

Strategic Review

December 2013

Commercial in Confidence – Final Report

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The Report has been prepared by NBN Co with the benefit of expert input as follows:

- Deloitte Touche Tohmatsu (Deloitte) (ABN 74 490 121 060) provided input into the authoring of the Executive Summary and sections 0, 1 and 6 of the Report, and assisted NBN Co in managing the program of work which resulted in the Report;
- The Boston Consulting Group Pty Ltd (The Boston Consulting Group) (ABN 70 007 347 131) provided the analysis on which sections 2.5.1, 2.5.5, 3, 4 and 5 of the Report are based; and
- KordaMentha Pty Ltd (KordaMentha) (ABN 36 220 576 038) provided the analysis upon which section 2 (excluding section 2.5.1 and 2.5.5) of the Report is based.

(together the **Experts**).

Given the required time frame for the Report's completion, NBN Co has relied on the Experts for the matters within their respective scope of work and has not independently verified or audited the information presented in the Report through the work of the Experts.

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Executive Summary

Executive Summary

Objectives of the Strategic Review

Following the election in September 2013 the Government issued an interim Statement of Expectations (SOE) to NBN Co Limited (NBN Co) that outlined the Government's commitment to completing the construction of the National Broadband Network (NBN).¹

The Minister for Finance and Minister for Communications, as joint Shareholder Ministers of NBN Co, announced the initiation of a Strategic Review on 3 October 2013 to undertake an assessment of:

- The progress and cost of the rollout and NBN Co's financial and operational status;
- The estimated time and cost to complete the NBN under a fibre-to-the-premises (FTTP) model (i.e. Government policy prior to 7 September 2013);
- The estimated cost and time to complete the NBN if variations were made to the current plan such as increased use of fibre-to-the-node (FTTN) in established (brownfield) areas;
- The economic viability of NBN Co under alternative strategies;
- The implications of capital costs and principles of cost recovery on wholesale and consumer prices under existing and alternative strategies;
- Recommendations for organisation restructuring, any amendments to the construction model and a revised NBN Co strategy to achieve Government policy objectives; and
- Any other matters the Chair deems relevant to the strategic consideration of NBN Co's present situation and future prospects.²

The Strategic Review, together with a number of other reviews (i.e. the "Independent Cost-benefit Analysis and Review of Regulation" and the broadband quality project), will form a key input into NBN Co's 2014-17 Corporate Plan which will be provided to the Government in the first half of 2014. The Strategic Review has been prepared to assist the Government formulate policy and inform decisions on revised Statement of Expectations for NBN Co.

Approach

The Strategic Review was undertaken by NBN Co over a period of five weeks from 28 October 2013, concluding with the submission of a draft report on 2 December 2013 and, following Board approval, this final report to the Minister for Communications and Minister for Finance on 12 December 2013.

NBN Co appointed three advisory firms to contribute to the review process:

- Deloitte provided governance and program management services in conjunction with NBN Co to ensure the Strategic Review was delivered within the parameters and timeframe set by the Government;

¹ http://www.communications.gov.au/__data/assets/pdf_file/0004/186115/130924_NBN_Co.pdf

² http://www.financeminister.gov.au/media/2013/mr_2013-3-joint.html

- KordaMentha undertook an independent assessment of NBN Co's operational and financial performance to date and developed a revised outlook of cost and time to complete the rollout under the previous SOE based on current performance ; and
- The Boston Consulting Group supported the independent assessment in preparing a revised outlook for revenue and undertook a review of the timing, costs and product offers under alternative models of delivering high-speed broadband.

The Strategic Review was conducted by NBN Co's Board, under the sponsorship of NBN Co's Executive Chairman, and was led by NBN Co's Head of Strategy and Transformation. NBN Co mobilised a cross-divisional team of internal employees who worked closely with the external consultants to complete the review under the direction of NBN Co's Chief Commercial Officer.

Background to the build of the National Broadband Network

On 7 April 2009, the then Government announced the creation of a wholesale-only, open-access communications network aimed at delivering high-speed broadband and telephony services to the nation.³ This represented the largest infrastructure project ever to be undertaken in Australia.

The Government formed NBN Co as a Government Business Enterprise (GBE) to carry out the NBN project. In December 2010, the Government released the first SOE which articulated the policy objectives on which NBN Co was required to deliver, reflecting the Government's central policy objective for NBN Co "...to deliver significant improvement in broadband service and quality to all Australians, address the lack of high-speed broadband in Australia, particularly outside of metropolitan areas, and reshape the telecommunications sector."⁴

NBN Co translated the Government's policy initiative into specific objectives, as set out in the 2012-2015 Statement of Corporate Intent (tabled in Parliament on 9 October 2012). The objectives included compliance with the SOE coverage requirements for provision of FTTP technology to homes, schools and businesses with wholesale broadband speeds of up to 100Mbps, to serve all remaining premises with Fixed Wireless and Satellite technologies providing peak download speeds of 12Mbps, and to provide fibre in all new developments of 100 or more premises (after 1 January 2011).

The first Government approved Corporate Plan (Corporate Plan 2011-2013, dated 17 December 2010) shows that NBN Co planned to achieve network completion by FY21 for Capital Expenditure of \$35.9 billion and peak funding of \$40.9 billion.

The most recent Government approved Corporate Plan (Corporate Plan 2012-2015, dated 6 August 2012, herein referred to as the Corporate Plan) shows that NBN Co planned to achieve the outcomes set out in the Statement of Corporate Intent above by FY21 for Capital Expenditure of \$37.4 billion and peak funding of \$44.1 billion.

³ http://pandora.nla.gov.au/pan/80090/20091110-0000/www.minister.dbcde.gov.au/media/media_releases/2009/022.html

⁴ Statement of Expectations, Minister for Finance and Deregulation and Minister for Broadband, Communications and the Digital Economy, December 2010

NBN Co's performance to date and Revised Outlook

The Strategic Review included an independent assessment undertaken by KordaMentha with input from The Boston Consulting Group on likely future Revenue (the Independent Assessment). The Independent Assessment reviewed NBN Co's operational and financial performance up to 30 September 2013 compared to the Corporate Plan. The Independent Assessment considered the achievements of the organisation to date, rollout performance against Corporate Plan and financial performance against Corporate Plan, and outlined reasons for the differences in each case. It also considered the operational and financial position of NBN Co based on the continuation of the current rollout plans (the Revised Outlook).

Progress to date

Key activities undertaken by NBN Co since it was founded in April 2009 include:

- Establishing a functioning organisation with 2,956 staff located in six offices across Australia;
- Planning, designing, and commencing rollout of the FTTP network;
- Negotiating and securing a complex long term contract with Telstra Corporation Ltd (Telstra) for the provision of a significant portion of the required infrastructure, concluding the Singtel Optus Pty Ltd and other Optus entities (Optus) Hybrid Fibre Coaxial (HFC) Agreement, and obtaining the approval of the Australian Competition and Consumer Commission (ACCC) for both agreements;
- Developing a supply chain and entering into supply arrangements with over 1,200 suppliers;
- Developing a Wholesale Broadband Agreement (WBA) and signing up a number of Retail Service Providers (RSPs);
- Developing a Special Access Undertaking (SAU); and
- Securing a managed services agreement for interim satellite and completing contracts for the construction and deployment of two purpose-built NBN Co satellites.

Operational performance to date and Revised Outlook

At 30 September 2013, the rollout of the brownfields FTTP network was 48 percent behind the planned Premises Passed in the Corporate Plan, with 227,483 Premises Passed at that date. Of these premises, only 153,977 are Serviceable (i.e. premises that are available to be connected) by NBN Co. The greenfields and Fixed Wireless rollouts are also behind the Corporate Plan.

The Revised Outlook for the current deployment plan indicates that the fibre rollout project will take three years longer to complete than indicated in the Corporate Plan, with a revised end date of June 2024. The Revised Outlook for Premises Passed at June 2014 is 357,000 compared to 1,129,000 in the Corporate Plan.

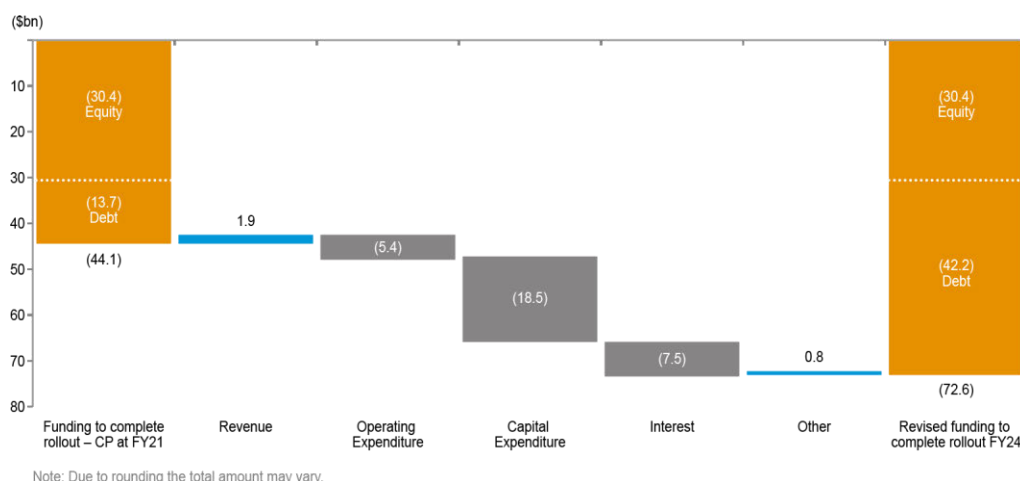
Financial performance to date and Revised Outlook

Expenditure to 30 June 2013 was 26 percent under the Corporate Plan at that date. Whilst this is an under-spend relative to the Corporate Plan, it is significantly ahead of the expenditure which would have been required in the Corporate Plan to reach the levels of actual rollout achieved.

In the Revised Outlook, delays in deployment and take-up, lower average revenue per user (ARPU) and higher levels of non-subscription result in ~\$13-14 billion less Revenue to FY21 than in the

Corporate Plan, Capital Expenditure required will increase from \$37.4 billion to \$55.9 billion and the peak funding requirement will be \$72.6 billion (with equity and debt) in FY24 which is \$28.5 billion higher than the Corporate Plan (\$44.1 billion).

Exhibit 0-1: Comparison of funding in Corporate Plan FY21 to Revised Outlook FY24 rollout



The Revised Outlook assumes the existing Equity Funding Agreement between NBN Co and its shareholders remains in place and all funding beyond \$30.4 billion would be funded by debt.

The Independent Assessment concluded that based on the Revised Outlook it is highly unlikely that debt funding will be available from a third party financier in the near to mid-term in the absence of a Government guarantee.

Governance, planning and reporting performance to date

The Independent Assessment (based on a forensic investigation) found that no material issues exist within the accounts of NBN Co.

The Independent Assessment concluded that, although the Corporate Plan is based on detailed and quantitative analysis, it is “*extremely optimistic and very unlikely to be achieved*”.

The Independent Assessment found that certain of the factors causing the financial and operational under-performance to date (relative to the Corporate Plan) related to governance, planning and reporting including:

- *An unrealistic assessment by key internal and external stakeholders of the complexity and time required to complete the task;*
- *“Blind faith” in the achievability of the Corporate Plan, notwithstanding clear factual evidence to the contrary;*
- *Some significant operational decisions being made without appropriate commercial rigour and oversight;*
- *A relentless focus on the metric of Premises Passed as the single most important determinant of corporate success, rather than a balanced view including Premises Serviceable, and Premises Activated;*
- *Immature end-to-end operational performance management metrics to manage significant queues (including rework) in design and construction; and*
- *The lack of a “single version of the truth” for information and decision making.*

Organisational capability and processes performance to date

The Independent Assessment found that NBN Co has attracted a committed, motivated, and generally capable group of people who want to do important, meaningful work.

The Independent Assessment concluded that the culture and leadership of the organisation are widely seen to be a major problem.

The Independent Assessment concluded that the organisation is currently carrying a level of overhead and headcount which is in excess of current requirements as they are predicated on the achievement of the Corporate Plan.

The Independent Assessment found that certain of the factors causing the financial and operational under-performance to date (relative to the Corporate Plan) related to organisational capability and processes as follows:

- *A lack of deep internal experience in complex infrastructure, construction projects and project management;*
- *A frequently changing program of works* [REDACTED]
- *Significant issues with the fibre network detailed design,* [REDACTED]
- *Insufficient consideration of operational construction constraints and costs when developing detailed designs;*
- *Provision of fibre servicing area module (FSAM) construction instructions* [REDACTED]; and
- *Significant queues in connections and activations without sufficient root cause analysis and timely focus on rectification.*

These matters will be addressed in the preparation of NBN Co's next Corporate Plan.

Comparative evaluation of alternative scenarios

The Strategic Review undertook a comparative evaluation of alternative scenarios and technology approaches which is described below. The scenarios refer to threshold download speeds, for example 50 megabits per second (Mbps) services. In many circumstances, a large proportion of premises may access download speeds in excess of the threshold.

Comparisons of Cost Per Premises to international next generation broadband networks

Many international markets are rolling out next generation broadband networks, which are typically FTTP, FTTN or HFC. Globally the proportion of these networks which is FTTP has fallen, with FTTN increasing in coverage, and super-fast HFC networks growing rapidly⁵.

The key measure of rollout cost is Cost Per Premises. This is not a tightly defined measure, however, international benchmarks provide useful comparators for consideration by NBN Co.

Internationally, the cost of rolling out a new FTTP network in countries most comparable to Australia ranges from \$1,100 - 1,300 per premises, for FTTN it ranges from \$350 - 700 per

⁵ Idate FTIX Watch Service 2013

premises, and for upgrading existing HFC networks to data over cable service interface specification (DOCSIS) 3.0 it is ~\$100 per premises.

A range of alternative technologies for building the NBN were explored by The Boston Consulting Group as input to the Strategic Review, with important Cost Per Premises implications.

Based on overseas experience, it is possible to radically redesign the NBN Co FTTP deployment to reduce the Cost Per Premises. The changes to deployment include changes in the delivery model, which in turn result in labour productivity improvements, different and more cost-efficient architecture and materials, and cost-efficient construction techniques. This radically redesigned FTTP deployment is estimated to cost [REDACTED] build Capital Expenditure⁶ per brownfield premises passed, representing savings of [REDACTED] per premises passed versus the Revised Outlook.

In relation to FTTN, observations from Europe suggest that a very high proportion of vectored VDSL premises can receive download speeds of ~50Mbps or more, and upload speeds of ~20Mbps. Many premises will be able to receive download speeds in excess of this. However, as vectored VDSL has not yet been deployed in this country, field tests will be needed to determine actual speed-distance performance which could be substantially different than in Europe.

Construction costs for an FTTN network in Australia would be in the order of [REDACTED] per premises, including the proactive copper remediation of up to [REDACTED] percent of lines in the FTTN footprint. Upgrade paths to fibre-to-the-distribution point (FTTdp) or FTTP are possible at lower cost than building FTTP now (based on estimated present value), provided that upgrades take place five or more years in the future.

[REDACTED] HFC networks could provide high-speed broadband to ~3.4 million premises in the future by adapting and extending existing HFC infrastructure. Configuration and construction capital expenditure is estimated at [REDACTED] per premises (averaged over the entire HFC footprint) to pass and connect the HFC footprint, including capacity expansion to offer at least 50Mbps service through 2019, with 1:3 relation between upstream and downstream speed.

In the Fixed Wireless and Satellite footprint, customers are taking up NBN Co's services faster than planned. If the current trend in take-up continues, NBN Co will need to add [REDACTED] base stations and possibly an additional satellite. Initial very high-level estimates indicate that allocating ~100,000 premises to FTTN rather than Fixed Wireless and Satellite may partly avoid the cost of these capacity expansions estimated at between \$0.6 – 1.1 billion. More work is required to explore this option further.

Comparison of alternative scenarios

In order to evaluate the potential combinations of the above technologies for the construction of the NBN, five scenarios were considered in addition to the Revised Outlook set out earlier (Scenario 1):

- **Scenario 2: Radically Redesigned FTTP** – In this scenario, NBN Co continues to roll out fibre to all premises within the fixed line footprint and makes radical changes to improve its productivity, architecture, materials and construction techniques to increase rollout speed and decrease costs;

⁶ [REDACTED]
[REDACTED]
[REDACTED]

- **Scenario 3: FTTN short loop/FTTB large MDUs** – In this scenario (as in all others), NBN Co rolls out fibre to premises where it has already committed to do so. Beyond that, in the fixed line footprint, FTTB would be rolled out to ~1 million premises in large MDUs (those with greater than 30-40 units) and FTTN to ~1.5 million premises in short loop areas (areas where over 90 percent of premises are within 400 metres of the pillar);
- **Scenario 4: HFC in HFC footprint** – In this scenario, NBN Co rolls out all committed FTTP, then connects all remaining premises within the 'HFC footprint' using HFC. Outside the HFC footprint, all short loop areas would have FTTN, and long loop areas would have FTTP;
- **Scenario 5: FTTN and HFC (no demobilisation)** – In this scenario, NBN Co will deliver some form of technology to all homes as fast as possible. In HFC areas, the fastest rollout will be by completing the lead-ins required and filling in gaps in the footprint with HFC. For areas outside the HFC footprint, the fastest rollout would most likely be achieved with FTTN. However, all committed FTTP will still be rolled out, as will an additional amount of FTTP (mostly in areas with longer loops) so that construction can continue while FTTN ramps up. In total, under this scenario, FTTP will reach ~1 million brownfields premises; and
- **Scenario 6: Optimised Multi-Technology Mix** – There are many ways for NBN Co to deliver a multi-technology approach. In this scenario, NBN Co selects which technologies will be rolled out on an area-by-area basis, in a way that minimises peak funding and maximises long term economics, while delivering 50Mbps to a significant proportion (~90 percent) of the fixed line footprint by end of CY19 (covering all areas, both broadband-served and –underserved). The technology selection by area takes into account:
 - The earliest available technology that provides a certain speed for that area;
 - The relative cost position (build Capital Expenditure, ongoing Capital Expenditure and Operating Expenditure) of the various technologies;
 - The constructability in relation to neighbouring areas;
 - The implications on future revenue realisation; and
 - The potential future upgrade path.

All scenarios assume a more effective funding model of FTTP deployment in greenfields over 100 premises in the fixed line footprint.

In addition, scenarios 2 to 6 have been modelled using a 20% contingency on all Capital Expenditure compared to 10% on all Capital Expenditure in the Corporate Plan and Revised Outlook. The higher contingency reflects the inherent risk and complexity associated with projects of this size and scale as evidenced by global experience, and the findings of the Independent Assessment in the Revised Outlook.

Scenario 6 gives priority in time to serving areas with poorer current broadband service. These areas have been modelled based on 8 to 10 percent of the fixed line footprint. Additional costs have been estimated to allow for areas to be prioritised in time where in those areas in the fixed line footprint there is very limited availability of broadband, for example notable gaps in ADSL coverage without access to alternative broadband services. It is assumed any prioritisation will take into account reasonable operational efficiency considerations, such as needing to rollout in contiguous workfronts and dealing with an area as a whole. Following the completion of the Government's review of under-served areas, NBN Co will consider further the impact of prioritising these areas in the rollout. All other scenarios approach areas of service in a roughly even timing across the years of the rollout.

Scenario 6 also assumes alternative technologies such as FTTN might be used in small areas of the Fixed Wireless and Satellite footprint.

In Scenario 6, the preferred choice of technology for MDUs in a particular area will depend on a range of factors including the technology in the surrounding area, ability to access the building and relative cost. For example, for MDUs containing more than 30-40 units in an FTTP area, there is a cost advantage of using FTTB instead of FTTP assuming similar building approval processes. NBN Co will evaluate the appropriate technology for MDUs in a particular area as part of the network design process.

Scenario 3 assumes that MDUs containing more than 30-40 units will be served by FTTB. For smaller MDUs (i.e. less than 30-40 units), on average there is no technology cost advantage to FTTB over FTTP, assuming building approval processes are similar between technologies, so these are costed as served by FTTP (i.e. fibre run to individual units).

In all other Scenarios, the cost assumption has been modelled such that units within MDUs will be served with the same technology as neighbouring single dwelling units. For MDUs in an FTTP area, fibre will be run to individual units, for MDUs in an FTTN area individual units would be served by their existing copper lines to a node outside the MDU building, and in an HFC area units would be served by HFC. In practice though, the choice to use FTTB to drive further cost benefits over FTTP or HFC for large MDUs would be a consideration for local roll out planning.

The table below sets out the relative financial performance of the different scenarios:

Table 0-2: Financial outcomes including Fixed Wireless, Satellite and greenfields (1)

	Scenario 1: Revised Outlook	Scenario 2: Radically Redesigned FTTP	Scenario 3: FTTN short loop, FTTP large MDUs	Scenario 4: HFC in HFC footprint	Scenario 5: FTTN & HFC (no de-mobilisation)	Scenario 6: Optimised Multi- Technology Mix
Deployment completed by end	CY24	CY23	CY22	CY21	CY20	CY20
Technology used by scenario in fixed line footprint at the end of rollout						
FTTP	100%	100%	87%	63%	19%	26%
FTTN/dp/B	0%	0%	13%	5%	48%	44%
HFC	0%	0%	0%	32%	33%	30%
Premises with access to download speed (% of fixed line footprint)						
% with 25Mbps by 2016	22%	19%	23%	48%	45%	43%
% with 50Mbps by 2019	57%	56%	67%	87%	87%	91%
% with 100Mbps by 2019 (2)	57%	56%	55-65%	80-85%	60-75%	65-75%
Date of first positive free cashflow (3)	FY25 - ~FY40	FY25-27	FY24-25	FY22	FY22	FY22
Cumulative FY11-21						
Revenue (4)	\$10bn	\$9bn	\$11bn	\$16bn	\$16bn	\$18bn
Operating Expenditure	\$23bn	\$23bn	\$24bn	\$26bn	\$27bn	\$27bn
Capital Expenditure	\$43bn	\$35bn	\$36bn	\$36bn	\$29bn	\$30bn
Peak funding (equity & debt) (5)	~\$73bn	~\$64bn	~\$59bn	~\$51bn	~\$43bn	~\$41bn
Peak funding (all equity)	~\$63bn	~\$54bn	~\$52bn	~\$47bn	~\$40bn	~\$39bn
Cumulative Capital Expenditure FY11-24 (Incl. replacement Capex)	\$56bn	\$44bn	\$43bn	\$40bn	\$34bn	\$33bn
IRR (FY10-40) Revenue Trajectory A*	2.5%	4.0%	4.1%	4.7%	4.9%	5.3%
Revenue Trajectory B*	n/a	1.7%	1.9%	2.5%	2.6%	3.1%

Notes:

The Strategic Review assessed the revenue trajectory of NBN Co to be significantly below the trajectory described in the Corporate Plan. Two alternative trajectories were assessed. Trajectory A represents a telecommunications market without significant change, and includes real wholesale residential ARPU decline to NBN Co of 0.3 percent per annum. Trajectory B has lower NBN Co revenues even than Trajectory A. Trajectory B might result from a range of market changes. It includes real wholesale residential ARPU decline to NBN Co of 2.5 percent per annum.

Scenarios 2 to 6 have been modelled using a 20% contingency on all Capital Expenditure (compared to 10% on all Capital Expenditure in the Corporate Plan and Revised Outlook). The higher contingency reflects the inherent risk and complexity associated with projects of this size and scale as evidenced by global experience, and the findings of the Independent Assessment in the Revised Outlook.

All scenarios assume that 7 percent of the total Premises Passed are served with Fixed Wireless and Satellite, with the exception of scenario 6, which assumes 6 percent, with the remaining 1 percent on FTTP.

- All numbers in the table are estimates and subject to change. Further, all numbers are subject to finalisation of agreements with Telstra and Optus (including ACCC approval). To allow a direct comparison of costs between Scenarios 5 and 6, the financial modelling has assumed for both scenarios that FTTP and FTTP are available, and used, in order to increase the fraction of premises attaining 25Mbps or greater from 98% to ~100% by the end of the rollout.
- Range depends on the proportion of FTTP premises which can receive 100Mbps or greater. This will depend on the distance from their premises to the pillar, and the copper quality.
- The year during which free cashflows become positive.
- The average range between the higher and lower case revenue estimates is ~\$300 million in cumulative revenues FY11-21. The figures in the table represent the average.
- Total funding consists of equity funding plus net debt as at the end of the year for which total funding is at its peak. For the Revised Outlook equity funding is capped at \$30.4 billion. For all other scenarios, equity funding is capped at \$29.5 billion in accordance with the Government's policy statement with any further funding requirements assumed to be met by debt funding in both cases.

* The IRR includes an enterprise valuation in 2040 at 6x EBITDA. A detailed explanation of how IRR has been calculated is outlined in section 4.

It is noted that regardless of the technology deployed, NBN Co will need to consider multiple factors to improve rollout timing and cost efficiency. These include:

- Efficiencies for improving the construction delivery model and construction management;
- NBN Co's approach to greenfields deployment;
- Consideration of how voice services are provisioned and customer premises equipment is provided and installed;
- Efficiencies from operational support systems (OSS) / business support systems (BSS), IT, and network operations systems; and
- The impact of different technologies on NBN Co's pricing and product strategy.

Strategic direction

NBN Co recommends that it develops an optimised multi-technology approach to rolling out the NBN that balances fast deployment of 50Mbps broadband with better economics, to the highest number of Australians. This approach delivers access to at least 50Mbps to ~90 percent of the fixed line footprint and 100Mbps to 65-75 percent by CY19, which is faster than the Revised Outlook. NBN Co will decide on its exact priorities after consultation with industry, Government and other stakeholders. A high-level assessment of a multi-technology approach suggests that the eventual optimal mix of technologies in the fixed line footprint could be in the range of:

- FTTP to ~20-26 percent of premises;
- FTTN/dp/B to ~44-50 percent; and
- HFC to ~30 percent.

Fixed Wireless and Satellite will be used outside the fixed line footprint, along with some FTTN/dp.

The optimised technology mix reflects a set of considerations:

- HFC will be provided as quickly as possible to the premises already connected;
- FTTP will continue to be built until CY18 to maintain momentum. FTTP will also be used where it is the most economical choice, either because of high revenue potential (especially in business areas) or because of the high cost associated with deploying FTTN/dp;
- FTTN/dp/B will be deployed in all other areas in the fixed line footprint:
 - FTTN in areas with relatively short-loop lengths;
 - FTTdp to complement the FTTN rollout in long-loop areas towards the end of the build; and
 - FTTB especially for large MDUs, depending on the relative complexity of installing the competing technologies.
- Fixed Wireless and Satellite will serve 6 percent of premises by the end of CY19.

The Optimised Multi-Technology Mix scenario results in the following outcomes:

- **~40-45 percent** of the fixed line footprint will have at least 25Mbps in CY16 provided by NBN Co;
- **~90 percent** of the fixed line footprint will have at least 50Mbps in CY19;
- **~98-100 percent** will have at least 25Mbps by end of CY20;

- Most areas in the fixed line footprint that currently, across the area, have no or very low levels of broadband (~8 to 10 percent of the fixed line footprint premises) will receive an NBN Co service, on average, **two years earlier** in the deployment than they would in all other scenarios;
- **A credible upgrade path** is achievable, which could generate download speeds between 100Mbps to 1,000Mbps to the fixed line footprint at lower costs than building FTTP throughout the fixed line footprint today. The Strategic Review expects that NBN Co would not need to upgrade to a second access technology sooner than five years after construction of the first access technology. On this timetable it is economically more efficient to upgrade over time. In addition, upgrading over time provides significant economic 'option value' for NBN Co as technologies evolve, enabling NBN Co to utilise the most appropriate upgrade technology at the time;
- **Substantially earlier revenues** than expected under the Revised Outlook, leading to cumulative revenues over FY11-21 of ~\$18 billion (~\$7-8 billion more than in the Revised Outlook scenario), although slightly lower revenues than the Revised Outlook in the later years;
- **EBITDA margin of ~60 percent** in FY28 which is in line with expectations for a wholesale-only telecommunications company;
- **Peak funding** (equity and debt) is expected to be around \$41 billion, of which around \$15 billion is already committed as of November 2013. This \$41 billion is substantially lower than the ~\$73 billion estimated for the Revised Outlook and the ~\$64 billion estimated under Scenario 2. The difference is driven both by earlier Revenue realisation as well as lower Capital Expenditure and the associated financing costs; and
- **Cash-flow positive** in FY22.

