yearly increase.

SUMMARY FINANCIALS

- Revenue over 2012-2021 is \$16 billion, versus \$23 billion in the current NBN Co plan.
- Opex over 2012-2021 is \$22 billion, versus \$26 billion in the current NBN Co plan.
- Capex over 2012-2021 is \$22 billion, versus \$37.4 billion in the current NBN Co plan.
- Capex to 2019, when the rollout reaches 100 per cent coverage, is about \$20.4 billion.
- The NBN is projected to be cash flow positive in 2020-21.

	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019
REVENUE	\$53	\$275	\$825	\$1,624	\$2,438	\$3,164
OPEX	-\$1,061	-\$1,397	-\$2,560	-\$3,516	-\$3,667	-\$3,335
EBITDA	-\$1,008	-\$1,122	-\$1,735	-\$1,892	-\$1,229	-\$171
CAPEX	-\$2,842	-\$3,064	-\$3,386	-\$2,981	-\$2,505	-\$2,127
CASHFLOW	-\$3,569	-\$4,088	-\$5,371	-\$5,157	-\$4,045	-\$2,402
FUNDING (FY END)	\$7,734	\$11,822	\$17,193	\$22,350	\$26,395	\$28,796
ARPU	\$22.26	\$25.36	\$27.54	\$29.60	\$31.59	\$33.61
ARPU in \$2012	\$21.19	\$23.55	\$24.95	\$26.16	\$27.24	\$28.28

THE NBN & THE BUDGET

One controversial aspect of the NBN has been whether expenditure on it should be included on the Government's annual Budget or not. At present it is not.

The Commonwealth's financial reporting rules recognize that Government-owned business enterprises such as Medibank Private or Australia Post are not part of general government and shouldn't be included in the Budget measures of outlays and fiscal balance.

The NBN is also classified as a Government business, which means that \$5.8 billion provided to it in the 2012-13 financial year will not show up as a Budget expense. This is consistent with the rules, but somewhat misleading - every cent invested in the NBN is borrowed, and will have to be repaid by taxpayers if it cannot be recouped from consumers, regardless of its Budget classification.

BACKGROUND TO THE OFF-BUDGET ISSUE

Government finances are categorized by the Australian Bureau of Statistics using standards known as GFS. These are based on international statistical standards issued jointly by the IMF, World Bank, OECD and Commission of European Communities.

The GFS system divides public sector activities and entities into three categories, which in turn determines their treatment in the Budget:

- General government
- Public non-financial corporations or PNFCs
- Public financial corporations

PNFCs typically produce goods or non-banking services (e.g. private health insurance, postal services, broadband) that are sold at 'economically significant prices' (i.e. market prices which determine the quantity of output supplied and the quantity consumed).

PNFC entities have commercial objectives, professional management and boards, profit and loss accounts, and are valued in the Government's financial statements as assets. Their activities do not affect the Budget fiscal balance or underlying cash balance.

ABS DECISION REGARDING NBN Co

In 2009-10 the ABS classified NBN Co as a PNFC. There is no definitive set of rules which determine whether an entity is a PNFC or not, but the factors ABS would likely have considered include:

- Is the government investment in NBN Co genuinely equity (a purchase of ownership in a legally separate business) or is it more like a grant?
- Is there an expectation of "recovery of investment" - commercial returns, or at the very least a recovery of the capital invested in after-inflation terms?
- Does NBN Co earn (or plan to earn) most of its revenue from charging market prices for its services?
- Can the Government exert control over its investment?
- How will the Government recoup its cash - through dividend payments? Or sale of its equity?

Given the loose GFS definitions and NBN Co's 2011-2013 Corporate Plan (which bravely forecast a robust IRR of 7 per cent) the ABS decision that the project could legitimately begin its existence off the Budget was entirely reasonable.

CAN NBN Co STAY OFF-BUDGET?

A more challenging question is whether NBN Co can stay off the books on its current trajectory. Answers to several of the above questions would need to become ambiguous and/or negative for the matter to be revisited. This is gradually becoming the case.