The recommended optimised multi-technology mix approach provides NBN Co with the flexibility to adapt over time. It allows NBN Co to adjust its technology mix dynamically to leverage future technological improvements across all types of networks (copper, fibre and HFC) and to reflect changes in customer demands.

The eventual mix of technologies for each geography will be determined by using the most recent and relevant information.

Given the relatively low IRR of the Optimised Multi-Technology Mix Scenario, NBN Co will need to carefully manage the economics of the business to deliver an acceptable IRR.

Next steps

Subsequent to this review, the Board and Executive Management of NBN Co will begin to work with the Minister Shareholders and Departments on the revised SOE for NBN Co. It is noted that NBN Co requires a revised SOE in order to develop and finalise its next Corporate Plan. The Corporate Plan needs to be approved prior to 1 July 2014. The next steps must determine a new direction for the organisation as well as address issues with the current network build under the interim SOE.

NBN Co has commenced a number of steps that are not contingent on a revised SOE. These steps will commence immediately, and include:

- Engaging with Government on the findings of the Strategic Review;
- Mobilising the transformation agenda including establishing a Transformation Program Office;

- Implementing changes to the FTTP construction delivery model;
- Preparing for a multi-technology approach;
- Preparing for commercial negotiations;
- Assessing IT capability for a multi-technology approach;
- Focusing on people and organisational change;
- Implementing a revised governance approach; and
- Engaging and consulting widely with stakeholders.

When the revised SOE is issued, NBN Co will undertake the changes needed to deliver the new objectives in the most efficient, cost effective and transparent way. NBN Co has identified a number of medium term changes that are likely to be required including:

- Developing a new Corporate Plan;
- Establishing a whole of business operating model;
- Finalising the technology mix and network design principles for the new SOE;
- Renegotiating agreements with Telstra, Optus, vendors, contractors and RSPs;
- Engaging stakeholders in relation to potential regulatory changes;
- Making ongoing changes to the construction delivery model;
- Improving IT and network operations; and
- Making ongoing organisational and culture change.

1

NBN project: Background to industry and policy developments

1 NBN Project: Background to industry and policy developments

Government recognition of the economic and social benefits of broadband can be traced back almost a decade to the Commonwealth Government's 2004 National Broadband Strategy⁷, which outlined an important role for policy to promote "fair and reasonable access to broadband and its benefits by all Australians". Following its own strategic review in 2005, Telstra announced a proposal in November that year to install FTTN. However, Telstra failed to reach an agreement with the ACCC over several key matters (e.g. treatment of actual costs incurred in providing the service)⁸ and withdrew its proposal in August 2006.⁹

A proposal for a FTTN network was announced in 2006 by a group of nine carriers, planned to be an open access network with separation of network ownership and retail services. The nine carriers lodged a Special Access Undertaking (SAU) with the ACCC in May 2007¹⁰ which was later rejected by the ACCC through a draft decision in December 2007 (the undertaking was formally withdrawn by the consortium in March 2008).¹⁰

On 7 December 2007, the Minister for Broadband, Communications and the Digital Economy announced an intention to build a FTTN NBN.¹¹ In April 2008 a request for proposal (RFP) was issued to build and operate the network, with an earlier announced Expert Panel to assess the proposals.¹² While several responses were received, the "...Independent Panel of Experts advised that none of the national proposals offered value for money",¹³ leading to the Government terminating the RFP in April 2009. Coinciding with the termination, was the Government announcement to establish NBN Co to design, build and operate a \$43 billion FTTP wholesale-only NBN.¹³

1.1 Original intent of the National Broadband Network project

On 7 April 2009, the Government announced the establishment of "...a new company (NBN Co) to build and operate a new super-fast National Broadband Network."¹³ The NBN was announced to be a wholesale-only, open-access communications network aimed at delivering high-speed broadband services to the nation, and formed part of the then Government's reform of the telecommunications market to separate the infrastructure and retail operations of Telstra.

The Government formed NBN Co as a GBE operating under the Commonwealth *Authorities and Companies Act 1997*, the *Commonwealth Government Business Enterprise Governance and Oversight Guidelines October 2011 (GBE Guidelines - updated in 2011)* and the *Corporations Act 2001* to carry out the NBN project. At the time of the announcement, the original intent was for NBN

⁷ http://www.archive.dcita.gov.au/2007/12/national_broadband_strategy

⁸ <http://www.telstra.com.au/abouttelstra/media-centre/announcements/telstras-earnings-at-better-end-of-guidance-and-transformation-on-target.xml>

⁹ <http://www.accc.gov.au/media-release/accc-perplexed-by-telstra-decision-on-fibre-to-the-node-investment>

¹⁰ <http://transition.accc.gov.au/content/index.phtml/itemId/788471>

¹¹ http://www.archive.dbcde.gov.au/_data/assets/pdf_file/0007/110014/Summary_observations_for_website.pdf

¹² http://www.archive.dbcde.gov.au/2009/april/national_broadband_network

¹³ http://pandora.nla.gov.au/pan/80090/20091110-0000/www.minister.dbcde.gov.au/media/media_releases/2009/022.html

Co to be jointly owned by the Government and the private sector, with NBN Co to invest up to \$43 billion over eight years to build the NBN. This was to use Government funding sourced through the Building Australia Fund and issuance of Aussie Infrastructure Bonds.¹³

NBN Co was established with two Shareholder Ministers – the Minister for Communications and the Minister for Finance – who represented the Commonwealth Government (formerly the Minister for Broadband, Communications and the Digital Economy and the Minister for Finance and Deregulation). In December 2010, the Shareholder Ministers released the first NBN SOE¹⁴ which articulated the policy objectives on which NBN Co was required to deliver, reflecting the Government's policy objective for NBN Co "...to deliver significant improvement in broadband service and quality to all Australians, address the lack of high speed broadband in Australia, particularly outside of metropolitan areas, and reshape the telecommunications sector."¹⁴ NBN Co translated the Government's policy initiative into specific objectives as set out in the 2012-2015 Statement of Corporate Intent, tabled in Parliament on 9 October 2012:¹⁵

- To comply with the SOE coverage requirements for provision of FTTP technology to Australian homes, schools and businesses designed to offer its retail service provider customers wholesale broadband speeds of up to 100Mbps. NBN Co's product roadmap also includes a fibre service with speed options of up to 1 gigabits per second (Gbps) (1000/40Mbps downstream/upstream) aimed for enterprise-grade services;
- To serve all remaining premises with a combination of leading-edge Fixed Wireless and Satellite technologies providing peak download speeds of up to 12Mbps. In the period before NBN Co launches its own satellite service in 2015, NBN Co is using an Interim Satellite to provide broadband services for rural and remote Australians who don't have access to "metro comparable" broadband;
- To provide fibre in all new developments of 100 or more premises, (broadacre or infill), which receive Stage 5 (civil works) planning approval after 1 January 2011; in developments, irrespective of size or type, in areas where NBN Co has already rolled out fibre and the fibre is ready and capable of connection; and in areas NBN Co has publicly identified as a rollout region. NBN Co may also provide infrastructure in smaller developments where practical for it to do so;
- To establish a wholesale-only, open-access network, subject to the ACCC scrutiny, to support the Government's objective of structural market reform;
- To offer open and non-discriminatory access to wholesale services via Layer 2 bitstream services, which in time will help enable multi-operator delivery of data, voice and video services;
- To charge access seekers uniform national wholesale pricing within technologies and uniform national entry level pricing across technologies consistent with the government's objective of providing uniform national wholesale prices. Where new technologies become available, NBN Co will seek to maintain this principle; and
- To implement the Telstra Definitive Agreements (Telstra DAs) and the Optus HFC Agreement.¹⁶

¹⁴ Statement of Expectations, Minister for Finance and Deregulation and Minister for Broadband, Communications and the Digital Economy, December 2010

¹⁵ <http://www.nbnco.com.au/about-us/our-purpose.html>

¹⁶ Statement of Corporate Intent, 2012 – 2015, NBN Co, October 2012 (URL: <http://www.nbnco.com.au/content/dam/nbnco/documents/statement-of-corporate-intent-2012-15.pdf>)

1.2 Chronology of key milestones

1.2.1 Milestones in establishment of NBN Co

Post establishment of NBN Co in April 2009, the balance of the year saw a number of critical milestones achieved which were integral to shaping NBN Co's operational and strategic environment. These included the first trials of the NBN (in Tasmania) which were announced in July 2009 (see section 1.2.4.1), commissioning the McKinsey-KPMG National Broadband Network Implementation Study (August 2009) and work was started on reforms to existing telecommunications regulations (e.g. addressing the vertical integration of Telstra) which was later passed in 2010.

The period from 2010 through to 2012 also saw significant progress, such as: release of the first NBN Co Corporate Plan (December 2010), release of the Government's SOE (December 2010), execution of the Telstra DAs and Optus HFC Agreement (June 2011) (see Section 1.2.3.1), release of the first three year rollout plan (March 2012) and release of the 2012–2015 Corporate Plan (August 2012). During this period systems and processes were put in place to support the rollout of NBN Co's products and services and there was extensive development of NBN Co's commercial agreements with its customers and the parallel development of its SAU.

For a detailed list of key milestones see the Annexures.

1.2.2 Board and key executive appointments

The current and previous NBN Co Board is detailed in Exhibit 1-1 below.

Exhibit 1-1: Current and previous NBN Co Board

Board appointments and departures

	Appointments		Departures	
	Chairman, Executive Director & Company Secretary	Non-Executive Director	Chairman, Executive Director & Company Secretary	Non-Executive Director
2009	<ul style="list-style-type: none"> Norman Holcroft (Company Secretary) Alisa Taylor (Company Secretary) 	<ul style="list-style-type: none"> David Yarra James Cameron 	<ul style="list-style-type: none"> Norman Holcroft (Company Secretary) 	
.....				
	<ul style="list-style-type: none"> Michael Quigley (Executive Director & CEO) Douglas Campbell (Executive Director) 	<ul style="list-style-type: none"> Martin Hoffman Peter Hay Gene Tilbrook Siobhan McKenna Diane Smith-Ganger Clement Doherty Terrence Francis 		<ul style="list-style-type: none"> David Yarra James Cameron Martin Hoffman
2010	<ul style="list-style-type: none"> Harrison Young (Chairman) Stephanie Lynch (Company Secretary) Debra Connor (Company Secretary) 		<ul style="list-style-type: none"> Alisa Taylor (Company Secretary) Stephanie Lynch (Company Secretary) 	
.....			<ul style="list-style-type: none"> Douglas Campbell (Executive Director) 	
2011				
.....	<ul style="list-style-type: none"> Diane Smith-Gander (Deputy Chair) 	<ul style="list-style-type: none"> Richard Turchini 		
2012				
.....		<ul style="list-style-type: none"> Kerry Schott Alison Lansley Bradley Wayne Orgill 		<ul style="list-style-type: none"> Peter Hay Gene Tilbrook Clement Doherty
2013	<ul style="list-style-type: none"> Siobhan McKenna (Chairman) 		<ul style="list-style-type: none"> Harrison Young (Chairman) 	
.....	<ul style="list-style-type: none"> Ziggy Switkowski (Chairman) 	<ul style="list-style-type: none"> Patrick Flannigan Simon Hackett Justin Milne 	<ul style="list-style-type: none"> Michael Quigley (Exec. Director & CEO) Siobhan McKenna (Chairman) 	<ul style="list-style-type: none"> Terrence Francis Richard Turchini Diane Smith-Gander Bradley Orgill
	<p>Key ● Current Board ● Appointments/Departures per half year</p>			

Current and previous appointments to the Executive are detailed in Exhibit 1-2 below.

Exhibit 1-2: Current and previous NBN Co Executive

Executive appointments and departures

Mid 2009	Appointments	Departures
.....	<ul style="list-style-type: none"> Michael Quigley (Executive Director & CEO) Greg Willis (Head of Program Management) Jean-Pascal Beaufret (Chief Financial Officer) Steve Christian (Head of Network Operations) Tim Smeallie (Head of Commercial) Christy Boyce (Head of Industry Engagement) Patrick Flannigan (Head of Construction) Gary McLaren (Chief Technology Officer) Kevin Brown (Chief Human Resources Officer & Head of Corporate Services) 	
2010	<ul style="list-style-type: none"> Jim Hassell (Head of Product Management and Industry Relations) 	<ul style="list-style-type: none"> Greg Willis (Head of Program Management)
.....		
2011	<ul style="list-style-type: none"> Dan Flemming (Head of Construction) 	<ul style="list-style-type: none"> Patrick Flannigan (Head of Construction)
.....	<ul style="list-style-type: none"> Michael Kaiser (Head of Quality) Ralph Steffens (Chief Operations Officer) Kieran Cooney (Chief Marketing Officer) 	<ul style="list-style-type: none"> Tim Smeallie (Head of Commercial) Christy Boyce (Head of Industry Engagement)
2012	<ul style="list-style-type: none"> Robin Payne (Chief Financial Officer) 	<ul style="list-style-type: none"> Jean-Pascal Beaufret (Chief Financial Officer)
.....		<ul style="list-style-type: none"> Steve Christian (Head of Network Operations)
2013	<ul style="list-style-type: none"> Kevin Brown (Head of Corporate and Commercial, originally Chief Human Resources Officer and Head of Corporate Services) Caroline Lovell (Head of Regulatory Affairs and Industry Analysis) John Simon (Head of Product and Sales) Ziggy Switkowski (Executive Chairman) JB Rousselot (Head of Strategy and Transformation) Greg Adcock (Chief Operating Officer) 	<ul style="list-style-type: none"> Dan Flemming (Head of Construction) Jim Hassell (Head of Product Management and Industry Relations)
.....		<ul style="list-style-type: none"> Michael Quigley (Chief Executive Officer) Ralph Steffens (Chief Operating Officer) Michael Kaiser (Head of Quality)
.....		

Key ● Current Executive ● Appointments/Departures per half year

1.2.3 Key contracts and approvals

1.2.3.1 Telstra and Optus agreements

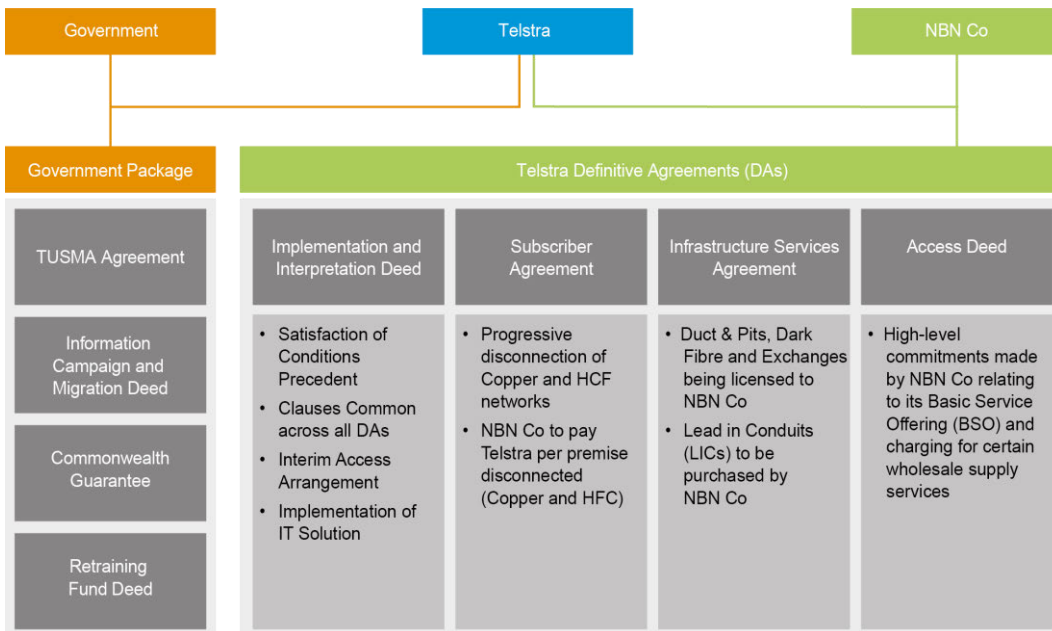
Telstra Agreements

On 23 June 2011, NBN Co and Telstra concluded nearly two years of negotiation by announcing the Telstra DAs (based on the framework provided by the June 2010 Financial Heads of Agreement) had been signed to facilitate the efficient rollout of a high speed national broadband network.¹⁷ The Telstra DAs provided the foundation on which the NBN can be built by leveraging Telstra’s existing network assets and infrastructure.

The Telstra DAs consist of two core agreements, the Subscriber Agreement and Infrastructure Services Agreement (ISA) and two supporting deeds (Interpretation and Implementation Deed and Access Deed) and are complemented by a number of Government policy commitments to Telstra (Telecommunication Universal Service Management Agency (TUSMA) services, responsibilities for fibre in new developments etc), bringing the total estimated June 2010 post tax net present value (NPV) to Telstra to ~\$11 billion (where NPV comprised of ~\$9 billion for the Telstra DAs and ~\$2 billion for the Government Package).^{17, 18}

The NPV noted above is a post-tax NPV calculation made public by Telstra and may use a methodology that differs from that used in the Strategic Review.

Exhibit 1-3: Telstra Definitive Agreements Overview^{17, 18}



¹⁷ Media Release: NBN Co and Telstra Sign Binding Definitive Agreements, NBN Co, 23 June 2011 (URL: <http://www.nbnco.com.au/assets/media-releases/2011/nbn-co-and-telstra-sign-binding-definitive-agreements-23-jun-11.pdf>)

¹⁸ <http://www.telstra.com.au/abouttelstra/download/document/2011-definitive-agreements-telstra-nbnco.pdf>

The Telstra DAs aim to achieve the following outcomes by facilitating:¹⁷

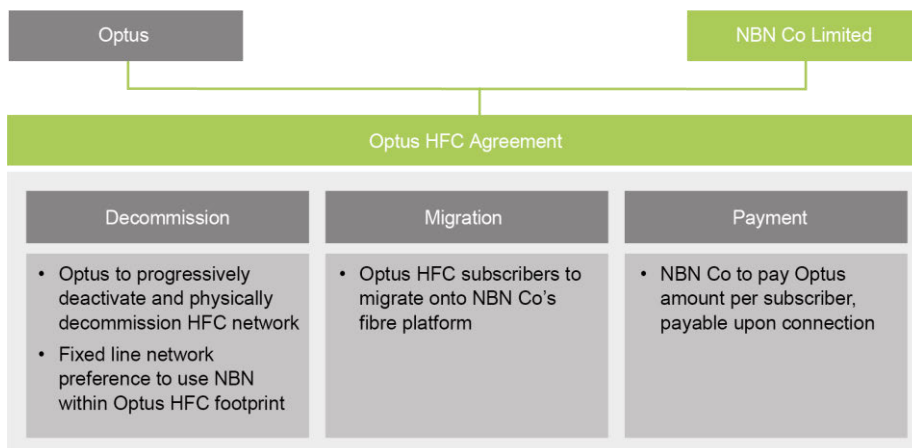
- NBN Co access to Telstra infrastructure over a minimum 35-year period, reducing duplication and enabling efficient use of existing infrastructure;
- Increased NBN Co certainty over revenues where Telstra agrees to a fixed line network preference in favour of NBN Co for wholesale fixed line services;
- NBN Co progressive payments to Telstra for the disconnection of customers (other than HFC pay-TV customers) from Telstra’s legacy fixed line networks (i.e. copper and HFC) (subject to limited exceptions); and
- Interim arrangements for NBN Co’s immediate access to Telstra infrastructure to accelerate network deployment.

The rationale for entering into the Telstra DAs was that they provided the most cost effective and efficient means by which NBN Co could meet the objectives set out in the SOE¹⁹ and they were expected to significantly accelerate the rollout and result in a reduction in execution risk.

Optus HFC Agreement

On 23 June 2011, NBN Co signed a ~\$800 million (post tax NPV) definitive agreement with Optus to migrate Optus HFC subscribers to the NBN and decommission its HFC network in return for a payment per customer migrated (see Exhibit 1-4 below).²⁰ This agreement was reached as part of the broader objective to develop a national wholesale only, open-access industry structure and support the growth of NBN revenues (e.g. through the decommissioning of Telstra’s copper and the Telstra and Optus HFC networks).

Exhibit 1-4: Optus HFC Agreement Overview²⁰



The Optus HFC Agreement seeks to provide the following outcomes:²⁰

- Optus is to progressively migrate HFC customers to the NBN as it is rolled out;

¹⁹ Letter from Shareholder Ministers to the Chairman of NBN Co on 17 December 2010

²⁰ Media Release: NBN Co and Optus Sign Binding Agreement, NBN Co, 23 June 2011 (URL: <http://www.nbnco.com.au/assets/media-releases/2011/nbn-co-and-optus-sign-binding-agreement-23-jun-11.pdf>)

- NBN Co is given greater certainty over revenues as Optus agrees to a fixed line network preference in favour of NBN Co for residential and small business customers served by the Optus HFC network;
- NBN Co is to pay Optus progressively for the migration of customers from the Optus HFC network; and
- Optus will decommission parts of the HFC network (subject to limited exceptions).

1.2.3.2 Key vendor and contractor agreements

NBN Co entered into and currently has a number of key vendor and contractor agreements²¹ in place with partners in the fields of construction, network operations, equipment provision, Fixed Wireless and Satellite equipment and services, IT, Human Resources (HR), infrastructure access, marketing and communications. A summary of the key vendor and contractor contracts is provided in Exhibit 1-5 below.

Exhibit 1-5: Key Vendor and Contractor Agreements

Contractor Group	Vendors/Contractor
Brownfield construction	Transfield, Silcar, Downer EDI, Visionstream, South Australia Power Networks
Greenfields construction	Visionstream
Network operations	Downer EDI, Silcar
Rollout equipment	Alcatel-Lucent, Corning Cables Systems, Prysmian Telecom Cables and Systems Australia, TE Connectivity / Tyco Electronic, Nokia Siemens Networks Australia Pty Ltd, Warren & Brown, Optimal Cable Services Pty Ltd and OFS Fitel LLC
MDU	Downer EDI, ISGM, UCG, Daly
Satellite	SSL LLC (long term solution), RF System and VSAT System Agreement with ViaSat, Inc. (long term solution), Arianespace S.A. (launch), Optus and IPSTAR (interim solutions)
IT	Accenture, IBM, Cisco, Fujitsu
HR	Accenture
Marketing and communications	Universal McCann, Digital Alchemy, Big N (n2n Communications)

1.2.4 Key operational milestones

1.2.4.1 Tasmanian trials

The first stage of the NBN Tasmanian trial rollout was announced in July 2009 with the release of a competitive tender for fibre optic cable. The federal and state Governments signed a memorandum of understanding and formed a new company, Tasmania NBN Co Limited, and later this business was incorporated as a wholly owned subsidiary of NBN Co.²² Corning Cable Systems was selected to provide the fibre optic cable for a FTTP network to deliver speeds of 100Mbps to ~4,300

²¹ Key contracts are defined as those of strategic importance to NBN Co, that is, imperative to the rollout of the network and of a material financial value

²² http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Former_Committees/broadband/third_report/c05

Tasmanian households and businesses as part of the pre-release trial in Smithton, Scottsdale and Midway Point. The network was activated in July 2010.

See Annexures for Tasmanian Trials Key Milestones.

1.2.4.2 First Release Sites

In March 2010, the first five sites in mainland Australia to receive high-speed broadband as part of the NBN rollout were announced. These sites were selected to test the impact on the rollout of different terrain, housing type and density, demographics, climate, existing infrastructure and other local factors, to trial the technology and to trial how NBN Co would interact with retail service providers.²³ This included selecting: a suburban area with the need to connect semi-detached houses, detached houses and apartment blocks, smaller rural town with more dispersed housing and three other sites representing a mix of major regional, smaller regional and differing climate and geography.²⁴

The first roll out test sites were part of Brunswick in Melbourne, an area of Townsville, Minnamurra and Kiama Downs, west Armidale and Willunga in South Australia.

Following the design phase, construction work on the first release sites was delivered in a staged rollout which began in July 2010 with the first NBN services on the mainland launched in May 2011.²⁵ After a period of customer trials at the five first release sites, commercial services became available on 1 October 2011.²⁶

See Annexures for First Release Sites Key Milestones.

1.2.4.3 Fixed Wireless

On 17 February 2011, NBN Co announced they would acquire AUSTAR's 2.3 GHz and 3.4GHz spectrum holdings under a \$120 million agreement to enable NBN Co to rollout its high speed Fixed Wireless service to rural and regional areas.²⁷ Ericsson was selected on 1 June 2011 as the partner to design, build and operate the 4G Fixed Wireless network by 2015, in a contract worth \$1.1 billion.²⁸ Further purchases of spectrum covering Western Australia, Northern Territory, South Australia, outback Queensland and far west New South Wales were made on 13 July 2011 to complete NBN Co's required Fixed Wireless geographic coverage.²⁹

²³ http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Former_Committees/broadband/interim4-report/-/media/wopapub/senate/committee/broadband_ctte/interim4_report/c03_pdf_ashx

²⁴ Media Release: NBN Co announces "first releases" sites for high-speed network, 2 March 2010 (URL: <http://www.nbnco.com.au/assets/media-releases/2010/first-release-mr-final-02-mar-10.pdf>)

²⁵ Media Release: national Broadband Network goes live on mainland Australia (URL: <http://www.nbnco.com.au/content/dam/nbnco/media-releases/2011/nbn-co-switches-on-first-mainland-customers-18-may-11.pdf>)

²⁶ Media Release: A new era of broadband service begins in first sites as "trial" ends (URL: <http://www.nbnco.com.au/assets/media-releases/2011/ready-for-commercial-service-final-30-sept-11.pdf>)

²⁷ Media Release: NBN Co acquires AUSTAR spectrum for rural and regional network (URL: <http://www.nbnco.com.au/content/dam/nbnco/media-releases/2011/wireless-spectrum-announcement-17-feb-11.pdf>)

²⁸ Media Release: NBN Co selects fixed wireless network partner for mid-2012 service start (URL: <http://www.nbnco.com.au/content/dam/nbnco/media-releases/2011/wireless-contract-final-01-Jun-11.pdf>)

²⁹ Media Release: Spectrum win brings wireless broadband to rural areas starting 2012 (URL: <http://www.nbnco.com.au/content/dam/nbnco/media-releases/2011/spectrum-win-brings-wireless-broadband-to-rural-areas-13-jul-11.pdf>)

In August 2011, NBN Co announced the first communities to receive services via its Fixed Wireless service in Geraldton (WA), Toowoomba (QLD), Tamworth (NSW), Ballarat (VIC) and Darwin (NT),³⁰ which by late 2013, had extended to areas across a large portion of rural and regional Australia.

1.2.4.4 Interim Satellite Service and Long Term Satellite Service

On 1 July 2011, NBN Co announced its first commercially available services over the NBN via its Interim Satellite Service.³¹ NBN Co's Interim Satellite Service (ISS) offered RSPs a wholesale broadband service designed for peak access speeds of 6/1Mbps. At the time of launch, four RSPs offered services over the ISS, including Bordernet, Clear Networks, Harbour IT and SkyMesh.³¹

NBN Co has scheduled to run the ISS until 2015 when it plans to launch two of its own high-capacity satellites (Ka-band satellites) to provide a Long Term Satellite Service (LTSS) as part of a \$2 billion infrastructure investment. NBN Co selected Space Systems/Loral to build these satellites on 8 February 2012 as part of a \$620 million contract.³² On 17 July 2012, NBN Co announced the selection of ViaSat to supply ground equipment (e.g. satellite dishes) for its satellite network through an initial ~\$280 million contract.³³ This equipment is to be located across NBN Co's ten satellite ground stations across Australia.³⁴ On March 2013, NBN Co announced that Arianespace would be awarded the contract (up to \$300 million) to put NBN Co's satellites into space.³⁵

As at 11 June 2013, over 30,000 customers were using the ISS, with 13 RSPs offering services to consumers.³⁶

1.2.4.5 Other key operational milestones

For additional key operational milestones, see the Annexures.

1.3 High-speed broadband status at the inception of the NBN program

At the time the NBN program was established, the Australian telecommunications industry was characterised by a monopoly provider of fixed line infrastructure (Telstra), a retail sector dominated by four major players (i.e. Telstra, Optus, iiNet Limited, TPG Telecom Limited), a regulatory environment going through substantial reform and an Australian economy which lagged other developed nations in key telecommunications indicators such as broadband penetration and cost of fixed line services for small to medium businesses.³⁷

³⁰ Media Release: First communities for National Broadband Network fixed wireless service unveiled (URL: <http://www.nbnco.com.au/content/dam/nbnco/media-releases/2011/first-release-wireless-3-aug-11.pdf>)

³¹ Media Release: NBN Co launches Interim Satellite Service for rural and remote Australians (URL: <http://www.nbnco.com.au/content/dam/nbnco/media-releases/2011/nbn-co-launches-interim-satellite-service-final-1-jul-11.pdf>)

³² Media Release: NBN Co selects Space Systems/Loral for communications satellites (URL: <http://www.nbnco.com.au/content/dam/nbnco/documents/lts-satellite-deal.pdf>)

³³ Media Release: NBN Co selects ViaSat to supply ground equipment for satellite network (URL: <http://www.nbnco.com.au/assets/media-releases/2012/viasat-satellite-ground-equipment-12-Jul-2012.pdf>)

³⁴ Media Release: NBN Co selects satellite ground station construction contractors (URL: <http://www.nbnco.com.au/assets/media-releases/2012/satellite-ground-station-construction-contracts.pdf>)

³⁵ Media Release: NBN Co and Arianespace seal satellite launch contract (URL: <http://www.nbnco.com.au/about-us/media/news/nbn-co-arianespace-seal-launch-contract.html>)

³⁶ http://www.archive.dbcde.gov.au/2013/september/nbn_overview

³⁷ National Broadband Network: Regulatory Reform for 21st Century Broadband Discussion Paper, Department of Broadband, Communications and the Digital Economy, April 2009

As at 2009, Australia's telecommunications industry was growing annually at ~0.2 to 0.5 percent (based on revenue between 2005 and 2009)³⁸ with significant increases in broadband demand and seven out of every eight subscribers in Australia using broadband to access the internet.³⁹ Of this, 83 percent occurred through digital subscriber line (DSL) with the balance through HFC (17 percent).³⁹ Demand for faster speeds (between 1.5Mbps and 8Mbps) grew by 59 percent over the 2008/09 financial year, which was matched by historically high levels of capital investment (~\$10.8 billion) in upgrades to HFC, fixed wireless, mobile carrier infrastructure (3G networks), unbundling lines and digital subscriber line access multiplexer (DSLAM).³⁹

Take-up of wholesale unconditioned local loop service (ULLS) in areas where access lines could be commercially unbundled also grew ~15 percent (2008/09 financial year), however the geographic footprint in which the ULLS were acquired remained constant (predominantly metropolitan areas). The ACCC noted in its 2008-09 telecommunications report that this suggested "...markets may be approaching a natural limit to the competitive advances that can be made within the current regulatory regime..." and that technological and commercial factors inhibited competition from entering regional areas, creating a regional blackspot.³⁹

The telecommunications industry was (and remains) dominated by a strong incumbent, Telstra, the former government owned Australian Telecommunications Commission (trading as Telecom). Telstra underwent privatisation as a vertically integrated company through a series of public share issues, commencing with T1 in 1997 through to T3 in 2006. At the inception of the NBN program (in April 2009), Telstra had a strong market position in several areas of the telecommunications industry, including having:

- ~70 percent³⁹ of all fixed voice subscribers via their fixed line copper network;
- ~40 percent of the retail fixed broadband subscriber base on their network;
- ~40 percent mobile sector subscriber market share;
- 50 percent shareholding in Australia's largest subscription television provider Foxtel;
- A NextG network that had 99 percent population reach;⁴⁰ and
- The largest HFC cable network passing ~2.7 million premises (in metropolitan areas across Adelaide, Brisbane, Gold Coast, Melbourne, Perth and Sydney).

Proposed access regulation (e.g. amendments to the Telecommunications Legislation Amendment Bill 2009 regarding fibre deployment and competition and consumer safeguards), together with higher demand for DSL services (83 percent fixed broadband connections) saw increased development of competitive fixed line supply networks within metropolitan areas. Within this footprint, four providers dominated the fixed line DSL market with ~70 percent of total market share collectively. As at 2008-09, Telstra and Optus held 43 percent and 11 percent market share of the retail fixed broadband market by number of subscribers (respectively), with iiNet and TPG representing 7 percent and 8 percent respectively.³⁹ Telstra and Optus each owned the two largest HFC networks which overlap (comprising 17 percent of the fixed broadband connections), together passing ~2.7 million unique premises.

At the time, the ACCC stated that it did not "...expect to see the overall footprint in which access seekers operate DSL networks to expand significantly, although additional DSLAMS will likely be installed within the existing footprint..." Several competitors also announced plans to deploy or

³⁸ Telecommunications Services in Australia, IBISWorld, February 2010

³⁹ ACCC telecommunications reports 2008-09 – Report 1, ACCC, 2010

⁴⁰ Telstra Investor Presentation, Telstra, October 2009

upgrade alternative technologies, including the Optus DOCSIS 3.0 upgrade to its HFC network, OptiComm FTTP and TransACT with their VDSL2, DOCSIS 3.0 HFC upgrade and FTTP deployment in greenfields estates.

The Organisation for Economic Co-operation Development also published a number of reports in 2007 and 2008 highlighting that Australia trailed other developed economies on a range of key telecommunications and economic indicators,^{41,42,43} where Australia ranked:

- 16th in terms of broadband penetration;
- 20th in terms of the average monthly subscription price for broadband;
- 16th for the total number of broadband internet subscribers per 100 population;
- 20th for monthly high speed broadband subscription charges;
- 25th for accessibility of digital content;
- 35th for the quality of competition in the Internet Service Provider sector; and
- 29th for the lowest cost of broadband.

The above factors characterised the evolution of the Australian telecommunications industry which, in conjunction with the failed Telstra and Government led proposals to introduce FTTN (between 2005 and 2007), culminated in the April 2009 Australian Government policy objectives to "...deliver significant improvement in broadband service quality to all Australia, particularly outside of metropolitan areas, and reshape the telecommunications sector"¹⁴ via a GBE, NBN Co.

⁴¹ OECD, Broadband Portal, June 2007 & June 2008,

⁴² Communications Outlook 2007, Organisation for Economic Co-operation and Development, 2007

⁴³ The Global Information Technology Report 2008–2009, World Economic Forum, 2009

2

NBN Co

performance to date
and a revised outlook

2 NBN Co performance to date and a revised outlook

In this section, NBN Co reports the findings of an independent assessment (the Independent Assessment) of performance up to 30 September 2013 and provides a view of revised revenue, costs and timings under the current FTTP deployment model (the Revised Outlook).

For purposes of performance comparison, the Independent Assessment used the August 2012 NBN Co Corporate Plan (referred to as the Corporate Plan), which is the most recent Shareholder approved plan.

The Revised Outlook performance analysis has been prepared using an appropriately conservative approach whereby forward performance metrics have been adjusted to reflect current performance run-rates, delivery and operational risk, and further adjustments have been made based on the analysis in the Independent Assessment.

2.1 Summary of findings

Key findings on the performance to date and Revised Outlook

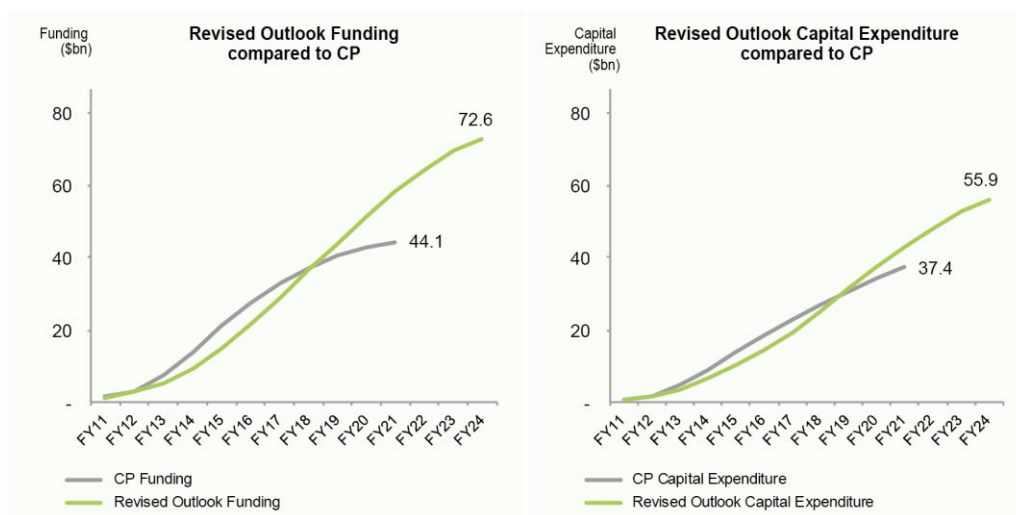
- From a forensic perspective, the Independent Assessment found that no material issues exist within the accounts of NBN Co;
- The Independent Assessment concluded that, although the Corporate Plan is based on detailed and quantitative analysis, it is “extremely optimistic” and very unlikely to be achieved;
- At 30 September 2013, the rollout of the brownfields FTTP network was 48 percent behind the planned Premises Passed in the Corporate Plan, with only 227,483 Premises Passed at that date. Of these premises only 153,977 are Serviceable by NBN Co. The greenfields and Fixed Wireless rollouts are also behind Corporate Plan;
- Total Expenditure to 30 June 2013 was 26 percent under the Corporate Plan at that date. Whilst this is an under-spend relative to the Corporate Plan, it is significantly ahead of the expenditure which would have been required in the Corporate Plan to reach the levels of actual rollout achieved; and
- The Independent Assessment found that NBN Co has attracted a committed, motivated, and generally capable group of people who want to do important, meaningful work. It concluded that the culture and leadership of the organisation are widely seen to be a major problem, and that the organisation is currently carrying a level of overhead and headcount predicated on the achievement of the Corporate Plan, which is in excess of current requirements.

The Independent Assessment found a revised and more realistic view of the project would indicate:

- The fibre rollout project will take three years longer to complete than indicated in the Corporate Plan, with a revised end date of June 2024;
- The Revised Outlook for brownfields Premises Passed at June 2014 is 357,000 compared to 1,129,000 in the Corporate Plan;
- Delays in deployment and take-up, lower ARPU and higher levels of non-subscription result in ~\$13-14 billion less Revenue to FY21;

- The Capital Expenditure required will increase from \$37.4 billion to \$55.9 billion;
- The peak funding requirement will be \$72.6 billion peaking in FY24 which is \$28.5 billion higher than the Corporate Plan (\$44.1 billion); and
- The Independent Assessment concluded that it is highly unlikely, in the absence of a government guarantee, that debt funding will be available from a third party financier in the near to mid-term.

Exhibit 2-1: Funding requirements and Capital Expenditure to network completion – Revised Outlook compared to Corporate Plan



Observations on progress and performance to date

Key activities undertaken by NBN Co since it was founded in April 2009 include:

- Establishing a functioning organisation with 2,956 staff located in six offices across Australia;
- Planning, designing, and commencing rollout of the FTTP network;
- Negotiating and securing a complex long term contract with Telstra for the provision of a significant portion of the required infrastructure, concluding the Optus HFC agreement, and obtaining the approval of the ACCC for both agreements;
- Developing a supply chain and entering into supply arrangements with over 1,200 suppliers;
- Developing a WBA and signing up a number of RSPs;
- Creating and implementing a network customisation services program;
- Undertaking an effective community engagement program;
- Implementing a compliant security framework;
- Developing a Special Access Undertaking (SAU); and

- Securing a managed services agreement for interim Satellite and completing contracts for the construction and deployment of two purpose-built NBN Co satellites.

The Independent Assessment found that financial and operational under-performance to date (relative to the Corporate Plan) can, to a significant degree, be attributed to:

- *An unrealistic assessment by key internal and external stakeholders of the complexity and time required to complete the task;*
- *“Blind faith” in the achievability of the Corporate Plan, notwithstanding clear factual evidence to the contrary;*
- *A lack of deep internal experience in complex infrastructure, construction projects and project management;*
- *A frequently changing program of works [REDACTED];*
- *Significant issues with the fibre network design process, [REDACTED];*
- *Insufficient consideration of operational construction constraints and costs when developing detailed designs;*
- *Some significant operational decisions being made without appropriate commercial rigour and oversight;*
- *Provision of FSAM construction instructions [REDACTED];*
- *A relentless focus on the metric of Premises Passed as the single most important determinant of corporate success, rather than a balanced view including Premises Serviceable (i.e. a premises that is available to be connected), and Premises Activated;*
- *Immature end-to-end operational performance management metrics to manage significant queues (including rework) in design and construction;*
- *Significant queues in connections and activations without sufficient root cause analysis and timely focus on rectification; and*
- *The lack of a “single version of the truth” for information and decision making.*

Differences between the Revised Outlook key metrics compared to the Corporate Plan are outlined below:

Revenue

- As a consequence of the slower deployment and reduced ARPU, cumulative Revenue to FY21 is reduced from \$23.1 billion in the Corporate Plan to ~\$10 billion in the Revised Outlook;
- Network completion in the Revised Outlook occurs in FY24, three years later than in the Corporate Plan. This results in reduced revenue in the early years due to the delay in deployment, but this is offset by the additional Revenue in the years from FY22 to FY24 inclusive. This is combined with lower ARPU overall, and results in an increase in Cumulative Revenue to network completion of \$1.9 billion; and
- In FY22 to FY24 inclusive, Revenue contributes \$15.0 billion as previously delayed premises are passed and subsequently activated.

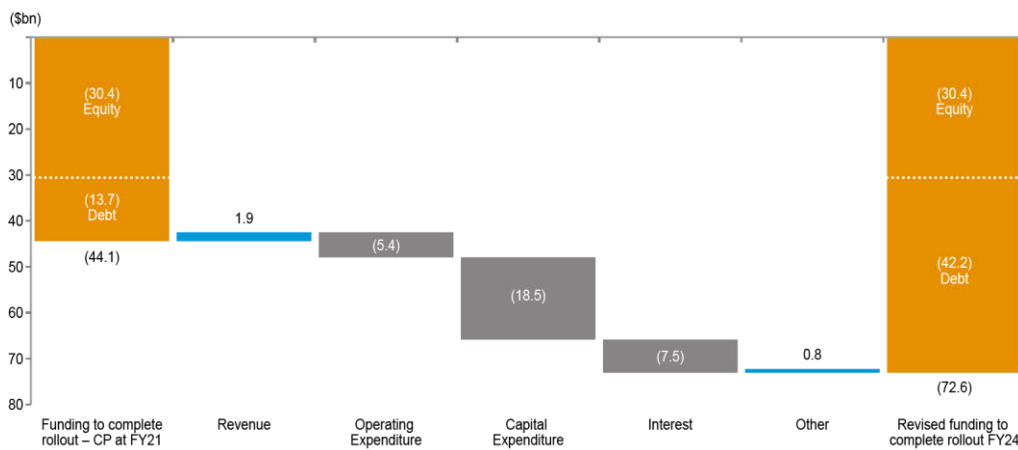
Operating Expenditure

- Operating Expenditure is \$3.4 billion lower in the Revised Outlook to FY21, predominantly as a result of the delayed rollout reducing payments to Telstra; and
- Cumulative Operating Expenditure to network completion increases by \$5.4 billion in the Revised Outlook. This is as a consequence of the delay in premises being passed, the consequential increase in license and migration payments, and the addition of three more years of Operating Expenditure.

Capital Expenditure

- The Revised Outlook shows Capital Expenditure increases of \$5.2 billion for the period to FY21 as a consequence of higher deployment costs, offset by lower Premises Passed compared to the Corporate Plan; and
- Cumulative Capital Expenditure to network completion increases by \$18.5 billion.

Exhibit 2-2: Analysis of increase in funding requirements – Revised Outlook compared to Corporate Plan



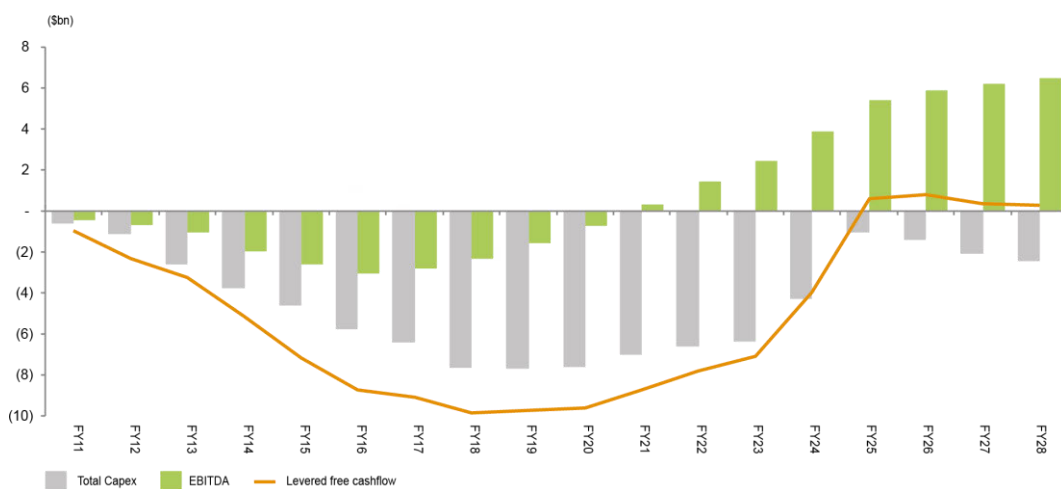
Note: Due to rounding the total amount may vary.

Funding

- The total funding requirement per the Corporate Plan at FY21 is \$44.1 billion made up of \$30.4 billion of equity and \$13.7 billion of net debt;
- The revised network completion date is FY24. The peak funding requirement of the Revised Outlook is \$72.6 billion in FY24;
- NBN Co will break-even based on EBITDA (i.e. total Revenue less total Operating Expenditure) for the first time in FY21 compared to FY19 in the Corporate Plan;
- NBN Co will be cashflow positive (i.e. total Revenue exceeds total Operating Expenditure and total Capital Expenditure in the year) in the year FY25 compared with FY22 in the Corporate Plan;
- The Revised Outlook assumes the existing Equity Funding Agreement between NBN Co and its shareholders remains in place and all funding beyond \$30.4 billion would be funded by debt. Accordingly, it is assumed that the increase to the revised funding requirement of \$28.5 billion will be entirely funded by debt;

- There is uncertainty surrounding the availability of debt funding to NBN Co based on the Revised Outlook; and
- The interest rates used in all scenarios are the same as used in the Corporate Plan and are detailed in section 2.5.4; they are based on interest rate projections at the time of preparing the Corporate Plan.

Exhibit 2-3: Summary of EBITDA, Capital Expenditure and levered free cashflow



The Independent Assessment also noted that:

- This is the largest infrastructure project ever undertaken in Australia. It is complex. It is being undertaken by a start-up company, albeit well-funded and resourced;
- Cost overruns and delays are the norm in such projects, not the exception. While NBN Co has included a contingency of 10 percent of Capital Expenditure in the Corporate Plan, there is significant risk in forecasting over such long periods; and
- The mandate for NBN Co has been to provide broadband fibre coverage to 93 percent of premises, and to provide Fixed Wireless and Satellite coverage for the remaining 7 percent at performance levels and costs that are comparable with those for fibre connections. This mandate necessarily leads to investment decisions that would not be made if commercial criteria alone were applied.

2.2 Network deployment performance

This section summarises the status of the network deployment as at 30 September 2013.

2.2.1 Network deployment definitions

In the Corporate Plan, NBN Co presents the progress of the network deployment using the measures of Premises Passed and Premises Activated. The Independent Assessment indicates that a further breakdown of the reporting of Premises Passed provides a more comprehensive view of the status of the network deployment.

In the WBA, NBN Co has further defined Premises Passed by means of sub-dividing the measure into Service Classes, defined as follows:

Exhibit 2-4: Service Class definitions

	Service Class	Definition
Premises Passed	0	A premises that is not NBN Serviceable for the purposes of the NBN Co Ethernet Bitstream Service (NEBS) but is in the footprint of the NBN Co Fibre Network
	1	A premises: <ul style="list-style-type: none"> (a) That is in the footprint of the NBN Co Fibre Network; and (b) That is NBN Serviceable for the purposes of the NEBS; but (c) Where a physical connection is not in place between the network access point (NAP) and the premises connection device (PCD), including because: <ul style="list-style-type: none"> a. The Drop Fibre or PCD has not been installed; or b. Some augmentation or patching between the PCD and the NAP is required for the supply of the NFAS.
	2	A premises: <ul style="list-style-type: none"> (a) That is in the footprint of the NBN Co Fibre Network; and (b) That is NBN Serviceable for the purposes of the NEBS; and (c) Where a physical connection is in place between the NAP and the PCD because, the Drop Fibre and PCD is installed as part of the NBN Co Fibre Network and no augmentation or patching between the PCD and the NAP is required for the supply of the NEBS; but (d) Where the NTD has not been installed.
	3	A premises that is in the footprint of the NBN Co Fibre Network and to which NBN Co can remotely provision the supply of the NEBS to the Premises (including Premises Activated) <ul style="list-style-type: none"> (a) The premises is NBN Serviceable for the purposes of the NEBS; and (b) A physical connection is in place between the NAP and the PCD, the Drop Fibre and PCD is installed as part of the NBN Co Fibre Network and no augmentation or patching between the PD and the Nap is required for the supply of the NEBS; and (c) The NTD has been installed, is receiving mains power and is able to be made operational as part of the NBN Co Fibre Network.

Until recently actual Premises Passed status by Service Classes was not reported. Commentary in relation to the status of each of these classes is provided below in section 2.2.5.

2.2.2 Network deployment Premises Passed compared to Corporate Plan

The total number of Premises Passed was 383,978 at 30 September 2013, which is 55 percent behind Corporate Plan. Current deployment represents less than 3 percent of the total rollout required to complete the network.

Exhibit 2-5: Comparison of actual Premises Passed to Corporate Plan

Premises Passed compared to Corporate Plan					
Premises Passed	Actual as at Sep-13	CP to Sep-13	Variance	% Variance	CP on completion FY21
Brownfields	227,483	436,411	(208,928)	(48)%	10,090,921
Greenfields	63,547	68,297	(4,750)	(7)%	2,111,067
Fixed Wireless	44,948	91,414	(46,466)	(51)%	395,749
Satellite	48,000	250,000	(202,000)	(80)%	578,490
Total	383,978	846,122	(462,144)	(55)%	13,176,227

Brownfields Premises Passed as at 30 September 2013 were 227,483 compared to 436,411 in the Corporate Plan. Of the brownfield Premises Passed, 73,506 are Service Class 0 and not NBN Co Serviceable.

It is noted that the Satellite service has coverage of 250,000 premises, however, the maximum capacity of the ISS is 48,000 due to the capacity limitations in the relevant agreements. As such, the reporting of Premises Passed for Satellite in the table above has been amended to include only those premises capable of being serviced.

2.2.3 Premises Activated compared to Corporate Plan

The total number of Premises Activated as at 30 September 2013 was 98,282, which is 35 percent behind Corporate Plan. Current activation represents approximately 1 percent of the total on completion.

Exhibit 2-6: Comparison of actual Premises Activated to Corporate Plan

Premises Activated compared to Corporate Plan					
Premises Activated	Actual as at Sep-13	Corporate Plan to Sep-13	Variance	% Variance	Corporate Plan on completion FY21
Brownfields	35,200	85,238	(50,038)	(59)%	6,939,000
Greenfields	19,758	17,132	2,626	15%	1,574,000
Fixed Wireless	2,788	14,212	(11,424)	(80)%	
Satellite	40,536	35,219	5,317	15%	
Fixed Wireless and Satellite	43,324	49,431	(6,107)	(12)%	232,000
Total	98,282	151,801	(53,519)	(35)%	8,745,000

Of the 35,200 brownfields Premises Activated as at 30 September 2013, 7,918 related to the pre-release and first-release sites. The pre-release sites were very early deployment. Of the remaining 27,282 brownfields Premises Activated it has taken, on average, 529 days from design commencement to customer activation. Of this, it has taken, on average, 341 days from commencement of the build phase to activation.

The number of Satellite Premises Activated at 30 September 2013 was 40,536, 15 percent ahead of Corporate Plan (35,219). 22,947 of the Premises Activated were migrations to the ISS from the former ABG service and effectively not net-new Satellite broadband subscribers.

2.2.4 Premises Passed and Activated by technology and state

The table below provides a breakdown by both geography and technology for Premises Passed as at 30 September 2013. This is based on the aggregate definition of Premises Passed set out in Section 2.2.1 above.

Exhibit 2-7: Analysis of Premises Passed all technologies excluding Satellite by state

Premises Passed all technologies excluding Satellite by state						
Premises Passed	Brownfields	Greenfields	Fixed Wireless	Total passed (excl. Satellite)	% of total excl. Satellite	
ACT	14,435	1,057	-	15,492	5%	
NSW	78,325	15,504	7,528	101,357	30%	
NT	2,712	848	1,159	4,719	1%	
QLD	54,203	11,573	11,200	76,976	23%	
SA	3,567	2,377	-	5,944	2%	
TAS	32,040	17	8,795	40,852	12%	
VIC	34,700	23,945	15,102	73,747	22%	
WA	7,501	8,226	1,164	16,891	5%	
Total	227,483	63,547	44,948	335,978	100%	
% of total excl. Satellite	68%	19%	13%	100%		

Exhibit 2-8: Analysis of Premises Activated all technologies by state

Premises activated all technologies by State						
Premises activated	Brownfields	Greenfields	Fixed Wireless	Total activated excl. Satellite	% of total excl. Satellite	Satellite premises activated
ACT	5,461	466	-	5,927	10%	34
NSW	9,789	5,128	642	15,559	27%	13,802
NT	4	215	61	280	1%	913
QLD	4,803	3,651	506	8,960	16%	10,429
SA	865	402	-	1,267	2%	2,302
TAS	7,643	-	293	7,936	14%	2,445
VIC	6,478	8,038	1,215	15,731	27%	5,540
WA	157	1,858	71	2,086	3%	5,071
Total	35,200	19,758	2,788	57,746	100%	40,536

2.2.5 Additional reporting of deployment status

Additional detail is available in relation to network deployment status for each of the Service Classes that make up Premises Passed and activated. Below is a summary of the Premises Passed by Service Class and Premises Activated as at 30 September 2013:

Exhibit 2-9: Analysis of Premises Passed by Service Class for brownfields

Service Class Status as at 30 September 2013			
Reporting Category	Premises at Sep 2013	Indicative time to connection based on current performance*	Current definition / description
Currently active premises - Already connected and subscribing to a service over the NBN	35,200	n/a	Service Class 3 – Premises activated
Deactivated premises - Owner has previously been activated but has moved premises or cancelled	770	~1 week	Service Class 3 – Deactivated premises
Fibre past the premises - Lead in to the property but no network termination device exists	13,772	~1-3 months	Service Class 2 – Includes premises which have lead in to the property and are able to accept installation of network termination device
Fibre past the premises - No lead into property or network termination device	104,235	~5-7 months	Service Class 1 – Includes premises which are pending i.e. waiting for NBN Co to complete connection, and also premises which have not requested NBN Co connection
Fibre past the premises - But are presently unable to be connected	73,506	Not available	Service Class 0 – Unable to be connected in existing state. Time for connection unknown. The majority of premises in this class are MDUs where the lead time for seeking approval from Body Corporates is longer than other lead times and has some uncertainty. Other reasons for this include that they are 'In Progress', 'unable to be connected' due to legislative impediment or persistent refusal by the building owner, or they have a Telstra service class restriction.
Total brownfields Premises Passed	227,483		

Note: * These times are indicative only and based on the performance to date. The time shown is the elapsed time between when a premises enters the Service Class and when it is Connected.