Skepticism about the claimed 'commerciality will grow if the NBN rollout continues to miss targets and show no sign of covering its costs. As the financial analysis elsewhere in this document makes clear, Labor's NBN is so expensive and its prospects of being genuinely 'commercial' so dim that it is barely credible to continue to claim it is a GBE.

The capital funding already required by Labor's NBN will probably never earn a return. And as the headline cost of the network rises, the Government will find it harder to hide behind the Budget rules keeping GBEs off the books.

A significantly less capital-intensive NBN such as the policy proposed here by the Coalition is the only way to ensure NBN Co can continue to have a legitimate claim to remaining off Budget, in addition to being the only way to avoid very large increases in prices.

GLOSSARY

ACCC	The Australian Competition and Consumer Commission, which enforces national laws designed to promote competition and protect consumer rights. The ACCC regulates many aspects of the telecommunications sector.
Access Seeker	A telephone or internet service provider which requires access to facilities (typically 'bottleneck' infrastructure such as the copper wires between telephone exchanges and user premises) owned by another company to provide service to its customers
ADSL/ADSL2+	Variants of DSL that provide broadband over copper wires. ADSL2+ can achieve download data rates of up to 24 Mbps (although performance declines with copper line length).
ARPU	Average Revenue Per User – a telecom industry term for how much revenue each user, on average, pays to a carrier providing services each month.
Broadband	Network connections which transmit multiple data channels over a single wire (e.g. phone calls and data, in the case of DSL). In practice used to refer to high-speed 'always on' Internet access.
Cable	Shorthand for 'hybrid fibre-coaxial cable' or HFC, the cables used in two networks rolled out by Optus and Telstra in the late 1990s to deliver pay TV. They also deliver fast broadband. The Optus and Telstra HFC networks pass about 3 million premises in the major capitals.
Capex	Capital expenditure – investment in long-lived assets such as buildings, networks or equipment.
Copper	Shorthand for the copper telephone wires owned by Telstra extending to 99 per cent of homes and businesses across Australia. These in many cases can also be used for broadband.
Cost Recovery	The practice of ensuring Government Business Enterprises (such as NBN Co) or the owners of infrastructure charge prices for users sufficient to recoup their operating and capital costs, over time.
CVC	A charge levied by NBN Co in proportion to the volume of data the users of an RSP download.
Data Rate	Also known as 'bandwidth' – the amount of data transferred over a connection per second. Often described as upload or download 'speed,' although strictly speaking all data moves at the same speed. The data rate between two points is limited by the network leg with least bandwidth.
Dialup	The original network connections between PCs and the Internet, using a telephone line.
DSL	A family of data transmission techniques (also called xDSL) that provide Internet access over copper telephone wires. DSL evolved into ADSL and then VDSL, each with higher peak data rates. Upload and download rates for all xDSL variants decline as the length of the copper line increases.
DSLAM	Networking equipment located in telephone exchanges that provides DSL broadband.
EBITDA	Earnings before interest, tax, depreciation and amortization. A measure of the underlying profitability of a company before factoring in non-cash expenses such as depreciation, taxes paid, and the interests costs of its particular capital structure.
Fibre	Fibre optic cable, a tube containing tiny strands of glass that transmit data in the form of light. Fibre provides much more bandwidth (higher data rates) than copper.
FTTN	Fibre to the Node – a network where fibre extends beyond telephone exchanges to concentration points ('nodes') such as street cabinets which are much closer to users, but existing copper lines then carry signals the last 50-1000m from the node to premises. FTTB (Fibre to the Building/Basement) and FTTC (Fibre to the Curb/Cabinet) are variants of FTTN.
FTTP/FTTH	Fibre to the Premises (sometimes called FTTH or Fibre to the Home) – a network where fibre optic cable runs all the way to each user's premises.