There are several sub-categories within each of the existing Service Classes. The Independent Assessment strongly recommends that NBN Co should include the detail above in its external reporting (including estimated time to connection). This will significantly improve stakeholder understanding of the network rollout status and the extent to which those premises that have been 'passed' by fibre can be activated.

MDU's (including apartments, commercial buildings etc) represent ~30% of all potential connections. As at 30 September 2013 fibre has passed 73,506 Service Class 0 premises (including MDUs) but very few had been connected as NBN Co had not determined the appropriate approach to cabling such diverse buildings.

2.2.6 Delays in FTTP deployment

The rollout of the FTTP network to date has been affected by a number of factors including the complexity in process and design tools, immature systems and lack of experience in a project of this size and scale. These factors have led to:

Delays in design

- Delays in NBN Co producing Network Design Documents (taking on an average 226 days compared to a target of 90 days); and
- Delays in turnaround on Detailed Design Documents by Delivery Partners (to enable construction documents to be issued).

Delays to construction

- [REDACTED]
- [REDACTED]
- [REDACTED]
- Construction delays, in part, due to the complexity of the interfaces between NBN Co and the Delivery Partners, the uniqueness of an infrastructure build of this scale and nature in Australia, and the lack of deep project management resources, particularly as the volumes have increased;
- Delays in dealing with Telstra [REDACTED]
- Ineffective collaboration between NBN Co and its Delivery Partners in resolving contract, design and construction issues; and
- Disproportionate focus on workforce size and Premises Passed as key drivers of behaviour rather than Premises Activated driven by more effective design and collaboration.

Defects and variations encountered during construction

- Lead times not adhered to with power utilities in relation to aerial work [REDACTED]
- Delays in remediation caused by issues with asbestos;
- Inconsistencies in definitions and processes to deal with defects on completion; and
- [REDACTED]

Delays to connections and activations

- Activation delays resulting from blocked or damaged lead-in conduits, requiring civil works;
- MDUs which require cooperation or action from a third party such as a body corporate before connection and activation can be completed; and
- End user issues such as a refusal of access to the property.

These factors have resulted in a backlog of commercially contentious issues, pressure on rates paid to Delivery Partners and sub-contractors, and stalled mobilisation.

2.2.7 Delays in Fixed Wireless Premises Passed

The Corporate Plan targets 395,749 Fixed Wireless Premises Passed by June 2021.

The fixed wireless program is 51 percent behind Corporate Plan with 44,948 Premises Passed against a plan of 91,414.

The Fixed Wireless rollout program is trailing the Corporate Plan targets because of delays in construction. NBN Co has developed an amended rollout schedule and is forecasting to deliver on the Corporate Plan during FY15 having recently ramped up construction.

2.3 Network deployment Revised Outlook

2.3.1 Network deployment Revised Outlook – brownfields FTTP

The Independent Assessment found that revised NBN Co projections extend the completion of the fibre network rollout by three years from June 2021 (as per the Corporate Plan) to June 2024.

The revised timetable remains dependent on a number of factors including:

- Resolution of commercial issues with Delivery Partners;
- Provision of greater certainty and visibility of the deployment workflow to enable Delivery Partners to effectively mobilise their teams to deliver on time;
- A reliable stream of Detailed Design Documents;
- Avoidance of delays with Telstra remediation and approvals; and
- Availability of sufficient Delivery Partners capable of dealing with the complexity and scale of the rollout's design and project management challenges.

The Independent Assessment includes a network deployment rollout timetable for the Revised Outlook which is compared to the Corporate Plan and set out below.

Exhibit 2-10: Network deployment rollout timetable – Corporate Plan

Corporate Plan - Rollout Timetable														
Premises Passed Cumulative ('000s)	Jun-11	Jun-12	Jun-13	Jun-14	Jun-15	Jun-16	Jun-17	Jun-18	Jun-19	Jun-20	Jun-21	Jun-22	Jun-23	Jun-24
Brownfields	18	29	286	1,129	2,499	3,862	5,168	6,423	7,610	8,879	10,091	10,091	10,091	10,091
Greenfields	-	10	55	178	413	763	1,111	1,415	1,673	1,904	2,111	2,295	2,477	2,659
Fixed Wireless	-	9	70	124	225	369	374	379	385	391	396	401	405	410
Satellite	165	165	250	250	527	539	547	555	563	571	578	585	592	599
Total⁴⁴	183	213	661	1,681	3,664	5,532	7,200	8,772	10,230	11,744	13,176	13,372	13,566	13,759

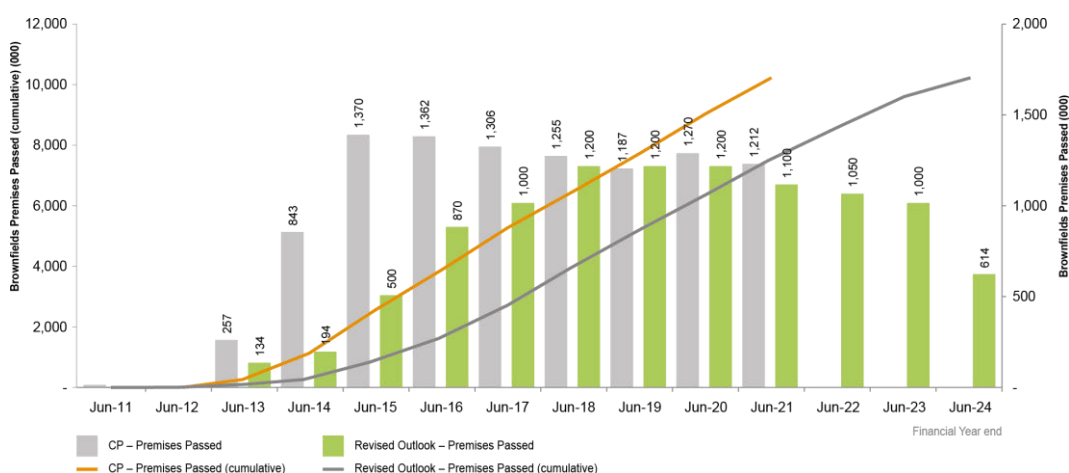
⁴⁴Due to rounding the total amounts may vary

Exhibit 2-11: Network deployment rollout timetable – Revised Outlook

Revised Outlook Rollout Timetable														
Premises Passed Cumulative ('000s)	Jun-11	Jun-12	Jun-13	Jun-14	Jun-15	Jun-16	Jun-17	Jun-18	Jun-19	Jun-20	Jun-21	Jun-22	Jun-23	Jun-24
Brownfields	18	29	163	357	857	1,727	2,727	3,927	5,127	6,327	7,427	8,477	9,477	10,091
Greenfields	-	4	44	110	192	285	414	564	742	967	1,240	1,581	1,893	2,111
Fixed Wireless	-	1	28	122	260	354	431	508	554	554	554	554	554	554
Satellite	48	48	48	48	48	206	206	206	206	206	306	306	306	306
Total	66	82	283	637	1,357	2,572	3,778	5,205	6,629	8,054	9,527	10,918	12,230	13,062

2.3.1.1 Revised Outlook – brownfields FTTP deployment

The Exhibit below shows the impact of the three year delay to the overall deployment timetable and the Revised Outlook for brownfield FTTP Premises Passed to 30 June 2024.

Exhibit 2-12: Comparison of Revised Outlook brownfields FTTP deployment rollout to Corporate Plan**Brownfields FTTP – analysis of short term deployment to 30 June 2014**

A critical analysis of NBN Co's current forecast deployment to 30 June 2014 has been undertaken as part of the Independent Assessment.

The analysis below compares the Revised Outlook short term deployment numbers with the Corporate Plan.

Exhibit 2-13: Comparison of brownfields FTTP deployment short term – Corporate Plan and Revised Outlook

Brownfields FTTP Deployment		
Deployment to 30 June 2014	Revised Outlook	Corporate Plan
Premises passed by 30 June 2013	163,000	286,000
Deployment - July 2013 to September 2013	64,000	150,411
Premises passed by 30 September 2013	227,000	436,411
Deployment - October 2013 to June 2014	130,000	692,589
Premises passed by 30 June 2014	357,000	1,129,000

In arriving at this Revised Outlook for the short term brownfields FTTP deployment, NBN Co and the Independent Assessment have taken into consideration the following risks and issues:

- Delivery Partner relationships need to be 'reset'; a number are currently at an impasse as a result of the backlog of unresolved claims and delays in resolution of go-forward rates;
- Delays in Telstra remediation, including for asbestos, [REDACTED]; the halting of duct and pit remediation due to asbestos has caused delays in 84 FSAMs;
- The unwillingness of Delivery Partners to remobilise until go-forward schedules and volumes are confirmed providing certainty for contiguous and continuous delivery scheduling;
- A reassessment by Delivery Partners of what is an efficient commitment of resources to NBN Co and its impact on their working capital;
- Ongoing delays in detailed design approval and design queries;
- Delays in the operationalisation of commercial arrangements with power utilities for aerial access;
- Delays in utilities approving access to poles and delaying FSAM completion, where aerial design is specified;
- Delays in on-boarding additional Delivery Partners to absorb volume; and
- Delays in ramping up labour requirements to the levels inherent in the Revised Outlook.

Based on these factors, and the analysis in the Independent Assessment, NBN Co believes it likely that a significant proportion of the 130,000 premises due to be passed in the remainder of FY14 will be passed towards the end of the fiscal year.

It is not possible to completely de-risk the forecast deployment for brownfields Premises Passed, and therefore there is still some scope for this forecast deployment to be adversely affected by the above risks and issues. However there is also scope for NBN Co, the Delivery Partners and Telstra to improve their individual and collective performance such that the short term forecast deployment of 357,000 Premises Passed could be exceeded.

Brownfields FTTP – analysis of medium term deployment (FY15/FY16)

The Corporate Plan is based on a “3-1-7” construction delivery model (Exhibit 2-14 below). This delivery model assumes that FSAMs are completed over 11 months with three months for design activities, remediation activities taking net one month (i.e. overlapping design and construction activities) and seven months for construction.

Compared with the “3-1-7” model used in the Corporate Plan, the Revised Outlook is based on an updated model of “7-2-6” in which FSAMs are completed over 15 months. This updated model factors in adjustments to improve the design process that will take time to resolve and are constrained by current systems and available design resources.

In the project to date, on average, the design phase performance has been taking █ days (█ months) to the acceptance of the final detailed design, and █ days (█ months) for the Certificate of Accuracy to be accepted. This is █ times the target in the “3-1-7” that has been the basis of modelling in the Corporate Plan.

In comparison, the construction phase is being completed in an average of approximately 216 days (7.1 months), which is in line with the Corporate Plan.

The Revised Outlook reflects the updated “7-2-6” model and adjustments to the deployment plan have been made for known risks.

The analysis below compares the Revised Outlook medium term deployment with the Corporate Plan.

Exhibit 2-14: Comparison of brownfields FTTP deployment medium term – Corporate Plan and Revised Outlook

Brownfields FTTP Deployment		
Deployment Medium Term (FY15/FY16)	Revised Outlook	Corporate Plan
Premises Passed by 30 June 2014	357,000	1,129,000
Deployment – FY15	500,000	1,370,000
Premises Passed by 30 June 2015	857,000	2,499,000
Deployment – FY16	870,000	1,362,000
Premises Passed by 30 June 2016	1,727,000	3,862,000

In order to meet the deployment ramp up in the Revised Outlook, NBN Co will need to ensure sufficient Contract Instructions are issued in accordance with the revised work schedule.

Brownfields FTTP – analysis of long term deployment (from FY17 to FY24)

It is assumed that monthly Premises Passed will increase from 83,333 per month in FY17 to 100,000 per month (~4,800 per day) (more in line with the Corporate Plan) from FY18. This will require a further ramp up by Tier 1 Delivery Partners and consideration of the engagement of additional Delivery Partners to augment existing capacity.

The Revised Outlook also assumes that some opportunity exists to utilise other contractors for construct only contracts which will supplement volume. The extensive use of tier 3 subcontractors engaged directly by NBN Co is not considered a viable solution.

Based on workforce modelling previously undertaken by NBN Co, and the Independent Assessment, it is not anticipated that construction field labour is a limiting factor in the FTTP deployment. The biggest constraint to the network rollout is the availability of network designers, senior and experienced project managers, in-field supervisors and project control staff to provide leadership and oversee program delivery.

2.3.2 Network deployment Revised Outlook – greenfields FTTP

The Corporate Plan targets 2,111,067 greenfields Premises Passed by June 2021.

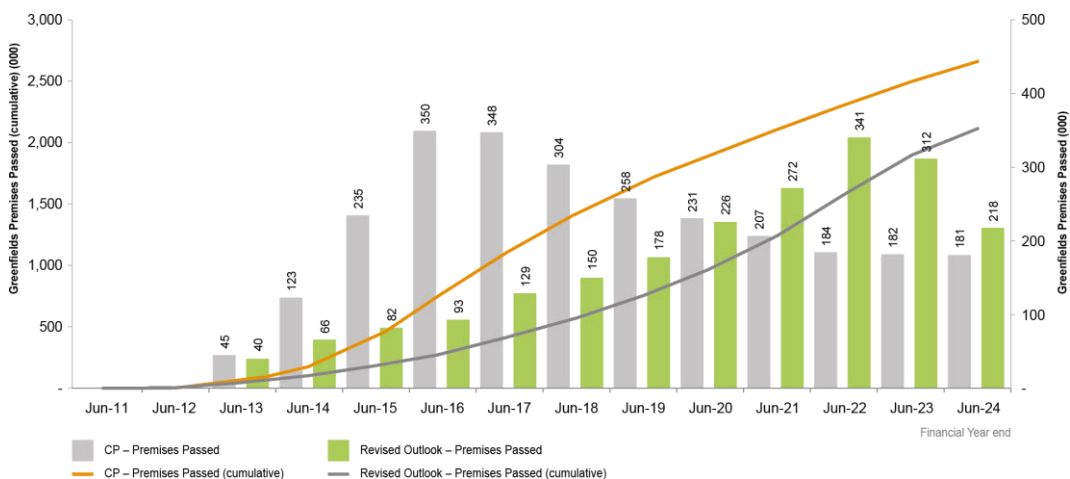
As at 30 September 2013 the greenfields deployment is 7 percent behind Corporate Plan with 63,547 Premises Passed on a plan of 68,297.

Greenfields deployment activity is driven by market demand for new and re-developed dwellings, and business premises. The Corporate Plan assumed that 50 percent of greenfields premises are new developments/broad-acre and 50 percent redevelopments/infill. For the first five years, the Corporate Plan has assumed that premises growth is based on the Australian Bureau of Statistics (ABS) and industry trends; thereafter it is aligned with ABS household population growth.

There is a risk that greenfields deployment will be impacted by the delay in brownfields deployment which reduces the ability to deal with infill development. The Independent Assessment also noted that, where possible, new developments of fewer than 100 lots should be rolled out at the same time as the FSAMs in which they are located.

The Revised Outlook for greenfields deployment reflects the risks of delays in brownfields deployment which will reduce the ability to deal with infill development. Although this delay is likely to reduce or delay Capital Expenditure, it will also adversely impact revenue. The chart below compares the impact of these delays on the Corporate Plan greenfields deployment.

Exhibit 2-15: Comparison of greenfields FTTP deployment – Corporate Plan and Revised Outlook



2.3.3 Fixed Wireless deployment Revised Outlook

The Corporate Plan targets 395,749 Fixed Wireless Premises Passed by June 2021 on the basis of 1,392 sites.

The Independent Assessment noted NBN Co has revised the scope of the Fixed Wireless program compared to Corporate Plan. This scope change includes an expansion of the fixed wireless program to [REDACTED] sites as the minimum number of sites required for Fixed Wireless to meet its coverage requirements. This change has resulted in an amended rollout schedule that will extend to August 2015.

The Independent Assessment found that the Fixed Wireless rollout is on track to meet the amended rollout schedule, but there is very little contingency factored in.

A key risk for medium term Fixed Wireless deployment is the need for NBN Co to obtain sufficient usable spectrum in the areas where Fixed Wireless is the only available technology.

NBN Co has announced its intention to undertake a strategic review of its Fixed Wireless and Satellite programs subsequent to the publication of this report.

2.3.4 Satellite deployment Revised Outlook

The ISS is currently active and has a maximum capacity of 48,000 users.

NBN Co has previously reported Satellite premises covered as 250,000, however the Independent Assessment considers that it is more appropriate to report 48,000 Premises Passed given the contractually limited capacity of the ISS.

NBN Co has announced its intention to undertake a strategic review of its Fixed Wireless and Satellite programs subsequent to the publication of this report.

2.4 Financial performance

2.4.1 Revenue and Operating Expenditure

This section reviews NBN Co Revenue and Operating Expenditure as at 30 September 2013.

The Independent Assessment highlighted that the financial performance of NBN Co to 30 September 2013 varied to the Corporate Plan. These variances are largely due to the significant delays in the network deployment. The deployment delays have resulted in deferrals of significant expenditure related to the use of Telstra infrastructure.

The variance in overall financial performance is significantly less than the proportionate underachievement in network deployment. The short term financial improvement will be offset by longer term expenditure in excess of the Corporate Plan.

As at 30 September 2013, NBN Co has incurred a loss after tax of \$2.2 billion, including a loss of \$339.4 million for the quarter ended 30 September 2013 as detailed in the Exhibit below.

Exhibit 2-16: Summary of financial performance as at 30 September 2013

Revenue and Operating Expenditure as per NBN Co Financial Statements				
	Actuals	Cumulative Actuals	Actuals	Cumulative Actuals
\$ millions ⁴⁵	FY13	As at June-13	Q1 FY14	As at Sept-13
Revenue	17	19	10	30
Direct Operating Expenditure	(160)	(231)	(63)	(293)
Indirect Operating Expenditure (overheads)	(586)	(1,445)	(173)	(1,618)
Forex/other	(3)	(3)	(4)	(7)
EBITDA	(732)	(1,659)	(229)	(1,889)
Depreciation & Amortisation	(197)	(291)	(79)	(370)
Earnings before interest and tax	(929)	(1,950)	(309)	(2,258)
Interest income	49	145	16	161
Interest expense	(63)	(69)	(40)	(110)
Profit/(Loss) before tax	(944)	(1,874)	(333)	(2,207)
Tax	12	19	(6)	13
Profit/(Loss) after tax	(932)	(1,855)	(339)	(2,194)

2.4.1.1 Direct Operating Expenditure

From a Corporate Plan perspective (compared to a financial statement perspective), Direct Operating Expenditure includes costs specifically attributable to each delivery technology, and includes Telstra infrastructure licence payments (dark fibre and transit racks for Backhaul, and ducts for the Local Network Distribution Network (LNDN)), Per Subscriber Address Amount (PSAA) payments, Satellite costs and Fixed Wireless delivery costs.

In the Corporate Plan, approximately 90 percent of total direct Operating Expenditure for the period FY11- FY21 arises from the Telstra DAs and the Optus HFC Agreement. These payments are treated on a cash basis for the Corporate Plan, whereas some of these payments are treated as finance leases for financial statement purposes. In any event, direct Operating Expenditure is substantially 'fixed' in value, but varies with the deployment profile.

FY13 Direct Operating Expenditure of \$224.6 million was \$104.3 million (refer Exhibit 2-17 below) lower than the Corporate Plan (\$328.9 million) primarily due to delays in network deployment resulting in lower than anticipated Telstra PSAA payments and dark fibre licence costs.

The Exhibit below outlines the components of total Direct Operating Expenditure, with actuals provided on a consistent basis compared with the Corporate Plan.

⁴⁵ Due to rounding the total amounts may vary

Exhibit 2-17: Direct Operating Expenditure comparison of actuals to Corporate Plan

Total Direct Operating Expenditure on a cash basis						
	Actuals	CP	Variance	Actuals	Cumulative Actuals	CP
\$ millions ⁴⁶	FY13	FY13	FY13	Q1 FY14	As at Sept-13	FY11 - FY21
Telstra PSAA payments	■	■	■	■	■	■
Optus HFC Agreement	■	■	■	■	■	■
Total Subscriber-Related Costs	■	■	■	■	■	■
Telstra Ducts	■	■	■	■	■	■
Telstra Dark Fibre	■	■	■	■	■	■
Telstra Rack Spaces	■	■	■	■	■	■
Total Telstra Infrastructure Payments	■	■	■	■	■	■
Total Fixed Wireless & Satellite	■	■	■	■	■	■
Other Direct Operating Expenditure	67	98	(31)	19	104	1,565
Total Direct Operating Expenditure	225	329	(104)	105	399	18,999

2.4.1.2 Indirect Operating Expenditure (overheads)

Indirect Operating Expenditure includes all salaries and wages, IT costs, legal costs, consulting fees, and facilities expenditure related to NBN Co business operations. Cumulative Indirect Operating Expenditure of \$1.6 billion has been incurred as at 30 September 2013 as outlined in the Exhibit below.

⁴⁶ Due to rounding the total amounts may vary

Exhibit 2-18: Indirect Operating Expenditure comparison of actuals to Corporate Plan

Indirect Operating Expenditure (overheads)						
	Actuals	CP	Variance	Cumulative Actuals	Actuals	Cumulative Actuals
\$ millions⁴⁷	FY13	FY13	FY13	As at June-13	Q1 FY14	As at Sept-13
Salaries and wages	346	405	(60)	693	111	803
Other employee costs	32	24	8	87	9	96
Capitalised Operating Expenditure	(69)	(85)	15	(110)	(30)	(140)
Net employment costs	308	345	(36)	669	90	759
Recruitment & training	12	16	(4)	30	3	33
Travel costs	12	20	(8)	31	4	34
External consulting/business advisory	44	42	2	143	9	152
Outsourced operations	32	23	10	127	7	134
Legal	17	26	(9)	108	4	111
Departmental ICT costs	91	100	(9)	193	26	219
Insurance costs	5	8	(2)	10	2	12
Facilities, security, WHS	43	59	(16)	90	14	103
General administration costs	5	21	(16)	15	1	16
Board of Directors	2	2	(0)	6	2	8
Advertising, licence & product development	14	39	(25)	24	3	27
Total other Indirect Opex	278	357	(79)	775	74	849
Contingency	-	-	-	-	9	9
Total Indirect Opex	586	701	(115)	1,445	173	1,618

2.4.2 Capital Expenditure

The FY13 Capital Expenditure of \$1.8 billion was \$1.4 billion lower than the Corporate Plan of \$3.2 billion, primarily due to delays in the network rollout. The key components of Capital Expenditure, with actuals life-to-date (LTD, which is the cumulative amount of actual expenditure incurred) as at 30 September 2013 and Corporate Plan to FY21 are set out in the Exhibit below.

⁴⁷ Due to rounding the total amounts may vary

Exhibit 2-19: Capital Expenditure comparison of Actuals to Corporate Plan

Capital Expenditure – Actuals to date versus CP								
\$ million ⁴⁸	Actuals - FY13	CP - FY13	Variance - FY13	Actuals LTD June- 13	CP - LTD June- 13	Actuals - Q1 FY14	Actuals LTD Sept-13	CP - EAC ⁴⁹ FY21
FTTP								
BF LNDN	367.0	444.4	(77.3)	614.7	692.1	96.8	711.5	11,336.6
BF CC	36.9	296.8	(259.9)	43.7	303.6	34.7	78.4	9,786.5
Greenfields	148.1	248.3	(100.2)	249.9	350.1	30.8	280.7	3,359.6
Total FTTP	552.0	989.4	(437.4)	908.4	1,345.8	162.3	1,070.6	24,482.8
Backhaul	409.3	655.3	(246.0)	570.7	816.7	133.4	704.1	2,842.3
Fixed Wireless	131.8	173.9	(42.1)	282.6	324.8	50.6	333.3	1,303.1
ISS	44.5	30.6	13.9	85.6	71.7	14.3	99.9	101.8
LTSS	329.8	454.3	(124.5)	392	516.4	120.9	512.8	1,826.7
OSS/BSS (IT)	226.7	272.6	(45.9)	663.1	709.0	50.0	713.1	963.5
Common	73.3	138.5	(65.2)	259.0	324.2	20.2	279.2	602.1
Project Mgmt & Design	-	65.1	(65.1)	-	65.1	-	-	1,175.3
Replacement Capex	-	-	-	-	-	-	-	423.1
Contingency	-	410.3	(410.3)	-	410.3	-	-	3,637.4
Total Capex	1,767.3	3,190.1	(1,422.7)	3,161.3	4,584.0	551.8	3,713.1	37,358.2

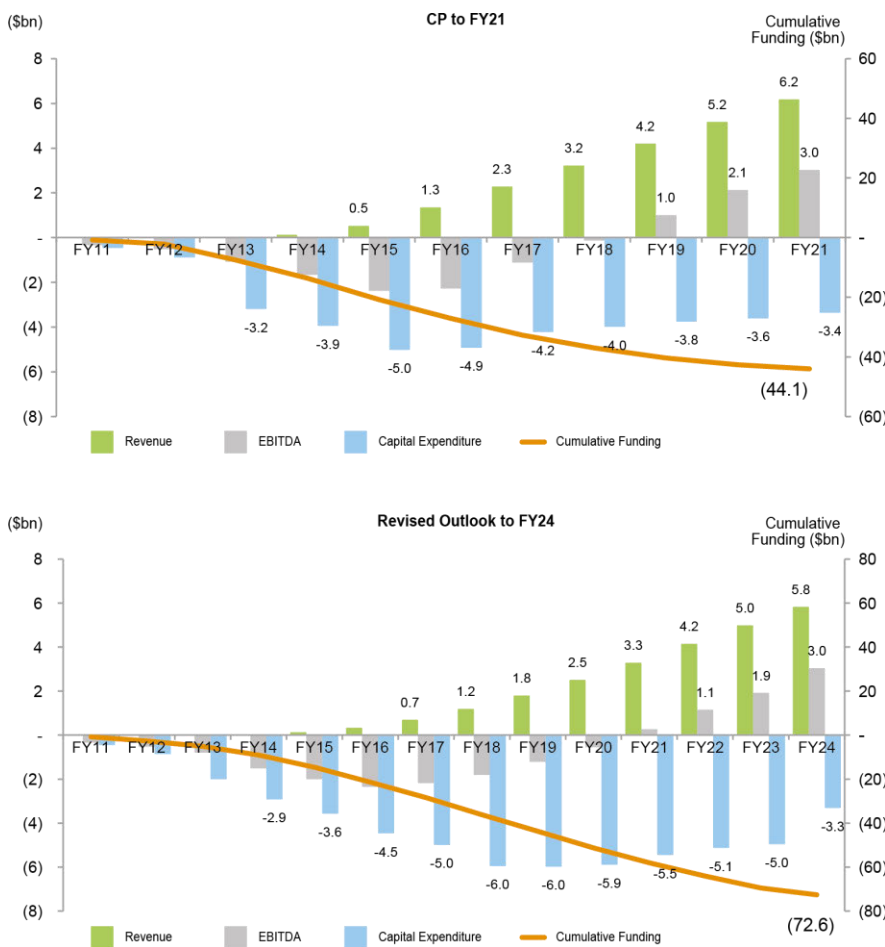
⁴⁸ Due to rounding the total amounts may vary

⁴⁹ Estimate at Completion (EAC) is defined in the A-1.2 glossary of key terms

2.5 Financial Performance Revised Outlook

In the Corporate Plan, NBN Co is forecast to have a peak funding requirement of \$44.1 billion in FY21. The peak funding requirement of the Revised Outlook is \$72.6 billion in FY24.

Exhibit 2-20: Corporate Plan versus Revised Outlook Peak Funding



The Revised Outlook takes into account the revised deployment schedule, a revision of both Capital and Operating Expenditure, and Revenue. In the Corporate Plan, deployment is forecast to be completed in FY21. In the Revised Outlook deployment is now forecast to be completed in FY24. Operating Expenditure to be incurred has been reviewed on the basis that actual Operating Expenditure in FY13 and Q1 FY14 is materially different in some cost categories to that estimated for FY14 in the Corporate Plan. In addition, the deployment period has been extended, hence an additional three years of operating costs will be incurred in the construction period.

Exhibit 2-21: The Revised Outlook to network deployment completion (i.e. FY24)

Revised Outlook – FY24							
\$ billions ⁵⁰	Revenue	Opex	Capex	Interest	Other	Net Annual Funding	Cumulative Funding
FY10	0.0	0.0	0.0	0.0	0.0	(0.1)	(0.1)
FY11	0.0	(0.3)	(0.4)	0.0	0.0	(0.7)	(0.8)
FY12	0.0	(0.5)	(0.8)	0.0	(0.4)	(1.7)	(2.6)
FY13	0.0	(0.8)	(2.0)	0.0	0.3	(2.5)	(5.1)
FY14	0.0	(1.5)	(2.9)	0.0	0.4	(4.0)	(9.1)
FY15	0.1	(2.1)	(3.6)	0.0	0.0	(5.6)	(14.7)
FY16	0.3	(2.7)	(4.5)	0.0	0.0	(6.8)	(21.5)
FY17	0.7	(2.9)	(5.0)	0.0	0.1	(7.0)	(28.5)
FY18	1.2	(3.0)	(6.0)	0.0	0.1	(7.7)	(36.2)
FY19	1.8	(3.0)	(6.0)	(0.4)	0.1	(7.6)	(43.7)
FY20	2.5	(3.1)	(5.9)	(1.0)	(0.0)	(7.5)	(51.2)
FY21	3.3	(3.0)	(5.5)	(1.5)	(0.0)	(6.8)	(58.0)
FY22	4.2	(3.0)	(5.1)	(2.0)	(0.1)	(6.1)	(64.1)
FY23	5.0	(3.1)	(5.0)	(2.4)	(0.1)	(5.5)	(69.6)
FY24	5.8	(2.8)	(3.3)	(2.7)	(0.1)	(3.1)	(72.6)
Revised Outlook FY24	24.9	(31.8)	(55.9)	(10.0)	0.3	(72.6)	(72.6)
CP (FY21) variance to Revised Outlook (FY24)	1.9	(5.4)	(18.5)	(7.5)	0.8	(28.5)	(28.5)

2.5.1 Financial performance Revised Outlook – Revenue

NBN Co revenue is primarily earned from residential FTTP premises connections, with an increasing proportion over time from business premises FTTP connections, government and other sources (e.g. multicast IPTV, infrastructure access). The Corporate Plan Revenue model was built taking a top down 'market view'. It forecast cumulative revenue of \$23.1 billion from FY11-21, which included \$0.4 billion from Fixed Wireless and Satellite.

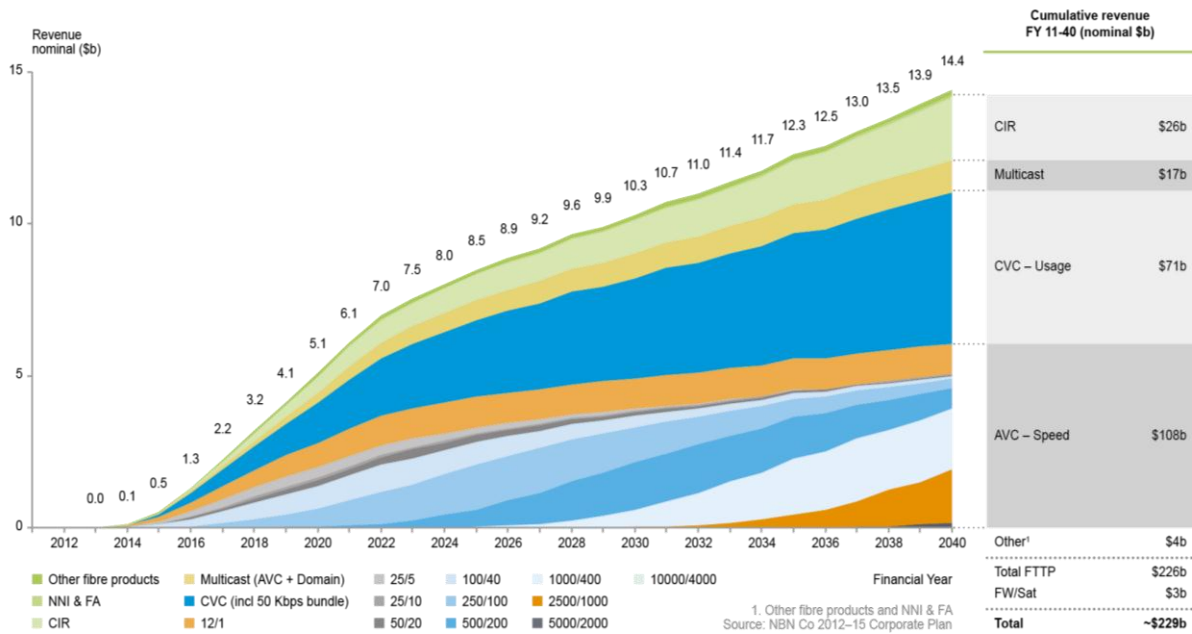
⁵⁰ Due to rounding the total amounts may vary

The two main factors in NBN Co's Revenue forecast were:

- The pace of the network deployment (as premises need to be connected before they can support the generation of revenue); and
- End-customer and RSP choice to take up fixed line services, and the mix of products, speeds and usage at the wholesale prices to be charged for those elements.

The exhibit below shows the composition of NBN Co revenues according to the Corporate Plan.

Exhibit 2-22: Corporate Plan Revenue profile



The exhibit below lays out the current take-up of NBN Co provided services in brownfields and greenfields premises in the fixed line footprint. It should be noted that no FSAM area has yet reached the date at which Telstra is required to disconnect its customers from current services (which will likely drive further take-up). Many brownfields premises passed are also currently unable to take-up services as they are Service Class 0 (~73,000 of ~227,000 premises passed as at September 2013).

Exhibit 2-23: Take-up rate of NBN Co services relative to Corporate Plan

Take-up rate relative to Corporate Plan: brownfields and greenfields				
	Actual (Sept-13)		Corporate Plan	
	All active FSAMs ² of 291,030	All FSAMs active before 31 December 2012 ²	Corporate Plan to Sept-13 of 504,708	Corporate Plan for 2016
Overall take-up rate of premises ¹	19%	42%	20%	66%
Mix of speed plans of those taking up services				
12/1Mbps plan	45%	49%	49%	42%
25/5-10Mbps plan	27%	23%	28%	26%
50/20Mbps plan	5%	4%	5%	5%
100/40Mbps plan	23%	24%	18%	23%
250/100Mbps plan	n/a	n/a	n/a	4%

Notes:

¹ Premises subscribing to an NBN Co service as a share of all premises passed at that time as counted by the Corporate Plan (including vacant premises)

² Note no FSAM has yet reached the date when, by FSAM, Telstra is required to disconnect its customers from current services. All premises in an FSAM are not necessarily active at the time of FSAM activation

Corporate Plan revenues overall appear to be higher than justified by international benchmarks and estimates for Australian revenue evolution.

As outlined in the Network deployment Revised Outlook, deployment will take approximately three years longer than indicated in the Corporate Plan. This delay will reduce the cumulative Revenue from FY11-21 by ~\$11.6 billion (falling from ~\$23.1 billion to ~\$11.5 billion). Other factors as set out below will reduce cumulative Revenue by a further ~\$1.8-2.1 billion to FY21, resulting in total cumulative Revenue for FY11-21 of ~\$9.4-9.7 billion. The further reduction of ~\$1.8-2.1 billion is composed of:

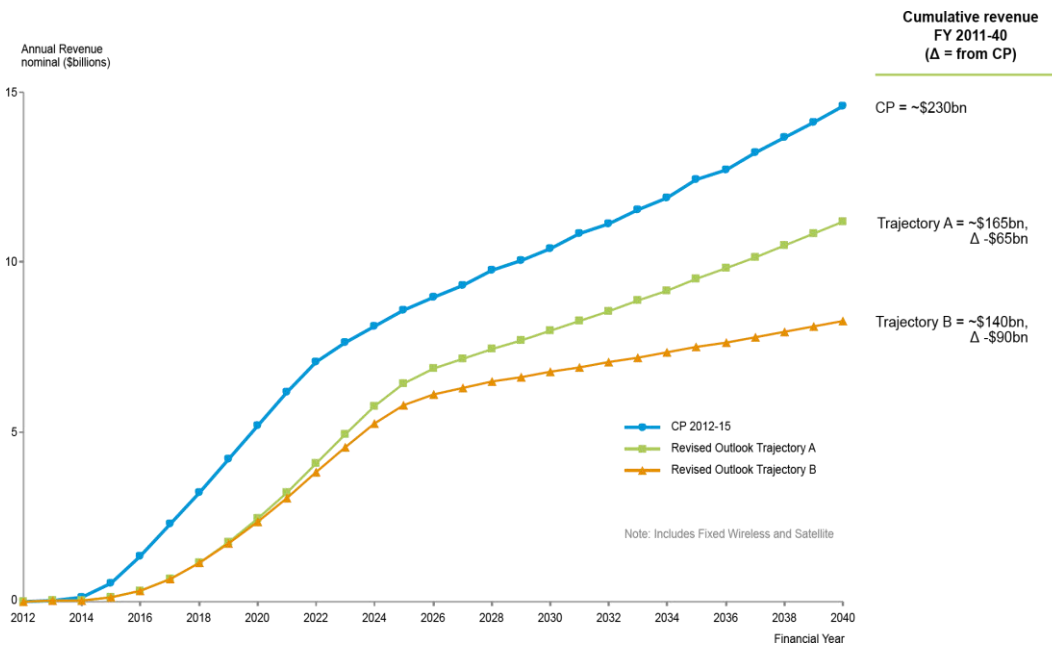
- ~\$0.3-0.5 billion due to lower wholesale prices for residential broadband services than in the Corporate Plan. The Corporate Plan assumes 0.3 percent real decline in ARPU for FY16-40. Experience in Australia and overseas indicates higher possible rates of decline. For example, real broadband ARPU in Australia has declined by ~1.9-2.8 percent from 2008-2013. This is in line with the typical experience that consumers pay 'less for more' or the 'same for more' in nominal terms for broadband as speeds advance. The Strategic Review assumed real ARPU declines of between 0.3 percent (as per long run Corporate Plan average) and 2.5 percent for residential broadband;
- ~\$0.2-0.3 billion due to fewer residential premises becoming NBN Co customers than in the Corporate Plan – driven by an accelerated migration to mobile-only and the potential for existing broadband infrastructure providers to use fibre to serve residential premises such as large apartment blocks (e.g. MDUs);

- ~\$0.3-0.4 billion due to lower prices for business premises than in the Corporate Plan. The Corporate Plan assumptions regarding non-residential premises likely overstated the size of the market and therefore also the revenues from enhanced business services. The Strategic Review found that more of the business market will be serviced by third-party fibre providers than is assumed in the Corporate Plan;
- ~\$0.4 billion due to lower revenues from the government sector. In the Corporate Plan, NBN Co has implicitly included the Government in the business segment. This effective double counting of government revenues has been removed; and
- ~\$0.4-0.6 billion due to lower take-up and prices for the multicast service. The multicast forecasts in the Corporate Plan appear to overstate the demand and availability of premium IPTV content in Australia.

During the period to FY21, the impact of the rollout delay is significantly greater than the impact of changes to ARPU and other factors. However, post FY21 the revised assumptions (particularly in relation to residential ARPU growth), will have a significant impact on Revenue because of lower ARPU and lower long-term growth forecast.

The Exhibit below highlights the Revenue trajectory of the Corporate Plan against two Revenue trajectories (described as Trajectory A (high case) and Trajectory B (low case)) assessed within the Strategic Review.

Exhibit 2-24: Total Revenue including Fixed Wireless and Satellite



It should be noted that the ability of NBN Co to increase its ARPU at levels below but somewhat in line with inflation – as assumed in Trajectory A – depends on the evolution of Australia's telecommunications market. This trajectory can be seen to represent a market without strong challengers in both the fixed and mobile markets, and with moderate consumer pressure. Trajectory B could be seen as a result of various drivers, not all of which need to occur. It could include a more aggressive build-out of fibre by a third-party network operator, or lower mobile network operator pricing– albeit with low data allowances – at substantially lower prices than NBN Co.

Determining possible ARPU outcomes relying solely on bottom-up calculations can disconnect the modelling process from experiences in the domestic and international markets where new features and better performance are expected at no price premium by today's consumers.

2.5.2 Financial performance Revised Outlook – Operating Expenditure

The Corporate Plan for FY13, and Operating Expenditure for subsequent years, were based on expectations formed in FY12 when there was limited empirical evidence on which to base expected spend. Accordingly, Direct and Indirect Operating Expenditure have been reviewed to determine whether the cost forecasts in the Corporate Plan are consistent with actual operating costs incurred by NBN Co in FY13 and Q1 FY14.

In a number of cost categories, the costs being incurred are materially different and hence a Revised Outlook for Operating Expenditure has been developed.

2.5.2.1 Direct Operating Expenditure

The key changes to Direct Operating Expenditure categories relate to Telstra duct licence costs and PSAA payments. Telstra duct license costs have been revised to adjust the ramp up in kilometres used to be consistent with the revised deployment profile, and include an additional three years of licence payments to the end of FY24. The profile of PSAA payments has been extended to reflect the adjusted Premises Passed profile.

All other Direct Operating Expenditure categories have been maintained at the Corporate Plan values, but have been extended for three years to FY24.

2.5.2.2 Indirect Operating Expenditure

All Indirect Operating Expenditure categories with the exception of those listed have been maintained at the Corporate Plan values, but have been extended for three years to FY24. Changes have been made in line with the Independent Assessment findings to net employment costs (headcount is maintained at 3,200 for three years before including the Corporate Plan reduction profile), recruitment and training, consultancy costs, outsourced operations, departmental ICT and facilities.

2.5.3 Financial performance Revised Outlook – Capital Expenditure

NBN Co's revised view of the expected Capital Expenditure required to complete the rollout based on the network deployment Revised Outlook is \$55.9 billion which is \$18.5 billion above the Corporate Plan.

The Revised Outlook for Capital Expenditure is largely driven by:

- A 78 percent increase in the average Cost Per Premises for LNDN (including provision) from \$1,123 to 1,997 per premises;
- A 50 percent increase in the Cost Per Premises for Connections from \$1,398 to 2,100 per premises;
- An increase in the BSS/OSS and other IT Capital Expenditure costs of \$0.7 billion;
- A \$0.5 billion increase in other Capital Expenditure as a result of increased capitalised labour over the revised deployment schedule; and
- An increase of \$1.4 billion required to maintain a 10 percent contingency.

An initial review of Fixed Wireless and Satellite highlighted potential similar issues in overall Capital Expenditure. A recommendation arising from the Strategic Review is the need to complete a comprehensive review of these two programs. However, the Revised Outlook (and all alternative scenarios set out in section 4) includes the following indicative increases in Capital Expenditure:

- A [redacted] percent increase in the Cost Per Premises for Fixed Wireless from [redacted] to [redacted] per premises; and
- An increase in the total cost for Satellite of [redacted].

Exhibit 2-25: Detailed Capex comparison between the Corporate Plan and the Revised Outlook

Capital Expenditure ⁵¹							
	Actual LTD Sept-13 (\$billion)	Corporate Plan			Revised Outlook		
		\$/premises	Premises Passed ('000s)	FY21 Capex (\$billion)	\$/premises	Premises Passed ('000s)	FY24 Capex (\$billion)
FTTP							
Brownfields LNDN	-	1,054	10,091	10.6	1,997	10,091	20.1
Brownfields LNDN Provision	-	70	10,091	0.7	-	-	-
Total LNDN	0.7	1,123	10,091	11.3	1,997	10,091	20.1
Brownfields Connections	0.1	1,398	7,002	9.8	2,100	7,002	14.7
Greenfields	0.3	1,591	2,111	3.4	1,591	2,111	3.4
Total FTTP	1.1			24.5			38.2
Transit/Backhaul	0.7	-	-	2.8	-	-	3
Fixed Wireless	0.3	3,291	396	1.3	[redacted]	[redacted]	[redacted]
ISS	0.1	2,117	48	0.1	2,550	48	0.1
LTSS	0.5	3,161	578	1.8	[redacted]	[redacted]	[redacted]
OSS/BSS (IT)	0.7	-	-	0.9	-	-	1.6
Common	0.3	-	-	0.7	-	-	0.7
PM & Design	-	-	-	1.2	-	-	1.7
Replacement	-	-	-	0.4	-	-	0.2
Total Capex excluding Contingency	3.7			33.7			51
Capex Contingency	-	-	-	3.6	-	-	5.0 ⁵²
Total Capex	3.7			37.4			55.9

⁵¹ Due to rounding the total amounts may vary

⁵² Due to rounding the total amounts may vary

2.5.3.1 Financial performance Revised Outlook – Brownfields LNDN Capital Expenditure

The revised brownfields LNDN Cost Per Premises for future FSAMs is \$1,997 compared with the Corporate Plan Cost Per Premises of \$1,054⁵³ as broken down in the Exhibit below.

Exhibit 2-26: Brownfields LNDN Cost Per Premises Revised Outlook compared to Corporate Plan

LNDN Cost Per Premises			
	CP	Current Normalised ⁵⁴ EAC	Revised Outlook
	\$/Premises	\$/Premises	\$/Premises
Civil works	302	547	
Fibre installation	211	191	
Surface works	70	164	
Design	57	127	
Specified equipment	414	354	
Future CPP	1,054	1,383	2,007
Premises Passed or in progress	-	-	(10)
Average LNDN CPP	1,054	1,383	1,997

The revised Cost Per Premises reflects the following:

- [REDACTED]
- The estimation of SOR increases for other current, and all future, FSAMs which are currently being negotiated with Delivery Partners and which reflect:
 - the operational and design issues in the rollout;
 - uncertainty around volumes going forward;
 - better understanding by the Delivery Partners of the complexity and costs;
 - greater Delivery Partner leverage as pressure to mobilise increases following the demobilisation that resulted from Telstra remediation;
- [REDACTED]
- [REDACTED]
- An increase in the mix of higher value SOR activities (i.e. boring versus trenching/reinstatement);

⁵³ Excludes \$0.7 billion capital expenditure provision as per the Corporate Plan

⁵⁴ The Normalised Estimate excludes the early release and Tasmania first release sites

- A lower mix of aerial component in LNDN due to unresolved commercial arrangements with power utilities and, once commercial arrangements are resolved, a difficult process to effect approval of designs and access to poles;
- Increased design costs to 30 September 2013 due to the complexity of the design process and the number of internal and external iterations which has varied between 3 and 16;
- Lower equipment costs to 30 September 2013 and further savings reflecting design enhancements which may be achieved over time;
- Inflation at 2.5 percent from FY15;
- Productivity improvements and efficiency savings of 2.5 percent in FY17 and FY18 only (compared to every year in the Corporate Plan), reflecting the intrinsic complexity of the project, the poor capability base of both NBN Co and its Delivery Partners, and the heavily interdependent relationship with Telstra; and
- Continuing the trend of historical increases in the Estimate at Completion (a definition of how EAC is calculated is outlined in A-1.2) (e.g. Fixed Price Lump Sum FSAM EAC increased from \$1,318 in June 2013 to \$1,475 in October 2013).

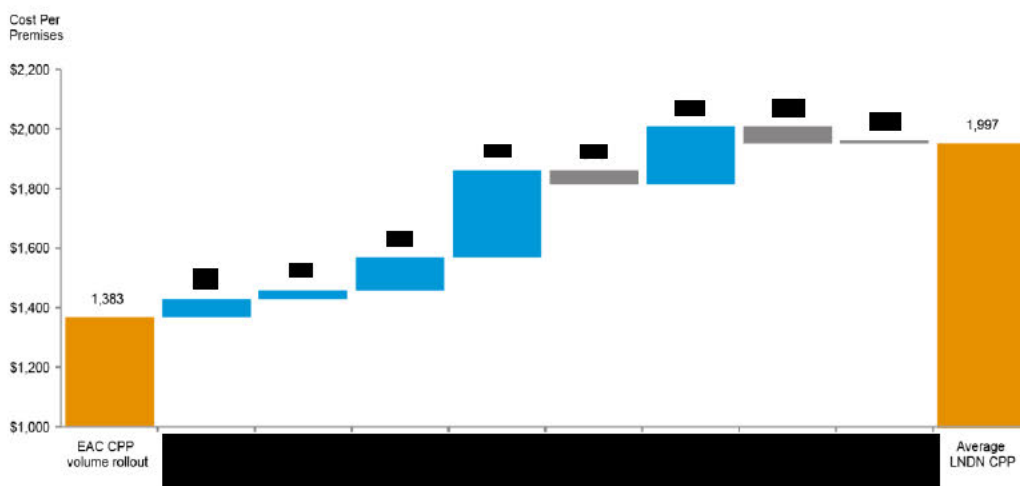
The Independent Assessment notes that there are opportunities for cost reductions in the future. Some potential savings have been identified in network design and architecture, primarily in reduced equipment costs, however a business case needs to be prepared. Business cases for ~\$1 billion of potential savings have been completed and implementation of some of these improvements is underway. These could be achieved over time, but allowing for the time to introduce these concepts and other risks, it is prudent to adjust the amount by 50 percent.

Improvements to in-field construction practice to reduce the amount of boring and re-instatement may result in reduced cost but these are dependent on a steady state and improved Delivery Partner management.

In addition, there are a number of barriers to NBN Co gaining any meaningful efficiency in the short and medium term. These barriers include the complexity, scale and scope of the rollout, and the constraint of available project management expertise within NBN Co as rollout ramps up. Further, the complexity of existing design and planning processes within NBN Co, and previously noted capability and organisational constraints, will take time to optimise and may yet result in increased costs. Any delays occurring as a result of the highly interdependent relationships between Telstra, the Delivery Partners and NBN Co will likely further limit efficiency gains.

It is considered likely that the Delivery Partners will become more efficient as they are provided with more consistent work flow, experience less interference in the design process, and are better managed through clearer delegated authority within NBN Co. These efficiencies are required to make the modules profitable for the Delivery Partners, [REDACTED]. Therefore, it is anticipated that any efficiency gains will primarily benefit the Delivery Partners and the revised figures have only included limited efficiency gains for NBN Co (2.5 percent per annum for FY17 and FY18 only).

The effect of the estimated variances on the Cost Per Premises is shown below.

Exhibit 2-27: Revised brownfields Cost Per Premises comparison

2.5.3.2 Financial performance Revised Outlook – Transit/Backhaul Capital Expenditure

Current expenditure is in line with Corporate Plan of \$2.8 billion; however, the additional three years in the deployment schedule will result in an increase in expenditure of \$0.2 billion to FY24.

2.5.3.3 Financial performance Revised Outlook – Brownfields connections and activations Capital Expenditure

The Revised Outlook for Connections and Activations Cost Per Premises is \$2,100 compared with the Corporate Plan Cost Per Premises of \$1,398. This reflects:

- A lower mix of aerial component in LNDN due to unresolved commercial arrangements with power utilities, and the difficulties and delays in the aerial connection approval process;
- Higher costs for using Telstra LICs compared with either aerials or new built LICs due to variations from Delivery Partners;
- A higher proportion of “unfit” Telstra LICs (i.e. unable to be used) than anticipated;
- A longer LIC length than anticipated in the Corporate Plan due to changes in the LNDN design;
- Further Delivery Partner rate increases;
- Some level of recognised, but unresolved, claims;
- Some level of unrecognised claims;
- Adding the estimated cost of variations into the accruals for connections;
- An increased level of complexity at connection due to QA and design issues with LNDN (e.g. 44 percent of all connections require multiple truck rolls);

- Inflation at 2.5 percent from FY15; and
- General efficiency of 2.5 percent in FY17 and FY18 only (rather than in every year as per the Corporate Plan), reflecting the intrinsic complexity of the project.

The transition to build and bulk drops is expected to provide some efficiency. However, the Independent Assessment found that this program is still in its infancy, and rates for Delivery Partners are not yet concluded. These potential efficiencies are not reflected in the Revised Outlook.

The effect of the various risks for Connections and Activations is illustrated in the cost factors below:

Exhibit 2-28: Risks for Connections and Activations

The effect of the various risks for Connections and Activations			
Estimated At Completion	CP	Current LTD ¹	Revised Outlook
	\$/Premises	\$/Premises	\$/Premises
Demand Drops	344	763	786
Bulk/Build Drops	328	314	682
In Premises Only	408	433	537
██████████	████	████	████
MDU Cabling	721	1,458	1,187

Note: ¹ LTD – Life to–Date - which is the cumulative amount of actual expenditure incurred

2.5.3.4 Financial performance Revised Outlook – Greenfields Capital Expenditure

The rollout of greenfields has been negatively impacted by the delays in the brownfields LNDN. By the end of FY24 it is considered that the number of premises in the Corporate Plan will be passed, albeit later than previously planned.

2.5.3.5 Financial performance Revised Outlook – Fixed Wireless Capital Expenditure

Approximately \$0.3 billion of the Corporate Plan Fixed Wireless Capital Expenditure forecast of \$1.3 billion had been spent through to the end of September 2013. There have been delays in the Fixed Wireless rollout and, whilst it is increasing in momentum, attaining the full coverage is reliant on sourcing sufficient spectrum. An allowance has been made for the purchase of additional spectrum, but given the limited amount that comes onto the market it is difficult to forecast the actual cost of obtaining this.

The revised forecast Fixed Wireless Cost Per Premises would increase Capital Expenditure to \$2.5 billion, compared with Corporate Plan of \$1.3 billion, reflecting:

- Increase in sites required to █████ compared with an assumption of 1,392 in the Corporate Plan;
- Increased construction costs per site; and
- Requirement for increased spectrum.

2.5.3.6 Financial performance Revised Outlook – Satellite Capital Expenditure

The Corporate Plan Capital Expenditure for the ISS and LTSS total \$1.9 billion.

This includes the construction and deployment of two purpose-built NBN Co satellites, which have been fully contracted for and are on schedule for delivery and launch in 2015.

Whilst the majority of the costs of the two long term satellites are known, there are some elements that are yet to be finalised. There are also risks including the following:

- There is no clear understanding of the requirement for further capacity which may be needed if the demand for the LTSS exceeds that outlined in the Corporate Plan; and
- Further Satellite capacity may be the only viable solution if fibre and Fixed Wireless coverage is less than the 97 percent included in the Corporate Plan.

The Independent Assessment has identified a potential increase of expenditure in addition to the Corporate Plan (to FY21) of [REDACTED].

2.5.3.7 Financial performance Revised Outlook – IT Capital Expenditure

IT Capital Expenditure at 30 Sept 2013 is \$0.7 billion which is 74 percent of the total Capital Expenditure in the Corporate Plan through to FY21. In some categories of expenditure, in excess of Corporate Plan to FY21 has already been incurred. The OSS/BSS Capital Expenditure in the Corporate Plan was based on vendor estimates.

The Revised Outlook for IT Capital Expenditure, including OSS/BSS, is approximately \$1.6 billion, compared with Corporate Plan of \$0.9 billion. This increase reflects:

- Over spend to date on foundation IT business requirements (which has been delivered without the necessary automation and integration);
- The need to deliver further integration and scale ahead of the ramp up in network activations; and
- Inadequate estimates in the Corporate Plan that are based on vendor estimates.

IT Capital Expenditure required in addition to the amounts shown in aggregate in the Corporate Plan is circa \$0.7 billion comprising an allowance for:

- Critical path integration projects to support key business process;
- Augmentation of data centres to address increasing demand for equipment and software capacity to support network rollout growth requirements; and
- EUT growth and lifecycle to support employees, contractors and Delivery Partners in Data Centre equipment and replacement Capital Expenditure including software refresh cycle (5-7 year life for key components).

The Independent Assessment recognised that both NBN Co and its IT function are at early stages of maturity. Delays in the deployment of system capabilities, automation and scale are key risks in enabling the planned network rollout.

While it is important to undertake a financial reforecast, there is also significant operational risk in the OSS/BSS system implementation that should not be understated.

2.5.4 Sources of Funding

The Corporate Plan assumed that the rollout would be funded by a combination of equity from the shareholders and debt sourced from banks and financial markets, with no explicit guarantee provided by the Australian Government.

On 22 June 2011, NBN Co entered into an Equity Funding Agreement with the Government which formalised the Government's intention to fund the equity component of the rollout of the NBN, subject to the annual budget appropriation process. At this stage there has been no agreement in respect of the provision of debt.