GDP	Gross Domestic Product, the value of all of the goods and services produced in a nation each year.
GNI	Gross National Income, the total income that accrues to the residents of a nation each year.
GPON	Gigabit Passive Optical Network – the type of fibre network being rolled out by NBN Co.
HFC	An abbreviation for ‘hybrid fibre-coaxial cable,’ cables used by Optus and Telstra in their networks used to deliver pay TV. These cables are also capable of delivering very fast broadband.
ISP	Internet Service Provider – a company that provides access to the internet to businesses and consumers. Examples include Telstra Bigpond, Optus, TPG, iiNet and most wireless carriers.
Kbps	Kilobits per second, a rate of data transfer. Dialup internet access supported 56 Kbps.
Letter of Expectations	A letter from the two ministers (the Minister for Communications and the Minister for Finance) who each hold 50 per cent of the Commonwealth’s shareholding in NBN Co. The letter sets out their instructions to NBN regarding its objectives, priorities and budget.
LTE	Long Term Evolution, a type of 4G wireless network capable in favourable settings of about the same download data rates as good quality ADSL2+ fixed line connections.
NBN	The National Broadband Network will run from 121 ‘points of interconnect’ (exchanges) to every premise in Australia, connecting 93 per cent with fibre and 7 per cent with fixed wireless or satellite. The NBN is a wholesale network open to RSPs and ISPs (‘access seekers’) on equal terms.
NBN Co	A Commonwealth-owned corporation founded in 2009 and given the task of building and operating the NBN. NBN Co is headquartered in Sydney, has about 2300 employees, and by June 2013 is scheduled to have received \$7.5 billion of funding from taxpayers.
NBN Corporate Plan	A document prepared every two years by NBN Co that sets out its business plan, detailed financial and operational projections for three years ahead, and less detailed longer-term forecasts. NBN Co’s second and most recent Corporate Plan covers 2012 to 2015.
NPV	Net Present Value, the value in today’s dollars of future payments, taking into account a ‘discount rate’ or interest rate that represents how risky (or risk-less) the future payments are.
MDU	Multi-Dwelling Unit, a site that includes more than one residential premise, such as a block of apartments or cluster of townhouses. About one in three residences is in an MDU.
Mbps	Megabits per second, a rate of data transfer. 1 Mbps = 1000 Kbps. A two-way video conference or a single stream of high definition video each requires about 6-8 Mbps.
Off-Budget	Government entities such as NBN Co whose expenditure, income and capital spending are not directly accounted for in the Federal Government’s annual Budget statements.
On-Budget	Government outlays or revenues included in the expenditure and receipts sections of the annual Budget.
Opex	Operating expenses – spending on salaries, maintenance, power, rent on offices and other premises, interconnect charges and other running costs that recur (must be paid each year).
Peak Capital	A term used in the NBN Co Corporate Plan to describe the largest sum of capital needed before NBN Co becomes financially self-sufficient, and can begin returning capital to investors.
Premise	A residence such as a house or apartment, or a commercial site such as an office, store or factory.
RSP	An abbreviation for Retail Service Provider, companies that will pay to use the NBN to deliver broadband and telephone services to customers. Examples include Telstra, Optus and TPG.

SAU	Special Access Undertaking. A binding set of commitments about prices, services and behaviour over a defined period proposed by a company, which the ACCC may accept or reject.
Structural Separation	The legal separation of ownership of 'bottleneck' network infrastructure (which in a competitive market is shared by competing carriers) from ownership of customer facing retail operations.
VDSL	A variant of DSL that provides considerably faster data rates (up to 100Mbps downstream and up to 20 Mbps upstream over short lengths of copper wire) than ADSL2+.
Vertical Integration	In telecommunications, vertical integration refers to an end-to-end carrier, which owns the physical network needed to reach customers, wholesale operations, which sell network access to rivals, and customer-facing retail operations. Telstra is a vertically integrated carrier.
Very Fast Broadband	Broadband that delivers higher peak download/upload data rates than ADSL2+ (24Mbps/1Mbps, although most users get lesser performance). Also called ultra fast or super fast broadband.