Under the Corporate Plan, NBN Co modelling indicates a peak funding requirement of \$44.1 billion by FY21 of which \$30.4 billion (69 percent) represents an equity contribution with the balance of \$13.7 billion (31 percent) being debt. If the Corporate Plan was unlevered (i.e. no debt issued), peak funding would be \$3.7 billion lower at \$40.4 billion due to a combination of a lower net debt funding cost (\$2.6 billion), lower cash interest Revenue (\$0.6 billion) and lower cash at bank (\$0.5 billion).

The Corporate Plan has used the interest rates in the exhibit below. The rates were modelled based on analysis conducted by NBN Co at the time of preparing the Corporate Plan.

Exhibit 2-29: Interest rates used in the Corporate Plan

Interest rates used in Corporate Plan and all Scenarios														
Year	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY24	FY26
Interest rate earned on deposits	5.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Interest rate paid on debt	9.9%	9.5%	9.1%	8.7%	8.3%	7.9%	7.7%	7.6%	7.4%	7.2%	7.1%	6.9%	6.9%	6.9%
Year	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37	FY38	FY39	FY40
Interest rate earned on deposits	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Interest rate paid on debt	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%

As at 30 September 2013, NBN Co had been funded by a series of equity contributions totalling \$6.5 billion. The Corporate Plan assumes that debt will be introduced into the funding model in FY15, with successive annual debt drawings through to FY21.

There are a number of factors that will determine whether, and to what extent, debt funding will be available to NBN Co. For the purposes of the Revised Outlook, it is assumed that there will be no changes to the current Equity Funding Agreement and all requirements beyond the planned \$30.4 billion will be funded by way of interest-bearing debt. This is consistent with the Government's policy. There is uncertainty surrounding the availability of debt funding to NBN Co based on the Revised Outlook.

2.5.5 Required retail and wholesale pricing to reach specific economic return

The Revised Outlook described in this report describes a rollout with higher costs than the Corporate Plan and lower revenues on account of the delayed rollout and revised ARPU and growth assumptions (i.e. Revenue Trajectories A and B). This will reduce the internal rate of return (IRR) from 7.1 percent in the Corporate Plan to 2.5 percent on Revenue Trajectory A, in which nominal ARPU grows roughly in line with inflation over time. Based on Revenue Trajectory B, in which nominal ARPU remains flat, the Revised Outlook does not generate a positive IRR.

If NBN Co was required to deliver the 7.1 percent IRR envisaged in the Corporate Plan, NBN Co would need to increase prices from those set out in both Revenue trajectories shown, subject to any necessary regulatory and contractual changes. It should be noted that 7.1 percent is not used to represent a considered view by the Strategic Review of the appropriate industry rate of return for a project of this size and risk profile – it is simply the IRR envisaged in the Corporate Plan.

The simple analysis below indicates the minimum price increases needed to deliver a 7.1 percent IRR. In reality, prices would need to increase much more than described below, because as prices increase more people and businesses would stop using the NBN, preferring to use alternative, mobile-only services, especially for voice calls and basic internet with small monthly data usage. To make up for that lost revenue, NBN Co would need to increase prices again, and so on.

By way of illustration only, under the Revised Outlook this would require a price increase, across all NBN Co packages and across the years, of 50-80 percent. (i.e. a 50 percent rise on Revenue Trajectory A or 80 percent rise on Revenue Trajectory B), assuming no change in product uptake or mix.

If RSPs were to pass on this price increase dollar-for-dollar (adding GST, but without adding any margin to the increase), again by way of illustration only, this would see consumers paying an additional \$27-43 more per month for a 50/20 Mbps service that otherwise ranges from ~\$75-95 per month.⁵⁵

Price increases will improve the Profit Before Tax of NBN Co and therefore the IRR. If the Government wishes to avoid these price increases and still enable an IRR of 7.1 percent, it could provide a specific direct subsidy to NBN Co. Under the Revised Outlook this would need to be a \$1.9 billion to \$2.5 billion subsidy per year, rising in line with inflation every year to FY40, assuming it was first paid in FY15.

If NBN Co. was required to deliver a lower return, closer to the current long-term government bond rate, for example 4.5 percent, price increases would still be required to achieve this. The price increase required to meet that level of return would be 20-45 percent (still assuming no change in product uptake or mix). Based on the assumptions above this would result in an increase for consumers of ~\$10-24 for a 50/20Mbps service, ~\$8-18 for a 25/5Mbps service, ~\$7-15 for a 12/1Mbps service and ~\$5-12 for a 12/1Mbps 'voice only' service.

⁵⁵ Note, cheaper 50/20Mbps plans are available with relatively low download quotas. The prices here are used for illustrative purposes only. For a 25/5Mbps service this rise would be \$21-33 (off an illustrative range of ~\$60-90 per month). For a 12/1Mbps service this rise would be \$17-28 (off an illustrative range of ~\$45-70 per month). For a voice only 12/1Mbps service this rise would be \$14-22 (there are only a few such plans available currently, their prices typically range from \$24-30 per month).

Exhibit 2-30: Required retail and wholesale pricing to reach specific economic returns

Illustrative NBN Co package	Illustrative retail priced package (\$ per month)	Price increase to achieve a 7.1 percent IRR ⁵⁶		Price increase to achieve a 4.5 percent IRR ⁵⁷	
		Wholesale price increase (percent)	Additional retail cost ⁵⁸ (\$ per month)	Wholesale price increase (percent)	Additional retail cost ⁵⁹ (\$ per month)
12/1 Mbps – 'voice only'	\$24-30	50-80 %	\$14-22	20-45 %	\$5-12
12/1 Mbps	\$45-70	50-80 %	\$17-28	20-45 %	\$7-15
25/5 Mbps	\$60-90	50-80 %	\$21-33	20-45 %	\$8-18
50/20 Mbps	\$75-95	50-80 %	\$27-43	20-45 %	\$10-24

2.6 Contractual Review

2.6.1 Contracts

2.6.1.1 Construction – LNDN

NBN Co has entered a series of Network Services Master Agreements (NSMA) with various Delivery Partners.

The first NSMA was signed on 1 July 2011 with Silcar (WP1) for the design and construction of parts of the passive fibre network in NSW, ACT and Qld for a 2 year initial term.

The NSMA has evolved over time and all subsequent NSMAs were structured as periodic agreements with work-specific "Modules". The NSMA structure is designed to facilitate the efficient generation of work packages of design, construction and operational support services activities over the initial term of the NSMA, in accordance with pre-agreed commercial terms and pricing structures.

⁵⁶ 7.1 percent was the internal rate of return (IRR) set out in the Corporate Plan

⁵⁷ 4.5 percent is an illustrative rate of return only, closer to the current long term Government bond rate

⁵⁸ If RSPs were to pass on an NBN Co wholesale price rise dollar-for-dollar (adding GST, but without adding any margin to the increase), shown in dollars per month of incremental cost to the consumer relative to an illustrative speed plan. Note, cheaper speed plans are available than those shown, but with relatively low download quotas. The speed plans here are used for illustrative purposes only. The NBN Co wholesale price rises are the minimum percentage increases required to deliver the required internal rate of return (IRR) over the period of the Corporate Plan (FY10-40) from a base of revenue Trajectory A in which nominal ARPU grows roughly in line with inflation over time, and revenue Trajectory B in which nominal ARPU remains flat. NBN Co calculates IRR including a valuation of the company at FY40 of six times EBITDA.

⁵⁹ As above.

Exhibit 2-31: Current LNDN NSMAs

Contractual review of LNDN NSMAs				
Work Package	State	Delivery Partner	Key terms and dates	Est. Contract value
1	NSW/ACT/QLD	Silcar	[REDACTED]	[REDACTED]
2a	VIC	Transfield	[REDACTED]	[REDACTED]
2b	WA	Syntheo	[REDACTED]	[REDACTED]
3	SA/NT	Syntheo	[REDACTED]	[REDACTED]
4	TAS	Visionstream	[REDACTED]	[REDACTED]
5	SYD	Transfield	[REDACTED]	[REDACTED]
6	NSW Nth	Downer	[REDACTED]	[REDACTED]
7	NSW Sth	Visionstream	[REDACTED]	[REDACTED]
8	Brisbane	Visionstream	[REDACTED]	[REDACTED]
9	Melbourne	Visionstream	[REDACTED]	[REDACTED]
10	SA Country	SAPN	[REDACTED]	[REDACTED]
11	Brisbane	Downer	[REDACTED]	[REDACTED]

Note: The scope in the individual contracts in this table varies with factors such as design or topology, so it is not possible to compare the Cost Per Premises from one contract to the other.

In addition to the LNDN contracts, there are construction contracts with various Delivery Partners and Service Stream, for the provision of Field Service Delivery (Demand Drops), Build Drops, New Developments and Transit/Backhaul.

2.6.1.2 Telstra Definitive Agreements

As outlined in Section 1, the Telstra DAs govern the relationship between NBN Co and Telstra. The DAs provide access to Telstra's infrastructure for 35 years, including ducts, LICs, rack space in Telstra Exchanges, and 'dark fibre' in the transit backhaul. The payments to Telstra over the life of the agreement were estimated to have a June 2010 post-tax present value of approximately \$9 billion. This excludes \$2 billion post-tax present value being provided to Telstra directly by the Government.

2.6.1.3 Optus HFC Agreement

The Optus HFC contract governs the relationship between NBN Co and Optus. Under the agreement, Optus will decommission its HFC network (in Melbourne, Sydney and Brisbane) as the NBN is rolled out, and will migrate customers to the NBN in return for a "per subscriber payment".

2.6.2 Status of contractual relationships

2.6.2.1 Disputes and Commercial Risks

Various NSMA and other construction-related contracts have given rise to claims and disputes.

Relatively few of these have progressed beyond the stage of informal claims, but there are a number which are now beginning to escalate through the alternative dispute resolution mechanisms in the contracts concerned. The Independent Assessment considered a selection of the larger claims and issues arising from the LNDN construction Delivery Partners and undertook discussions with several Delivery Partners.

Telstra Remediation

Significant delays have been encountered because of delays to the Telstra remediation schedule. This included a complete shutdown of all remediation work between May and August 2013 while Telstra confirmed its position on remediation and augmentation of Telstra pits and ducts due to asbestos concerns.

Extensions of Time (EOT) and SOR

[Redacted text block containing multiple lines of blacked-out content]

Visionstream – WP4 Tasmania

[Redacted text block containing multiple lines of blacked-out content]

Telstra DAs – CPI Dispute

Aside from the construction claims, the other current major dispute relates to the Telstra DAs. This is a dispute about the date from which CPI adjustments are to be made to the prices agreed under the Telstra DAs. NBN Co maintains it should be from 1 January 2013, whereas Telstra considers it should be from 1 January 2012.

Telstra has estimated that this claim is worth approximately \$100 million, but is an isolated case. There are no other contracts in a similar form and therefore this is not a systemic problem that is likely to be repeated. The Dispute Resolution decision which is being challenged by Telstra was made by a leading independent QC and former Federal Court Judge in NBN Co's favour.

2.7 People and Culture

The Independent Assessment conducted approximately 60 interviews including all senior management and a sample of employees from a number of divisions, locations and levels. While this was not a comprehensive organisational review it is KordaMentha's professional opinion that there are a number of people and culture issues that are important to note in the Strategic Review and that NBN Co should address these issues in the preparation of its Corporate Plan.

The Independent Assessment findings in relation to NBN Co's organisation, people and culture indicated that NBN Co has attracted a committed, motivated, generally capable group of people who want to do important, meaningful work.

NBN Co staff often speak about "living in the political and media fish bowl" and it is clear that this has adversely impacted the organisation.

The culture of the organisation is widely seen to be a problem.

The Independent Assessment indicated clear evidence that there are some excellent, satisfactory and poor leaders in the business. The hiring process was found, in most cases, to have lacked rigour and has potentially been compounded by the absence of a meaningful performance assessment for most staff. In addition, the Independent Assessment found that the important whole-of-business strategy seems to have been neglected in favour of targets within functional groups which are assumed will combine to progress the project.

The company values of "being authentic", "engendering trust", and "integrity" are in sharp contrast to the way people experience current practice. Staff cite many examples of inaccurate information, lack of robust challenge, fear of contradicting senior staff, and mistrust in the motives of some leaders. The Independent Assessment observed that a fear of being blamed for mistakes has generated a lack of willingness to accept responsibility in some functional groups. In addition, people are reluctant to document decisions for fear of the potential consequences.

The Independent Assessment also concluded that the perceived lack of clarity around strategy has resulted in a complex organisational structure with many layers of management. It noted duplication of roles across some functions and within functions and that this has impeded collaboration, confused roles, and reduced efficiency.

The Independent Assessment considers the organisation is carrying a level of headcount and overhead that has been predicated on the achievement of the volumes of rollout and activity in the Corporate Plan. These volumes have not been, and will not be, achieved for some time and therefore the level of headcount is not currently required.

The Independent Assessment noted that the Executive Committee has not been seen to operate efficiently and has tended to “seek to protect” perceived areas of responsibility and influence. While a number of recent changes are expected to improve the performance of the senior leadership team it was observed that “there is still a long way to go to optimise the performance of the organisation”. While the selection of a CEO is important for any organisation, it will be critically important for NBN Co.

Despite the above issues, there remains a committed core of employees. Staff at all levels of the organisation are seeking leadership and are hopeful that positive change will happen soon.

2.8 Exogenous Risks

Political and media interest

NBN Co has been subject to intense political and media interest since inception. The Independent Assessment commented that this attention has adversely impacted the performance of NBN Co and the efficient deployment of the network. While the ongoing interest in the project is understandable, NBN Co would benefit from being allowed to focus on its core task away from the political spotlight.

Inherent forecasting risk

The risks associated with completing the rollout of the NBN would challenge the world’s largest telecommunications and construction organisations.

There is well established global research that shows that cost overruns on large infrastructure projects are the norm rather than the exception. Global experience shows that 9 out of 10 large projects will have substantial cost over-runs and that the planning process is inherently unreliable. The more complex and unprecedented (unknown) the project, the larger the relative overrun is likely to be. Data from a 2009 study⁶⁰ shows that cost overruns across 20 countries by project type as follows: rail projects (58 projects in study) – average cost overrun of 45 percent; bridges and tunnel projects (33 projects in study) – average cost overrun of 34 percent; road projects (167 projects in study) – average cost overrun of 20 percent. This is also observed to be true for many telecommunications projects. For example, increases on three fibre projects across the UK, New Zealand and the USA range from ~20-30 percent above original estimates. The most common causes for cost overrun (in order) are material price escalation, poorly defined scope, contractual disputes, time delay, design creep, and lower than expected productivity improvement.

The Independent Assessment found that the size and scope of the NBN project creates significant inherent risk in the veracity of long-term financial and operational forecasts, which cannot be removed.

The Corporate Plan and Revised Outlook have a contingency of 10% on all Capital Expenditure to cover risks. The Scenarios developed in Section 4 have been modelled using a 20% contingency on all Capital Expenditure. The higher contingency reflects the inherent risk and complexity associated with projects of this size and scale as evidenced by global experience and from the findings of the Independent Review.

⁶⁰ Oxf Rev Econ Policy (2009) 25 (3): 344-367

Organisational disruption during Strategic Review and subsequent transitional period

The status of the project and the recent change in Government policy, coupled with the Strategic Review undertaken, has increased the strategic and operational uncertainty of NBN Co. This has been exacerbated by changes to the senior management team which have resulted in the organisation reconsidering a range of tactical and strategic issues. Given the long lead times associated with various internal processes as well as with supply chain and construction deployment partners, it is important that NBN Co continues to progress its current FTTP rollout.

3

Revised timing,
financials and product
offer under alternative
models

3 Revised timing, financials and product offer under alternative models

The Strategic Review considered the timing, financials and product offers under alternative models. The models often refer to threshold download speeds, for example 50 megabits per second (Mbps) services. Under any technology model a proportion of premises may experience download speeds in excess of the threshold.

3.1 International benchmarks of high-speed network rollouts

Many international markets are rolling out high-speed broadband networks. These networks are typically FTTP, FTTN or HFC, with the proportion of each changing over time, as the relative cost-to-performance trade-off changes with the evolution of technology. Globally, FTTP has fallen from 67 to 52 percent of cumulative premises passed between June 2010 and December 2012⁶¹. While FTTN has generally overtaken FTTP in recent years, both are losing ground relative to super-fast HFC networks, which have grown rapidly to take a 33 percent share of superfast broadband premises passed. The approaches taken by individual operators reflect a number of factors including their infrastructure, and their competitive and regulatory environment. Experiences in overseas markets need to be considered in light of Australia's unique circumstances, including but not limited to:

- An incumbent telecommunications provider that owns all legacy copper infrastructure; and
- A government mandate of certain speeds and service for the whole population.

As Exhibit 3-1 shows, FTTN rollouts have typically proceeded faster (with peak rollout rates up to 650,000 premises per month) than FTTP (up to 310,000 per month) given the need to rollout less new fibre. In both cases, it can take five years to achieve peak rates.

⁶¹ Idate FTTX Watch Service 2013

Exhibit 3-1: Comparative performance of FTTP/B, FTTN/C and HFC⁶²

Comparative Performances						
	Operator (Country)	Premises passed (Dec-12, '000s)	Subscribers (Dec-12, '000s)	Take-up rate (Dec-12)	Speeds plans offered (down/up, Mbps)	Peak premises passed per month (Jun-10 - Dec-12, '000s)
FTTP/B	NTT (JP)	44,600	17,100	31%	100/100 to 200/100	NA (250 in 2008)
	Verizon (US)	17,600	5,400	31%	15/5 to 300/65	130 (310 in 2008)
	Korea Telecom (KR)	16,700	6,200	37%	50/50 to 100/100	80
	Telefonica (ES)	2,200	300	15%	only 100/10	180
	KPN (NL)	1,400	400	27%	50/50 to 500/500	40
FTTN/C	AT&T (US) VDSL2	24,500	7,700	31%	3/0.5 to 45/6	250 (650 in 2007)
	BT (UK) VDSL2	13,000	1,000	8%	38/9.5 to 76/19	500
	KPN (NL) faster speeds are vectored, otherwise VDSL2	5,000	Not separately reported	After –12 months of substantive retailing. Now adding over 100,000 activations/month	8/1 to 80/8	170
	Belgacom (BE) VDSL2 (although vectored being rolled out)	4,000	1,200	30%	30/2.5 to 30/4 ⁶³	70
HFC	Comcast (US)	52,300	19,400	37%	6/1 to 105/20	built before 2010
	Virgin Media (UK)	13,000	2,200	17%	30/3 to 100/12	built before 2010
	UPC NL (NL)	2,800	1,000	38%	50/2.5 to 200/10	built before 2010

⁶² Idate FTTH Watch Service 2013; Company websites; Reggefiber Joint-Venture Paper, November 2011; The Reggefiber Model, June 2012; AT&T U-verse Timeline; FTTH Industry Overview, Telecom ThinkTank; Fibre Rollout, Ministry of Internal Affairs and Communications, Japan; Fibre Rollout Statistics, Statistical Survey Department, Statistics Bureau, Ministry of Internal Affairs and Communications, Japan; Case Studies from Japan, NTT, April 2012; Network Transformation Outlook, Belgacom, November 2012; Super-fast UK: Edging into Gigabit Territory, Point Topic, November 2012

⁶³ 30Mbps is the connection speed offered to the majority of new customers, however, more than 1.2 million households and companies can order a line offering a connection speed of 50Mbps. From January 2014, speeds of 70Mbps down and 50Mbps up supported by vectoring will be commercially available.

Overseas experience indicates that the cost⁶⁴ of rolling out a new FTTP network ranges from \$500-3,000 per premises. For networks most comparable to Australia, the cost is ~\$1,100-1,300 per premises.⁶⁵ FTTN is lower cost, at ~\$350 - 700 per premises. Upgrading an existing, fully deployed and connected HFC network to DOCSIS 3.0 is even lower, at ~\$100 per premises. In practice, these averages mask significant variation both between and within countries:

- Input cost variations (labour and materials) for developed countries drive a cost differential of three to four times between low cost countries such as Portugal, and high cost countries such as Norway and Switzerland;
- Costs also tend to reduce over time, due both to cost erosion and to scale and learning effects. For example, Verizon's Cost Per Premises fell from ~US\$2,600 to ~US\$1,600 between 2004 and 2006;⁶⁶
- Within countries, geographical factors such as density or building types can also drive large variances in cost. In some European rollouts, a tripling of density drove down unit cost by ~10 percent while Cost Per Premises varied by a factor of three times between large blocks of apartments and single dwelling units (SDUs); and
- Technology and construction choices can also be material. Point-to-point FTTP tends to cost ~10 percent more than GPON,⁶⁷ while underground cabling can cost ~30 percent more than aerial.⁶⁸

3.1.1 Demand forecast: bandwidth, speed and price

Globally, there is a rapid increase in demand for both data and speed from consumers and businesses. From 2007–12, global data usage increased from 7 to 44 billion gigabyte (GB) per month (46 percent compound annual growth rate (CAGR)), and by 2017 it is forecast to reach 121 billion GB per month (23 percent CAGR). Mobile broadband access is growing rapidly and forecast to be 2.1 billion connections by the end of 2013.⁶⁹ The largest driver of growth is, and will continue to be, traffic from streaming video online, which is forecast to grow by 29 percent per annum to 2017.⁷⁰

Forecasting future increases in bandwidth requirements (the speeds that will be required for specific uses) and demand (the speeds consumers will be willing to pay for) is difficult. A recent UK study⁷¹ estimates that the median UK household today requires a maximum download speed of 8Mbps.

The study (consistent with Cisco VNI studies⁷²) focused on the drivers of demand for bandwidth (ie, Mbps). The study identified a handful of applications which generate the greatest demand for bandwidth per person using them today:

- Standard definition TV (SDTV) streaming (2 Mbps);

⁶⁴ Cost is calculated per premises on the basis of Capital Expenditure to connect the LNDN, and connect the customer premises (including the NTD for FTTP, but excluding any CPE)

⁶⁵ Per The Boston Consulting Group analysis

⁶⁶ FTTx: Current Status and the Future, IEEE Communications Magazine', Ovum, 2008

⁶⁷ FTTx roll out and capex forecasts, 2012–2017, Analysys Mason, 2012

⁶⁸ Evaluating NBN FTTP Costs, Corning, 2013

⁶⁹ 'The State of Broadband 2013: Universalising Broadband' UNESCO, September 2013

⁷⁰ Cisco VNI, 2008, 2009, 2010, 2011, and 2012

⁷¹ Domestic demand for bandwidth: An approach to forecasting requirements for the period 2013-2023, Report for the Broadband Stakeholder Group, Robert Kenny & Tom Broughton, November 2013

⁷² Cisco VNI, 2008, 2009, 2010, 2011, and 2012

- High definition TV (HDTV) streaming (5 Mbps);
- Streamed gaming (5 Mbps); and
- 4K TV streaming (30 Mbps). 4K TV hardware is available today, although with very little media content. The hardware offers approximately twice the number of horizontal pixels as HD TV.

By 2023, even as new applications (such as over-the-top video and cloud computing) become more widespread, this is forecast to grow to 19Mbps. This takes account of improvements in compression. For example, bandwidth requirements have fallen over time, and are expected to continue to do so. The UK study estimated 9% improvements per year, compounded, which corresponds to 4K TV requiring ~12 Mbps in 2023. New standards like H.265 are expected to continue to contribute to better compression.

By then, even four-adult households with a 4K TV and three HD TVs (the top 1% of households by bandwidth demanded) would need less than 40 Mbps for all but the most intense four minutes of each month. Industry feedback to the Strategic Review was sceptical of widespread mass adoption of 4K TV in Australia.

The same study concluded that upstream demand in 2023 will grow from 1.1 to 2.4 Mbps for the median household and less than ~9 Mbps for the households with the highest demand. Video conferencing and uploading video content are the key drivers for this growth

This is consistent with the fact that only a small proportion of consumers in Western countries have so far taken up plans offering greater than 50Mbps (11 percent or less in 2012), and penetration of greater than 50Mbps plans is expected to remain less than 20 percent by 2017 in most Western countries.⁷³

At any point in time, there will be consumers willing to pay more for higher speeds.⁷⁴ However, consumer research indicates that for the majority, price is the most important factor in selecting a broadband service,⁷⁵ and faster broadband speeds have diminishing marginal value.⁷⁶ Moreover, macro trends in average revenue per user (ARPU) demonstrate that consumers are more likely to "pay the same for more" rather than "pay more for more" over time. For example, real broadband average revenue per user has fallen between 1–12 percent per annum across a range of countries over recent years with any ARPU growth coming from new services such as Internet Protocol Television (IPTV).⁷⁷

Higher broadband speeds are also not a prerequisite for high broadband usage. For example, average monthly usage per fixed line subscriber in the UK is more than 10 percent higher than in Japan, yet average peak connection speeds in the UK of ~30Mbps in 2012 were around one third lower than average peak connection speeds in Japan.⁷⁸

⁷³ Cisco VNI, 2008, 2009, 2010, 2011, and 2012

⁷⁴ Eurobarometer, 2012, "E-Communications Household Survey" (14% of European consumers willing to pay more for faster broadband than they currently have); NZ Commerce Commission, 2013, "High Speed Broadband Services Demand Side Study" (26% of SMEs and 21% of consumers willing to pay more than 10% more than they currently do for faster connectivity). ComReg, 2013, Consumer ICT Survey (22% of Irish consumers willing to pay more for faster internet).

⁷⁵ E-Communications Household Survey, Eurobarometer, 2012

⁷⁶ Household Demand for Broadband Internet Service, Final report to the Broadband.gov Task Force Federal Communications Commission, Roston, Savage and Waldman, 2010

⁷⁷ Orange (FR) and KPN Annual Reports; Van Dijk, Broadband Internet Access Cost (BIAC), Ofcom, PTS Sweden

⁷⁸ Akamai State of the Internet Report for 2012

3.2 Input factors and other available technologies

Different approaches to FTTP and the use of other available technologies offer significant potential to improve the rollout speed and cost efficiency of the NBN. Several input factors apply across the range of available technologies. These include improvements to the NBN Co delivery model, managing labour supply, different approaches to greenfields construction and network options for carrying voice. These are discussed below.

3.2.1 Delivery model

The Strategic Review found that NBN Co's FTTP network rollout (brownfields and greenfields) is behind plan, with 291,030 Premises Passed by 30 September 2013, 42 percent behind the 2012 Corporate Plan.

Changes to the NBN Co delivery model, irrespective of which technology is used for the network, can drive significant efficiency, predictability and improvement in rollout pace. These changes include:

- An enhanced program management function to own long-term planning, coordinate construction activity, masterplan, sequence activity, manage stakeholders across workfronts, and ensure internal alignment
- Ensuring a visible, committed and continuous flow of work by streamlining the design process so that designs are approved according to a regular 'takt'⁷⁹, recognising the trade-offs between cost-optimisation, constructability and timeliness, ensuring there is at least a 12 month forward view of volumes and locations
- Clear roles and responsibilities to ensure internal alignment within NBN Co (centre versus regions, across functions), clear local coordination authority for individual workfronts and a principle of minimising the number of hand-offs and interfaces
- Clear gating of changes (e.g. architecture) before release into the field. This includes processes to develop and approve business cases, test changes, and assess risk, and should be executed with a clear release cycle
- Simplified and standardised hierarchy of design rules, construction methodologies and "cookbooks", equipment, governance and accountabilities
- [REDACTED]
- A joint focus on construction productivity (between NBN Co, contractors and Telstra), including streamlined interfaces, aligned targets and incentives, and co-located regional and field operations that have delegated authority on minor variations

⁷⁹ 'Takt' is a lean construction term meaning 'steady beat', being the pace of the entire system of planning, design, permitting, construction and commissioning, with the bottleneck location chosen and sized to meet the production targets.

- A streamlined interface with Telstra with clear rules determining decision rights for accessing Telstra assets and remediation obligations.

These changes are expected to facilitate a significant improvement in productivity over 2-3 years. The rollout schedule will also need to be reviewed more often, so that it is more responsive to technological change, changes in input costs, and lessons from the field.

3.2.2 Labour supply

The Strategic Review has concluded that there is not a fundamental shortage of labour. With sufficient lead-times, visibility of future work and continuity of work within a geography (for at least six to twelve months), it will be possible to train (where necessary) and mobilise the required capacity. While there are some variations in the skills needed for the different technologies, most skills are either common between technologies or readily convertible.

The biggest constraint to the network rollout is the availability of network designers, senior and experienced project managers, in-field supervisors and project control staff to provide leadership and oversee program delivery. This constraint allows a maximum of 200-300 concurrent workfronts (for example, an FSAM, a set of nodes or HFC in-fill areas) and dictates the highest practical deployment speed achievable. Given the scarcity of (and competition for) these senior staff in Australia, it would be impractical to mobilise and manage more than ~1.5 million man hours of capacity per month, or 10,000-12,000 Full Time Equivalents. Within this constraint, a peak run-rate equivalent to 100,000 FTTP Premises Passed per month (equivalent to ~4,800 per day) should be achievable by mid to late 2016.

3.2.3 Greenfields

The current Government greenfields policy requires NBN Co to be the wholesale provider of last resort for new developments with more than 100 lots on a demand basis. This approach distracts design and construction resources, delays the broader NBN Co rollout schedule and, in some instances, results in high transit and managed service backhaul costs. Some policy changes could be made to address these challenges. NBN Co could also advise the developer of NBN Co's scheduled rollout date. Instead of NBN Co providing fixed line services within set time frames, voice services could be provided in the interim under Telstra's Universal Service Obligation (USO) for some areas, with alternate arrangements potentially necessary in others. NBN Co could then provide broadband in these areas as part of the general rollout.

Alternatively, NBN Co could pay the developer a fixed subsidy (e.g. average NBN Co greenfields connect cost under the Radically Redesigned FTTP scenario) to build the network to NBN Co's specification then transfer the network back to NBN Co to operate. NBN Co could also consider charging a new premises activation fee (\$300 would be comparable to Telstra's new premises activation fee)⁸⁰. Combined, this could save NBN Co up to \$850 million Capital Expenditure over 2014-2021.

3.2.4 Voice architecture choices

Providing voice via CPE using voice-over-internet-protocol (VoIP) is viable for Australia and represents a relatively easy, proven approach based on local and international experience as a stable, high-quality solution. Customers can connect their analogue telephone to CPE with a voice

⁸⁰ The Telstra Carrier Charges – Price Control Arrangements, Notification and Disallowance Determination 2005 (Telecommunications (Consumer Protection and Service Standards) Act 1999)

port. 12-15 percent of current NBN Co end-customers use the voice port to receive voice services. VoIP is already used by more than 4.4 million Australians, with 0.6 million relying on VoIP without a fixed line phone connection.

The Strategic Review has assumed voice will be provided in this way and proposes NBN Co works with industry partners and Government to make this solution the new standard in Australia.

The Strategic Review has also considered the continued provision of PSTN voice services. Should this occur, costs additional to those allowed for under the scenarios modelled may be incurred to, for example, provide copper based connectivity between exchanges and nodes providing FTTN. Revenues to NBN Co would also be reduced.

3.2.5 Special services

A number of existing Telstra retail and wholesale services and technologies operating on the existing copper plant (known as Special Services) are not easily migrated to the NBN. To assure continuity for these Special Services, Telstra continues to maintain the copper plant and operate them until such time as they can be migrated to NBN Co. The use of Special Services on the copper network may reduce the speed and service distance possible for vectored VDSL2 (one of the technologies discussed later) and limit the practicality of FTTN and FTTB/dp deployments in business areas.

3.2.6 CPE and premises installation

In any fixed-line telecommunications technology, there is a requirement for a point of network termination, providing a socket into which the "Customer Premises Equipment" (CPE) is connected. CPE, in this context, is a device such as a router which allows customers to connect to data services and an analogue telephone adaptor.

For the purposes of the Review, as is current industry practice today, the provision of CPE and any in-house wiring to the network termination point will be at the customer or RSPs expense.

For a FTTP connection, fibre is connected to a device known as a Network Termination Device (NTD), which is a powered box that converts the optical signal to an electrical signal and provides outlet ports for both data and analogue telephone. This device is currently provided by NBN Co and will continue to be provided under the new model. As today, the customer or RSP is then responsible for providing a router, at their expense, that connects to a UNI-D port to provide internet access.

For an HFC network, the point of network termination for the purposes of the Review is considered to be the first wall socket inside the customer's premises. As today, the customer or RSP is then responsible for providing, at their expense, a cable modem and router (typically contained in a single device), with the addition of an analogue telephone adaptor.

For an FTTN/dp network, the point of network termination is the current copper network connection point, usually the first wall socket inside the customer's premise (a 605 or RJ11/12 port). The customer or RSP is then responsible for providing, at their expense, the appropriate DSL modem and router (typically contained in a single device), with the addition of an analogue telephone adaptor.

The CPE required for all these technologies is expected to cost the customer or the RSP ~\$80-110 per premises. Some customers may also require battery-backup. Battery backup typically has an additional cost of \$40-60 each. For battery back-up, Government policy requires that, from 20 June 2014, all end-users (except those with a priority assistance service) will need to decide whether they want battery back-up for their FTTP NTD or not. End-customers with a priority assistance service must have battery back-up.

It has also been assumed NBN Co will provide battery back-up for priority assist customers.

3.2.7 OSS/BSS

It is estimated that the current deployment will exceed 50,000 premises per month by the first quarter of CY15. The current combination of IT capability and the people who will have to use these systems cannot sustain rollout volumes at this level. It is estimated that an additional \$40-60 million expenditure (over and above the Revised Outlook) in FY14 and FY15 will be required to ensure that these volumes can be successfully managed. This expenditure is also required in a multi-technology approach.

For NBN Co to extend its current OSS/BSS to support FTTN, the additional one-off cost is estimated to be \$110-180 million. For HFC, this one-off cost is estimated to be an additional \$70-110 million. The effort existing operator(s) may incur in providing these systems and data to NBN Co has not been estimated. Furthermore, the cost of using a managed service for FTTN and HFC has also not been estimated.

Regardless of technology mix, additional IT operating expenditure over and above the Revised Outlook is not expected. NBN Co's IT operating expenditure is already high relative to international benchmarks.⁸¹

3.2.8 Network Operations

NBN Co's network operations employs over 600 staff in customer-facing call centres, network operations, network field engineers and support readiness teams. NBN Co will likely need to change and automate the way it reports, fulfils orders and provides self-service to RSPs, especially in a multi-technology environment.

Operating costs in network operations are usually expected to increase in order to support a more complex technology environment. However NBN Co's level of Operating Expenditure in the Corporate Plan is significant. Benchmarks with comparable multi-network wholesale telecommunications companies suggest there is substantial cost reduction potential in both ongoing operating and overhead costs for NBN Co. The Strategic Review therefore assesses that cost increases due to increased complexity can be more than offset by potential cost reductions.

3.2.9 Ongoing costs, including maintenance

Different technologies will have varying ongoing costs associated with them, such as power for active network components, maintenance (including remote, exchange-based and field repairs), and pole access and use. These are discussed in more detail in sections 3.4 - 3.6, and summarised below. Note that the figures below do not include any replacement capital expenditure. Costs associated with using Telstra ducts as set out under the Telstra DAs have also been excluded.

- FTTP, as a passive last-mile network, has relatively low maintenance requirements in the timeframes considered in this Review. Total ongoing costs for the access network (from

⁸¹ TeBIT 2013: IT operational expenditure benchmark of 2.6-2.9 percent of revenues. NBN Co IT expenditure is currently greater than 3 percent of theoretical revenue

the premises to the OLT port on the FAN) are estimated at ~\$9 per brownfields premises passed. FTTP uses more Telstra ducts than FTTN or HFC.

- Given FTTN utilises existing copper for last-mile network, significantly more ongoing maintenance is required, and allowed for in the modelling conducted by the Review. FTTN variable operating expenses are estimated at \$35-55 for the access network per brownfields Premises Passed per year, including \$10–20 for electricity and \$25-35 for corrective maintenance. FTTN uses less Telstra ducts than FTTP.
- Based on long-standing industry experience for the HFC network, variable operating costs of \$15-25 per premises per year for the access network are assumed across the network, including electric power for all active network components, corrective maintenance, and pole access and use. HFC uses less Telstra ducts than FTTP.

3.2.10 Pricing and product

FTTN, FTTB/dp, and HFC have some speed and quality of service limitations relative to FTTP and will support lower total revenues than a FTTP network. However, the decision on which technology to deploy should be taken on an area by area basis and this will be influenced by many factors such as the concentration of business premises in an area.

Relative to FTTP, FTTN if rolled out across the full fixed line footprint is estimated on average to support ~5 percent lower ARPU at rollout completion for residential, small business and small government premises. FTTB/dp and HFC will support roughly the same ARPU. In practice, especially for small business, revenue considerations will influence what technology is rolled out where.

Similarly, if rolled out across the full fixed line footprint, relative to FTTP, FTTN is estimated on average to support ~20 percent lower ARPU at rollout completion for medium business and medium government premises. FTTB/dp and HFC are both estimated to support ~17 percent lower ARPU than FTTP. A driver of these differences is a reduced ability to provide committed information rate products. In practice, revenue considerations for medium business will influence what technology is rolled out where.

In the modelling of different technologies for the purposes of the Strategic Review, no revenues were assumed for multicast (without a comprehensive business case) nor for point-to-point fibre for 'enterprise' scale business in FTTN, FTTB/dp, and the HFC footprint. To be conservative revenue has been scaled across all scenarios for FTTN, FTTB/dp and HFC. Business cases will be required to establish the potential for any 'upside' revenue.

In FTTN and FTTB/dp areas, the full FTTP revenues for cell-site access products are expected to be achieved as it will be possible to connect mobile cell towers of mobile network operators (MNOs) to NBN Co's fibre network. Cell-site access revenues in HFC areas are not included in any scenario as mobile sites within these HFC areas are already largely connected to existing fibre rings.

3.3 Radically redesigning FTTP

A radically redesigned FTTP deployment is estimated to cost [REDACTED] per brownfields premises passed⁸², representing a saving of [REDACTED] per premises passed relative to the Revised Outlook FTTP cost outlined in Section 2. The savings are based on:

Increased labour productivity associated with fundamental changes to the delivery model (as outlined above) is expected to save an average of [REDACTED] per premises passed across the rollout. This includes the realisation of experience benefits through improved learning and feedback loops, systematised in the new delivery model. The forecast saving is based on a 30 percent labour productivity improvement over four years, followed by 2.5 percent per annum thereafter.

As outlined in section 2, the current schedule of rates for design and construction activities is significantly higher than the Corporate Plan (for example, boring and trenching rates increased by ~70 percent), [REDACTED]

While there is no comprehensive view of field labour productivity within NBN Co, initial analysis suggests there are productivity losses in excess of 50 percent (for example, NBN Co and contractor data from Northern Territory, Victoria and Tasmania suggests there is an uplift potential of 35-75 percent by reducing waste and lifting performance to current top-quartile productivity). These losses also drive waste in design and overhead functions. Global benchmarks indicate 25-30 percent cost reductions to the network owner are achievable in a short period of time (for example, Verizon).

In the short term, contractors would likely capture the majority of any productivity improvements (given the fixed schedule of rates) with NBN Co benefiting from mitigating increases in rates and avoided claims. Once the delivery model changes outlined above in 3.2.1 are in force, with a design process providing a constructible, visible, committed flow of work, and industry confidence has been restored in the NBN Co rollout, annual price resets (such as those in place in the Chorus rollout in New Zealand) would enable NBN Co to share in the future productivity benefits.

Cost-efficient architecture and materials (a saving of [REDACTED] per premises passed) including reducing from 3 to 1.2 fibres per premises⁸³, increased use of aerial deployment, removal of PON protection, using smaller diameter fibre cables, use of gel-free cables and eliminating the battery back-up for the NTD⁸⁴; and

Cost-efficient construction techniques (a saving of [REDACTED] per premises passed) including [REDACTED], aerial extension methods and alternative customer drop implementation techniques optimising fibre testing at multipoint and usage of direct bury cable.

⁸² [REDACTED]

⁸³ Current architecture provides an option for 1.5 fibres per premise allocation in "low growth" FSAMs, however no FSAM has commenced construction under this option and the cost saving is not represented in the Corporate Plan.

⁸⁴ Assumes battery back-up still provided to Priority Assist customers.

Ongoing costs for the access network⁸⁵ are estimated at ~\$90 million per annum (~\$9 per brownfields premises passed). Costs associated with using Telstra ducts as set out under the Telstra DAs have been excluded.

3.4 FTTN and FTTB/dp

Vectored VDSL has not been deployed in Australia and therefore actual speeds are not known empirically. However, experience from Europe (adjusted for Australian gauge copper⁸⁶) suggests that a very high proportion of vectored VDSL premises can receive download speeds of ~50Mbps or more. Field tests will be needed to determine actual performance, and speed outcomes will depend on the ability to consistently deploy vectoring for all lines at a node.

Speeds will also depend on the quality and condition of copper plant. The Strategic Review did not have access to detailed or specific data on the quality of Telstra's copper network, so field tests and detailed network inventory data will be needed to make an accurate estimate of remediation costs as a next step beyond this Review. The Review assumes that significant copper remediation, particularly for bridge taps, will be needed to achieve speeds of 50Mbps and more for 90 percent of the fixed line footprint.

In aggregate the Strategic Review modelled, for rollout of FTTN across the full fixed line footprint, upfront remediation of ■ million lines followed by remediation and maintenance of a further ■ million lines each and every year. The costs of remediation and maintenance for more than 10 million copper lines over ten years are included totalling ■ billion if FTTN were to be deployed to the full fixed line footprint.

Experts and experience at 'VDSL operators' BT and KPN indicate that little to no remediation has been necessary in high-speed VDSL deployments including vectoring deployments. Their experience indicates that if analogue voice works satisfactorily, VDSL will also work satisfactorily in most cases, as the analogue voice signal is more sensitive to noise and poor copper quality than digitised signals such as VDSL.

VDSL is, however, susceptible to the presence of bridge taps, whereas analogue voice is not. Significant and conservative remediation and maintenance estimates, reflecting the limited information available to date, have therefore been modelled in two parts:

- It is known that Australia's copper network has bridge taps - various industry sources indicate that a substantial percentage (around ■ percent) of copper lines in the Australian access network have bridge taps that would require remediation to enable consistent 50 Mbps performance of vectored VDSL. As the Strategic Review did not have access to Telstra data on the state of the copper network, this estimate will need to be verified or refined based on Telstra data.

Cost estimates used in the Strategic Review assume that a substantial percentage (■ percent) of copper lines are proactively remediated to remove bridge taps and fix poor joints. This would equate to ■ million lines if FTTN were rolled out for the full fixed footprint. The cost for remediation would be ■ million if efficiently coordinated and based on data that identifies bridge taps and bad joints. Industry sources indicate Telstra can provide test results and network inventory information that allow for this proactive

⁸⁵ Access network is defined as from the premises to the OLT port on the FAN

⁸⁶ Approximate adjustments of observations in other geographies adjusted from 0.5mm copper in those geographies to 0.4mm copper common in Australia. Other environmental factors vary, so observations are not predictive of performance in Australia, and local field tests will be required to determine performance

approach. Such an approach is preferred to remediation undertaken reactively on a line-by-line basis, for which the cost to remediate the same lines would be █████ million. In the alternative scenarios considered in the Strategic Review, remediation costs are adjusted in proportion to the extent to which the fixed footprint is served with FTTN.

- As previously described, if analogue voice works well then VDSL is likely to work well – likewise, if analogue voice works poorly then there is likely a need for further remediation of the copper line to improve VDSL performance. The Australian Communications and Media Authority (ACMA) reports the current fault rate for telephone services on the entire copper network at ~17 percent. The portion of faults on the local access network is not reported; however at some European network operators less than one fifth of all faults have been in the local access network. Given uncertainty about quality of Australian copper, the Strategic Review assumes that half of reported faults are in the local access network and will require remediation. The cost of this additional ongoing copper remediation would be █████ million annually as part of ongoing maintenance, if FTTN were deployed across the full fixed line footprint.

The base case assumed for FTTN modelling, including the remediation levers described above, is that 88 percent of the fixed line footprint could receive download speeds of ~50Mbps and upload speeds of ~20Mbps on a full rollout of FTTN. However, NBN Co could decide on an alternative configuration, raising upstream speed at the expense of downstream speed.

Empirical field data will be needed to refine these estimates. For example, as a sensitivity to the base case: if, despite the remediation described above, field data shows that premises more than 400 metres from nodes are not achieving 50Mbps, then an additional █████ percent of FTTN lines would require remediation. Across the entire FTTN footprint this would cost █████ million if undertaken reactively assuming relatively quick fixes (3 hours of labour). In the alternative scenarios this cost is adjusted in proportion to the extent to which the fixed footprint is served with FTTN.

For distribution areas in which copper performance is very bad or in which poor copper is highly concentrated, it could be more economical to use FTTdp instead of FTTN.

The timing and method of cut-over to the NBN (on activation of a premises) will impact NBN Co's costs and revenues. There are also likely to be significant cut-over issues that affect the implementation that will need to be considered in a regulatory response. In the Strategic Review a cut-over in periodic batches is assumed. This limits cut-over costs to █████ per premises connected and requires customers to wait two to three weeks after ordering, in addition to requiring operational coordination. Cut-over on demand is estimated to cost up to █████ per premises connected.

Construction costs for an FTTN network are estimated to be in the order of █████ per premises passed assuming current Australian practice of CPE provision by the RSP or customer, batched cut-over, and remediation as described above. Centralised costs including OSS/BSS, transit network construction costs, and contingencies are excluded from this amount. FTTN costs will vary by premises type and distribution area.

Approximately 12,000 MDU buildings containing ~1 million premises in total could be served by FTTB, providing speeds up to 75Mbps for MDUs of 30-40 premises or more, saving \$450–500 per premises passed in these MDUs relative to FTTP. Deploying FTTB will add substantial operational complexity. This complexity will need to be weighed against the complexity of using other technologies in large MDUs. Use of 48 port FTTdp within 200 metres of premises is estimated to cost █████ per premises passed and is proposed in dispersed residential areas where FTTN speeds are unsatisfactory and FTTP costs are higher.

FTTN variable operating expenses are estimated at \$35-55 for the access network per brownfields Premises Passed per year, including \$10–20 for electricity and \$25-35 for corrective maintenance. The basis for the ongoing corrective maintenance estimates is described above.

The primary upgrade paths from FTTN that can be foreseen at present include upgrading to FTTP, and upgrading to FTTdp (emerging technology such as G.Fast has shown speeds of 1Gbps over short loops under 100 metres in tests).

If FTTP is chosen as an upgrade path: At the average Cost Per Premises for Capital Expenditure and Operating Expenditure for FTTN and for Radically Redesigned FTTP discussed in this Review, it will be more economical to first build FTTN then upgrade later as long as FTTN can be used for several years before upgrading. Specifically, the 10-year present value of costs at an 8% discount rate is lower to build FTTN now and later upgrade to FTTP provided FTTN is used for more than 5 years before upgrading and distribution fibre can be re-used.

If FTTdp/G.Fast is chosen as an upgrade path from FTTN, the same principle applies – building FTTN now and upgrading to FTTdp/G.Fast later could have lower present value of costs than building FTTdp in the first instance. The evolution of copper technology and likely deflation of active equipment may make FTTdp an even more economical option in future than it is today.

There is option value in waiting for future upgrades provided that assets are re-used and waste is limited. NBN Co expects that the transit network as planned, and distribution fibre used for FTTN, can be leveraged for future access technology. Since active DSLAM equipment is expected to be replaced on a 7-year cycle, the amount of waste incurred by upgrading to future technologies can be limited.

As discussed in Section 3.2.4, the scenario analysis for the Strategic Review has assumed voice will be provided via CPE that uses VoIP. The modelling for FTTN assumes that voice customers will migrate from the PSTN to an NBN-enabled VoIP solution, with CPE provided by the RSP. ■

3.4.1 Co-funded FTTP

The Strategic Review did not consider the issue of co-funded FTTP.

However, NBN Co presently runs a number of programs which enable augmentation and customisation of the network including Network Extensions⁸⁷ and Co-developments⁸⁸.

Network extensions include:

- Adjacent Fibre Network Extensions - covering individual or multiple premises located on the edge of a fibre serving area module;
- Large Fibre Network Extensions - covering small communities or towns that are not planned to be serviced by fibre; and
- Fixed Wireless Network Extensions - covering small communities or towns that are planned to be serviced by satellite services

Network Extensions are available where they can be built, in an appropriate timeframe taking into account NBN Co's construction program, using NBN Co's standard reference architecture and

⁸⁷ www.nbnco.com.au/assets/documents/network-extension-policy.pdf

⁸⁸ www.nbnco.com.au/communities/co-development-with-nbn-co.html

construction methodology, in accordance with all applicable environmental and planning laws, and where the costs of the extension is funded by the applicant.

The Co-development program aims to minimise construction impacts on the community by identifying and leveraging any planned infrastructure projects. Construction of the NBN involves infrastructure works in public streets, roads and highways. This work typically includes all activities required to install optical fibre cable and any related equipment to provide broadband connectivity to individual homes and businesses. This can involve the construction of new pits and conduits that are generally located under footpaths. Co-developments can reduce disruption and lower costs for all parties.

Both the Network Extension and Co-development programs could continue, and be expanded, under a revised SOE. Some areas to be further explored include:

- A delay on doing any FTTP extensions in FTTN/B/dp or HFC areas until it is commercially viable to do so whilst ensuring that the construction program does not get impacted; and
- Considering expressions of interest from third parties to present innovative commercial proposals to provide fibre to the premises in relevant areas.

3.5 HFC

Collectively, Telstra and Optus HFC networks pass ~2.7 million premises. A further ~0.7 million premises are in the geographic area bounded by the networks, but currently not passed. Completing the construction of the HFC network to connect all premises within the geographic area that both networks bound would provide fast broadband to up to ~3.4 million premises. [REDACTED]

[REDACTED] The table below categorises premises within the HFC footprint:

Exhibit 3-2: Categories of premises within the HFC footprint (number of premises, millions)

HFC footprint			
	Telstra	Optus	Both networks overlapped
Premises passed by HFC that have a coax lead-in	1.7	0.9	2.5
Premises passed by HFC which have no coax lead-in	1.0	0.3	0.2
Premises not passed by HFC	0.7	1.1	0.7
Total potential HFC premises	3.4	2.3	3.4

HFC operates on spectrum shared by users, so while maximum download speeds above 50Mbps are already possible (up to 100Mbps is already available in Australia), capacity will need to be increased over time to accommodate growth in number of users and data usage per user. International and Australian benchmarks suggest a current peak contribution per user of 200-880 Kilo-bits-per-second (Kbps) which represents the average unconstrained download rate across all users on the network at peak usage times. The Review assumes capacity investments to serve all potential HFC premises providing for 18-30 percent growth in broadband bandwidth per user per annum and increased usage of streamed video by 2019, leading to a peak contribution per

subscriber of 4-7Mbps downstream by 2019. Expanding capacity to accommodate this peak use would enable a user experience consistent with 50Mbps downstream or greater.

The Review assumes that to increase capacity on the HFC network, NBN Co:

- Reallocates the unused portion of downstream spectrum (14x8 MHz);
- Reallocates the DOCSIS 1.1 capacity to support additional upstream and downstream capacity on DOCSIS 3.0;
- Upgrades upstream channels to 64QAM;
- Upgrades downstream channels to 256QAM; and
- Splits nodes.

Upload speeds observed for other operators internationally are typically at a 1:10 or 1:20 ratio to download speeds. In a hypothetical band plan for a NBN HFC network, it would be possible to allocate 7x6.4MHz channels at 64QAM for upload, allowing up to a 1:3 ratio of upload to download speed (for example 40Mbps upload to 120 Mbps download, more commonly described in reverse as 120/40 Mbps).

Potential future options for further capacity expansion beyond 4-7 Mbps peak contribution include:

- Building out the network from 750MHz to 1 GHz, providing access to another 30 8MHz channels (adding 1.5Gbps at 256 QAM). This could be done concurrent with upgrading to DOCSIS 3.1, expected in 2017, to allow expansion of upstream capacity concurrent with expansion of downstream capacity.
- In relation to the Telstra HFC network, should Foxtel agree at some point in time to move off HFC, this would free up another ~30 8MHz channels.

Total Capital Expenditure to configure the HFC network to deliver above 50Mbps or more in 2019, pass and connect the entire HFC footprint is [REDACTED]. This equates to [REDACTED] per premises based on Corporate Plan premises excluding OSS/BSS costs.

Variable operating costs of \$15-25 per premises per year for the access network are assumed across the HFC network, including electric power for all active network components, corrective maintenance, and pole access and use. This is based on current operating cost levels and assumes no synergy between the two networks.

As discussed in section 3.2.4, the scenario analysis for the Strategic Review has assumed voice will be provided via CPE that uses VoIP. It assumes that, as for FTTP areas, Telstra will continue to maintain and operate the existing copper plant only insofar as required to maintain special services (discussed in section 3.2.5), and that a similar disconnection and migration framework applies to Telstra and Optus as exists today in relation to disconnection and migration to FTTP. The modelling for HFC assumes that voice customers will migrate from the PSTN to an NBN-enabled VoIP solution, with CPE provided by their RSP. [REDACTED]

[REDACTED]

3.6 Fixed Wireless and Satellite

NBN Co is currently planning to use Fixed Wireless and Satellite technology to serve 7 percent of premises outside of the 'fixed footprint', in rural and low-density locations. It is planning to deploy two satellites as part of a long-term Satellite strategy and 1,392 Fixed Wireless base stations. Another ~200 base stations are slated for construction with their location to be determined based on need informed by actual uptake.

Customers are taking up Fixed Wireless and Satellite faster than planned. Under a 'business as usual' model, NBN Co will need to add another 800 base stations and possibly an additional Satellite if current levels of demand continue, contributing to the increased cost described in section 2.

The allocation of customers to the Fixed Wireless and Satellite footprint requires further consideration. For example, FTTN could be used in some areas currently planned to be served by Fixed Wireless and Satellite. An initial estimate identifies ~55,000 premises that could be shifted from Fixed Wireless provision to FTTN provision, and ~45,000 premises from Satellite provision to FTTN provision. At least 90 percent of the customers in these ~100,000 premises are within copper loop distances sufficient to receive ~25Mbps. This would free up capacity on both platforms and as such it is likely to mitigate capacity upgrade costs. Costs avoided are potentially [REDACTED] million by not building [REDACTED] base stations, [REDACTED]

In the current fixed footprint there are also premises planned to be served by FTTP that could be most cost effectively served by Fixed Wireless. An early estimate suggests Fixed Wireless may be less expensive than FTTN and FTTP in ~450 geographic distribution areas (~10,000 premises). Shifting these customers would yield potential savings to NBN Co of up to [REDACTED] million, and more work will be undertaken to investigate this following the Strategic Review.

4

Comparative evaluation of alternative scenarios

4 Comparative evaluation of alternative scenarios

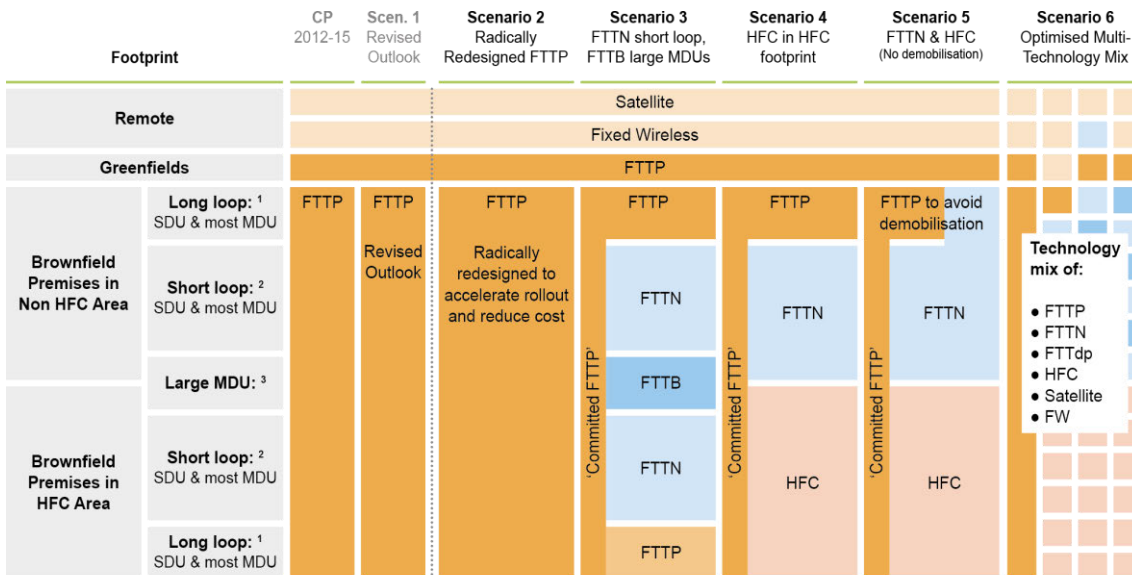
The strategic, economic and operational analysis of each of the technologies outlined in section 3 provides the information base on which to consider the appropriate strategic direction of the NBN. Given the nature of the work conducted, the findings of the Strategic Review should not be interpreted as targets or operational directives. Setting targets and operational directives will require more detailed work once the strategic direction has been agreed.

The implementation of these technologies will be highly dependent on a range of issues identified in the Strategic Review. These include NBN Co's ability to transform its organisation and operations, contractual renegotiations with Telstra, Optus and others and the timing of regulatory approvals and policy adjustments.

4.1 Overview of scenarios

The Strategic Review examined six scenarios based on deploying different technology mixes. These are shown in the following exhibit.

Exhibit 4-1: Technology scenarios considered in the Strategic Review (illustrative diagram)



1. Long loop areas are defined as copper pillar serving areas where less than 90% of premises in the area are within 400m of the pillar (~80% of the fixed footprint)
 2. Short loop areas are defined as copper pillar serving areas where 90% of premises in the area are within 400m of the pillar (~20% of the fixed footprint)
 3. Large MDUs are defined as those with 30-40 or more units

A description of each scenario is as follows:

- **Scenario 1: Revised Outlook** – This is the approach taken by NBN Co to date, outlined in section 2, with 93 percent of the population served by FTTP in the fixed line footprint, and 7 percent by Fixed Wireless and Satellite;
- **Scenario 2: Radically Redesigned FTTP** – In this scenario, NBN Co continues to roll out fibre to all premises within the fixed line footprint and makes radical changes to improve its productivity, architecture, materials and construction techniques to increase rollout speed and decrease costs;
- **Scenario 3: FTTN short loop/FTTB large MDUs** – In this scenario (as in all others), NBN Co rolls out fibre to premises where it has already committed to do so. Beyond that, in the fixed line footprint, FTTB would be rolled out to ~1 million premises in large MDUs (more than 30-40 units) and FTTN to ~1.5 million premises in short loop areas (areas where over 90 percent of premises are within 400 metres of the pillar);
- **Scenario 4: HFC in HFC footprint** – In this scenario, NBN Co rolls out all committed FTTP, then connects all remaining premises within the 'HFC footprint' using HFC. Outside of the HFC footprint, all short loop areas would have FTTN, and long loop areas would have FTTP;
- **Scenario 5: FTTN and HFC (no demobilisation)** – In this scenario, NBN Co will deliver some form of technology to all homes as fast as possible. In HFC areas, the fastest rollout will be by completing the lead-ins required and filling in gaps in the footprint with HFC. For areas outside the HFC footprint, the fastest rollout would most likely be achieved with FTTN. However, all committed FTTP will still be rolled out, as will an additional amount of FTTP (mostly in areas with longer loops) so that construction can continue while FTTN ramps up. In total, under this scenario, FTTP will reach ~1 million brownfields premises; and
- **Scenario 6: Optimised Multi-Technology Mix** – There are many ways for NBN Co to deliver a multi-technology approach. In this scenario, NBN Co selects which technologies will be rolled out on an area-by-area basis, in a way that minimises peak funding and maximises long term economics, while delivering 50Mbps to a significant proportion (~90 percent) of the fixed line footprint by end of CY19 (covering all areas, both broadband-served and –underserved). The technology selection by area takes into account:
 - The earliest available technology that provides a certain speed for that area;
 - The relative cost position (build Capital Expenditure, ongoing Capital Expenditure and Operating Expenditure) of the various technologies;
 - The constructability in relation to neighbouring areas;
 - The implications on future revenue realisation; and
 - The potential future upgrade path.

All scenarios assume a more effective funding model of FTTP deployment in greenfields over 100 premises in the fixed line footprint.

In addition, scenarios 2 to 6 have been modelled using a 20% contingency on all Capital Expenditure (compared to 10% on all Capital Expenditure in the Corporate Plan and Revised Outlook). The higher contingency reflects the inherent risk and complexity associated with projects of this size and scale as evidenced by global experience, and the findings of the Independent Assessment in the Revised Outlook.

Scenario 6 gives priority in time to serving areas with poorer current broadband service. These areas have been modelled based on 8 to 10 percent of the fixed line footprint. Additional costs have been estimated to allow for areas to be prioritised in time where in those areas in the fixed line footprint there is very limited availability of broadband, for example notable gaps in ADSL coverage without access to alternative broadband services. It is assumed any prioritisation will take into account reasonable operational efficiency considerations, such as needing to rollout in contiguous workfronts and dealing with an area as a whole. Following the completion of the Government's review of under-served areas, NBN Co will consider further the impact of prioritising these areas in the rollout. All other scenarios approach areas of service in a roughly even timing across the years of the rollout.

Scenario 6 also assumes alternative technologies such as FTTN might be used in small areas of the Fixed Wireless and Satellite footprint.

The preferred choice of technology for MDUs in a particular area will depend on a range of factors including the technology in the surrounding area, ability to access the building and relative cost. For example, for MDUs containing more than 30-40 units in an FTTP area, there is a cost advantage of using FTTB instead of FTTP assuming similar building approval processes. NBN Co will evaluate the appropriate technology for MDUs in a particular area as part of the network design process.

Scenario 3 assumes that MDUs containing more than 30-40 units will be served by FTTB. For smaller MDUs (i.e. less than 30-40 units), on average, there is no technology cost advantage to FTTB over FTTP, assuming building approval processes are similar between technologies, so these are costed as served by FTTP (i.e. fibre run to individual units).

In all other Scenarios, the cost assumption is that units within MDUs will be served with the same technology as neighbouring single dwelling units. For MDUs in an FTTP area, fibre will be run to individual units, for MDUs in an FTTN area individual units would be served by their existing copper lines to a node outside the MDU building, and in an HFC area units would be served by HFC. In practice though, the choice to use FTTB to drive further cost benefits over FTTP or HFC for large MDUs would be a consideration for local roll out planning.

The following section describes in more detail the assumptions and technology outcomes of Scenario 6, the Optimised Multi-Technology Mix. The performance and financial outcomes of all scenarios are then compared.

4.2 Optimised Multi-Technology Mix scenario

There are many ways to optimise a multi-technology FTTx approach. The Optimised Multi-Technology Mix scenario for which performance and financial outcomes are described in this document focuses on a solution that minimises peak funding and optimises long term economics, while delivering 50Mbps to a high proportion of the fixed line footprint (~90 percent by 2019, both broadband-served and -underserved). It considers the impact of a range of criteria, including capital and operating expenses, labour capacity, likely speeds available, take-up rates for broadband products and ARPU in around 70,000 defined geographic distribution areas. For the remaining ~10 percent of premises not served with 50Mbps by 2019, it seeks to serve those with 25Mbps.

The Optimised Multi-Technology Mix scenario allocates technology in order to meet these criteria. As a result, the model which underpins the scenario may recommend that neighbouring distribution areas be served by differing technologies. The Strategic Review noted that NBN Co will need to factor in practicalities (including whether it prefers to roll out similar technologies in contiguous areas) when making decisions about the network, which may alter the approach for a small number of geographic distribution areas.

It is critical to note that if NBN Co is required to optimise a multi-technology approach for different criteria, then different financial and performance outcomes will result. For example, if specific geographies are required to be favoured beyond those estimated in the Optimised Multi-Technology Mix Scenario described, then different (higher) costs will result. Following the completion of the Government's review of under-served areas, NBN Co will undertake to further consider the impact of prioritising these areas on the rollout.

4.2.1 Assumptions

The Optimised Multi-Technology Mix scenario described here assumes:

- Premises already passed or connected using fibre will retain fibre;
- Construction 'committed' by NBN Co remains committed and the associated premises will receive a fibre-based solution;
- NBN Co will have access to HFC in the second half of CY15 – with fill-in and lead-in work being completed in four subsequent years. In areas where HFC needs fill-ins, the model considers whether FTTP or HFC provides the optimal outcome depending on the revenue potential;
- FTTN deployments will commence in the second half of CY15 with a small trial and then scale up to full rollout speed by early CY18;
- FTTdp deployment will commence in the second half of CY16 using vectored VDSL. A potential future upgrade to G.Fast is not taken into account; and
- The Fixed Wireless and Satellite footprint may change, as FTTN is available in part of that footprint.

4.2.2 Optimised Multi-Technology Mix (Scenario 6)

The exhibit below summarises the Optimised Multi-Technology Mix that Scenario 6 would deliver.

Exhibit 4-2: Optimised Multi-Technology Mix rollout

Optimised multi-technology mix rollout						
Technology	End of CY16			End of rollout (CY20)		
	Premises ('000s)	% of all premises	% of all premises in relevant footprint	Premises ('000s)	% of all premises	% of all premises in relevant footprint
FTTP	1,330	12%	13%	2,890	24%	26%
FTTN	550	5%	5%	3,620	30%	32%
FTTdp/B	-	-	-	1,380	11%	12%
HFC	2,610	23%	25%	3,270	28%	30%
Not passed	5,980	53%	57%	-	-	-
Total fixed line footprint	10,480	93%	100%	11,180	93%	100%
FTTN (remote footprint)	-	-	-	100	1%	10%
Fixed Wireless	450	4%	57%	430	3%	53%
Satellite	340	3%	43%	320	3%	37%
Total remote footprint	790	7%	100%	850	7%	100%
Total (Australia)	11,270	100%		12,030	100%	

The technology mix reflects the following considerations:

- HFC** will be provided to premises in the HFC footprint [REDACTED]
 [REDACTED]
 [REDACTED];
- FTTP** will continue to be built up in brownfields areas to CY18 to provide FTTP where it is the most economical choice: either because of high revenue potential (especially in business areas) or because of the high cost associated with deploying FTTN/dp. This also takes into account certainty of supply to the construction industry while NBN Co prepares for the construction of alternative technologies. This could result in a 'patchy' FTTP rollout in some areas, contributing an incremental cost of less than \$300 million over the rollout period. FTTP rollout has been modelled for greenfields and fibre-on-demand beyond CY18;
- FTTN** is concentrated in areas with relatively short-loop lengths and (relative to FTTP), lower revenue potential. FTTdp will complement the FTTN rollout in long-loop areas towards the end of the build;

- **FTTB** may be used – especially for large MDUs depending on the relative complexity of installing the competing technologies; and
- **Fixed Wireless and Satellite** will serve 6 percent of premises by the end of CY19. About 100,000 premises planned in the current Fixed Wireless and Satellite footprint could be better served by FTTN, and about 10,000 premises in the current fixed line footprint could be served at lower cost by Fixed Wireless. These changes may substantially reduce the demand for Fixed Wireless and Satellite capacity and therefore the need for high-cost capacity expansions, such as new Fixed Wireless base stations and a third satellite. While the scenario takes these savings into account, a more detailed cost-benefit analysis is suggested for the affected geographic distribution areas.

4.3 Performance outcomes of the different scenarios

4.3.1 Approximate regional technology allocation and deployment timing

The exhibit below sets out the Optimised Multi-Technology Mix share and expected speed mix for the entire network deployment.

Exhibit 4-3: Deployment timing, technology allocation, and performance outcomes by scenario

Deployment timing by scenario						
	Scenario 1: Revised Outlook	Scenario 2: Radically Redesigned FTTP	Scenario 3: FTTN short loop, FTTB large MDUs	Scenario 4: HFC in HFC footprint	Scenario 5: FTTN & HFC (no demobilisation)	Scenario 6: Optimised Multi- Technology Mix
Deployment completed by end	CY24	CY23	CY22	CY21	CY20	CY20
Technology used by scenario in fixed line footprint at the end of rollout						
FTTP	100%	100%	87%	63%	19%	26%
FTTN/dp/B	0%	0%	13%	5%	48%	44%
HFC	0%	0%	0%	32%	33%	30%
Performance outcomes in the fixed line footprint						
Premises with access to download speed by CY16 (% of fixed line footprint)						
- 25Mbps	22%	19%	23%	48%	45%	43%
Premises with access to download speed by CY19 (% of fixed line footprint)						
- 25Mbps	57%	56%	67%	87%	94%	96%
- 50Mbps	57%	56%	67%	87%	87%	91%
- 100Mbps	57%	56%	55-65%	80-85%	60-75%	65-75%
Premises with access to download speed by end of deployment (% of fixed line footprint)						
- 25Mbps	~100%	~100%	~100%	~100%	~100%	~100%
- 50Mbps	~100%	~100%	~100%	~100%	~92%	~97%
- 100Mbps	~100%	~100%	85-95%	95-100%	60-75%	65-75%

- **Scenarios 5 and 6** complete the rollout in CY20 – the fastest deployment of all scenarios and ~4 years faster than the Revised Outlook. This rapid deployment is driven by the extensive use of FTTN and HFC which is faster to roll out than FTTP;
- **Scenarios 4, 5 and 6** deliver the greatest proportion of the fixed line footprint with 25Mbps by the end of CY16: 43-48 percent. This is mostly driven by the rapid inclusion of HFC in the NBN footprint;
- In **Scenarios 5 and 6**, for the last 2 percent of the fixed line footprint (~200,000 premises), the incremental cost of delivering 25Mbps rather than ~12Mbps by CY20 is approximately \$2-3 billion which is included in the range of financial outcomes described below;
- **Scenarios 4, 5 and 6** deliver the greatest proportion of the fixed line footprint with 50Mbps by the end of CY19: 87-91 percent (although the rollout continues beyond this date); and
- **Scenarios 1 to 4** all deliver 50Mbps to 100 percent of the fixed line footprint at the end of the rollout. Given the use of FTTN in longer-loop areas in scenarios 5 and 6, they deliver 50Mbps to more than 90 percent of the fixed line footprint at the end of the rollout.

In all scenarios, 25Mbps will be available in the remote footprint from CY16 onwards, after the Satellites are launched. It must be noted that the overall capacity to serve customers outside the fixed-line footprint with 25/5Mbps service is limited. If more than ~50 percent of premises sign up for Fixed Wireless, the Strategic Review noted that NBN Co will have to put in place a more stringent fair use policy (FUP). In the Satellite footprint, an FUP will be needed in any case to manage congestion.

The rollout could also be optimised to achieve other objectives, as discussed in section 4.4.2.

4.3.2 Upgrade paths

The scenarios described above all provide clear upgrade paths to higher speeds and better quality of service for all premises served.

In the Optimised Multi-Technology Mix, at least 65 percent of premises in the fixed line footprint will have access to 100Mbps or faster services at the end of the rollout in CY20. In fact, the actual proportion of premises with access to these speeds will be higher as, in addition to premises passed by HFC, FTTP and FTTPd, a sizeable number of FTTN customers may get 100Mbps services. This will depend on the distance from their premises to the pillar, and the copper quality.

Exhibit 4-4 summarises the present value of cost for three different upgrade paths relative to the cost in each of building FTTP immediately. While there are multiple possible upgrade paths and timing of build and upgrades can be spread out over time, the calculations in the exhibit assume for simplicity that each initial build and future upgrade occurs in a single year for the whole footprint.

Exhibit 4-4: Illustrative upgrade paths: Optimised Multi-Technology Mix in the fixed line footprint

Illustrative upgrade paths: Optimised Multi-Technology Mix in the fixed line footprint					
Upgrade path	Technology needing upgrade (millions of premises)	Technology upgraded to	Hypothetical upgrade timing ⁸⁹	NPV of savings of an upgrade approach vs. building FTTP now (\$billions) ⁹⁰	
Path to 100Mbps download	FTTN (3.6)	FTTdp	CY20		~2
Path to 250Mbps download	FTTN (3.6)	FTTdp with G.Fast	CY25		~5
	FTTdp (1.4)	FTTdp with G.Fast			
	HFC (3.3)	DOCSIS 3.1 / 1 GHz spectrum			
Path to 1000Mbps download	FTTN (3.6)	FTTP	CY30		~4
	FTTdp (1.4)	FTTP			
	HFC (3.3)	FTTP			

As an example, Exhibit 4-5 outlines how the NPV of savings from the upgrade approach is calculated for the upgrade of FTTN to FTTdp to achieve 100Mbps download speed across an entire area.

The cost of deploying FTTP now to 3.6 million premises is based on the 'Radically Redesigned FTTP' average unit cost, and equates to around \$8 billion in present value.

This is compared to the cost of deploying FTTN now to 3.6 million premises and later upgrading to FTTdp, which in aggregate equates to around \$7 billion in present value:

- The cost of deploying FTTN to 3.6m premises now is based on the average unit cost of FTTN, and equates to around \$2 billion in present value;
- The cost of upgrading these premises to FTTdp so that all have access to speeds of 100Mbps in CY20 is based on the average unit cost to deploy FTTdp, less the cost of infrastructure that can be reused (primarily, the distribution network);
- Additional incremental operating expenditure is included, where it is required to support FTTN and FTTdp (for example, electricity and copper maintenance) above and beyond the operating expenditure associated with FTTP.

The NPV saving of ~\$2 billion is based on a discount rate of 8 percent. If a discount rate of 10% or higher were used, as is common in the telecommunications industry, the NPV of an upgrade strategy (rather than deploying FTTP now) would be higher.

⁸⁹ As assumed for the calculation of the net present value of an approach to upgrade from a base technology rather than build FTTP now

⁹⁰ Calculated as present value of capital expenditures, plus incremental operating expenditures for each technology minus cost of building FTTP in 2014, using 8% discount rate. Assumes "Radically Redesigned FTTP" average unit cost for FTTP and average unit costs for FTTN, FTTdp, and HFC, with 1% deflation of equipment and 2.5% labour productivity per year. Assumes full build and upgrade in one year for simplicity of comparison.

Exhibit 4-5: Illustrative example of deploying FTTN now and upgrading to FTTdp in CY20 rather than deploying FTTP now

NPV savings example

	Present value (\$ billion)
Cost of deploying FTTP now to 3.6 million premises	~8
Cost of deploying FTTN now and upgrading FTTdp in CY20 comprised of:	
Cost of deploying FTTN to 3.6 million premises CY14	2
Cost of incremental FTTN operating costs (CY14 – CY20)	1
Cost of upgrading 3.6m premises from FTTN to FTTdp (CY20)	2
Cost of incremental FTTdp operating costs (CY21 – CY30)	1
Total Cost of deploying FTTN now and upgrading to FTTdp in CY20	~6
Net present Value (NPV) of the savings of an upgrade approach vs deploying FTTP now	~2

As described in section 3, building an FTTN network now and upgrading later in many areas is financially attractive if FTTN is used for more than five years before upgrading. This is also reflected above, which shows significant cost savings (expressed in present value) of building a base technology now and upgrading later, rather than building FTTP now in those areas⁹¹.

It is not possible to predict the future evolution of demand for broadband speed. However, a recent study commissioned by the Broadband Stakeholder Group in the UK⁹² assessed that the need for download speeds would be ~20Mbps in CY23 for the median UK household and ~40Mbps for the top one percent of households. This suggests upgrades to the Optimised Multi-Technology Mix scenario would not be needed before CY23.

In summary, the Optimised Multi-Technology Mix scenario provides a credible upgrade path to download speeds from 100-1,000Mbps to the fixed line footprint, although it is not likely to be needed until after CY20. In addition, the option value of timing the upgrade only when needed is substantial.

⁹¹ Calculated as present value of capital expenditures, plus incremental operating expenditures for each technology minus cost of building FTTP in 2014, using 8% discount rate. Assumes "Radically Redesigned FTTP" average unit cost for FTTP and average unit costs for FTTN, FTTdp, and HFC. Assumes full build and upgrade in one year for simplicity of comparison.

⁹² Robert Kenny & Tom Broughton, Broadband Stakeholder Group, 'Domestic demand for bandwidth – an approach to forecasting requirements for the period 2013-2023', November 2013

4.4 Financial outcomes of the different scenarios

4.4.1 Network-wide financial outcomes

The exhibit below sets out the relative performance of the different scenarios in terms of financial outcomes. Undertaking financial modelling over a 30 year time frame, particularly based on emerging technologies, does not provide for robust absolute numbers. What is more important is the relative performance between scenarios, which supports high-level strategic decision making.

Exhibit 4-6: Financial outcomes (rounded), including Fixed Wireless, Satellite and greenfields (1)

Financial outcomes for Scenarios 1-6						
	Scenario 1: Revised Outlook	Scenario 2: Radically Redesigned FTTP	Scenario 3: FTTN short loop, FTTB large MDUs	Scenario 4: HFC in HFC footprint	Scenario 5: FTTN & HFC (no demobilisation)	Scenario 6: Optimised Multi- Technology Mix
Date of first positive free cashflow (2)	FY25 - ~FY40	FY25-27	FY24-25	FY22	FY22	FY22
Cumulative FY11-21						
Revenue (3)	\$10bn	\$9bn	\$11bn	\$16bn	\$16bn	\$18bn
Opex	\$23bn	\$23bn	\$24bn	\$26bn	\$27bn	\$27bn
Capex	\$43bn	\$35bn	\$36bn	\$36bn	\$29bn	\$30bn
Peak funding (equity and debt) (4)	~\$73bn	~\$64bn	~\$59bn	~\$51bn	~\$43bn	~\$41bn
Peak funding (all equity)	~\$63bn	~\$54bn	~\$52bn	~\$47bn	~\$40bn	~\$39bn
Cumulative Capex FY11-24 (Incl. replacement capex)	\$56bn	\$44bn	\$43bn	\$40bn	\$34bn	\$33bn
Steady state financial performance (FY28)						
Revenue	\$6.6-7.5bn	\$6.6-7.5bn	\$6.5-7.4bn	\$6.4-7.4bn	\$6.2-7.0bn	\$6.3-7.2bn
Opex	\$2.4bn	\$2.4bn	\$2.5bn	\$2.5bn	\$2.6bn	\$2.6bn
EBITDA	\$4.1-5.1bn	\$4.1-5.1bn	\$4.0-4.9bn	\$3.9-4.8bn	\$3.6-4.4bn	\$3.7-4.6bn
Capex	\$1.9bn	\$1.1bn	\$1.1bn	\$1.1bn	\$1.0bn	\$1.0bn
IRR (FY10-40) – Revenue Trajectory A*	2.5%	4.0%	4.1%	4.7%	4.9%	5.3%
IRR (FY10-40) – Revenue Trajectory B*	n/a	1.7%	1.9%	2.5%	2.6%	3.1%

Notes:

The Strategic Review assessed the revenue trajectory of NBN Co to be significantly below the trajectory described in the Corporate Plan. Two alternative trajectories were assessed. Trajectory A represents a telecommunications market without significant change, and includes real wholesale residential ARPU decline to NBN Co of 0.3 percent per annum. Trajectory B has lower NBN Co revenues even than Trajectory A. Trajectory B might result from a range of market changes. It includes real wholesale residential ARPU decline to NBN Co of 2.5 percent per annum.

The Corporate Plan and the Revised Outlook include a 10 percent contingency on Capital Expenditure. However, to ensure a relative level of conservatism, a 20 percent contingency has been included for Scenarios 2-6.

- All numbers in the table are estimates and subject to change. Further, all numbers are subject to finalisation of agreements with Telstra and Optus (including ACCC approval). To allow a direct comparison of costs between Scenarios 5 and 6, the financial modelling has assumed for both scenarios that FTTdp and FTTP are available, and used, in order to increase the fraction of premises attaining 25Mbps or greater from 98% to ~100%.
- The year during which free cashflows become positive.
- The average range between the higher and lower case revenue estimates is ~\$300 million in cumulative revenues FY11-21. The figures in the table represent the average
- Total funding consists of equity funding plus net debt as at the end of the year for which total funding is at its peak. For the Revised Outlook equity funding is capped at \$30.4 billion. For all other scenarios, equity funding is capped at \$29.5 billion in accordance with the Government's policy statement with any further funding requirements assumed to be met by debt funding in both cases.

* The IRR includes an enterprise valuation in 2040 at 6x EBITDA. The Cost-Benefit Analysis proposed by the Government may draw different conclusions once estimates of social benefits of the NBN are made and offset against opportunity costs.

One aspect of the Optimised Multi-Technology Mix scenario is increasing the proportion of premises in the fixed line footprint receiving 25Mbps by the end of deployment. At a very high level estimate, the cost of providing 25Mbps rather than ~12Mbps to the last 2 percent of premises in the fixed line footprint is ~\$2-3 billion.

In summary, the table shows that:

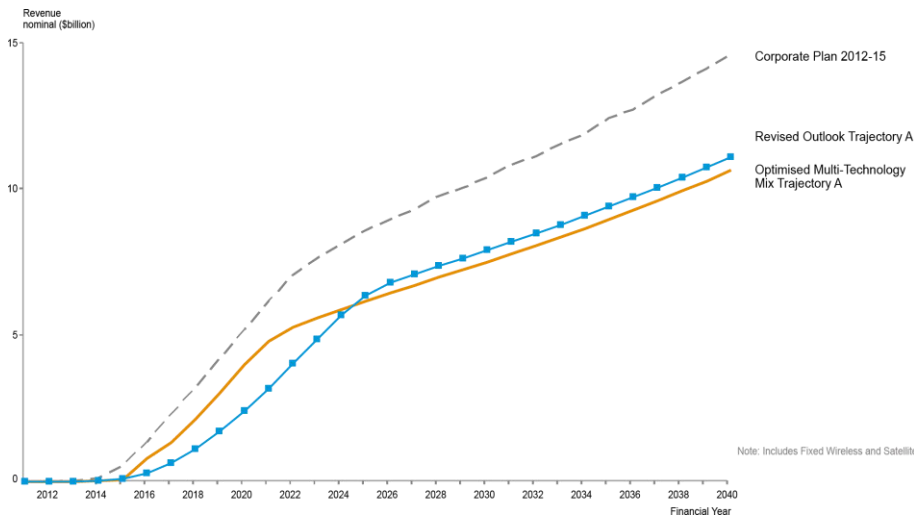
- **Scenario 6** reaches positive free cashflow first, more than three years earlier than the Revised Outlook deployment;
- **Scenario 6** minimises the total funding requirement at around \$41 billion, \$32 billion lower than the Revised Outlook deployment outlined in Section 2;
- **Scenarios 1 and 2** provide the highest EBITDA in steady state (e.g. FY28) as they provide the highest revenue and the lowest ongoing cost;
- **Scenario 6** provides the highest IRR at 5.3 percent under the higher revenue case (Trajectory A) – assuming a valuation of the company at 6x EBITDA in FY40 (noting the caution above); and
- **Scenarios 1, 2, and 3** would require debt funding of \$29-42 billion. However, NBN Co may not be able to secure such funding under commercial terms (e.g. without government guarantees). As such, the long-term financial viability of NBN Co under the current policy is questionable in these scenarios.

In addition, Scenarios 2 to 6 have been modelled using a 20% contingency on all Capital Expenditure (compared to 10% on all Capital Expenditure in the Corporate Plan and Revised Outlook). The higher contingency reflects the inherent risk and complexity associated with projects of this size and scale as evidenced by global experience, and the findings of the Independent Assessment in the Revised Outlook.

As the Optimised Multi-Technology Mix scenario provides the most attractive financial profile, more detailed financial outcomes for this scenario are summarised below.

Scenario 6 will provide a substantially faster revenue uptake than described in section 2, leading to cumulative revenues over FY11-21 of ~\$18 billion. This is ~\$7-8 billion more than in the Revised Outlook scenario. As shown in the exhibit below, revenues in the outer years will be up to \$400-500 million lower due to lower revenue realisation on certain products in areas with FTTN and HFC.

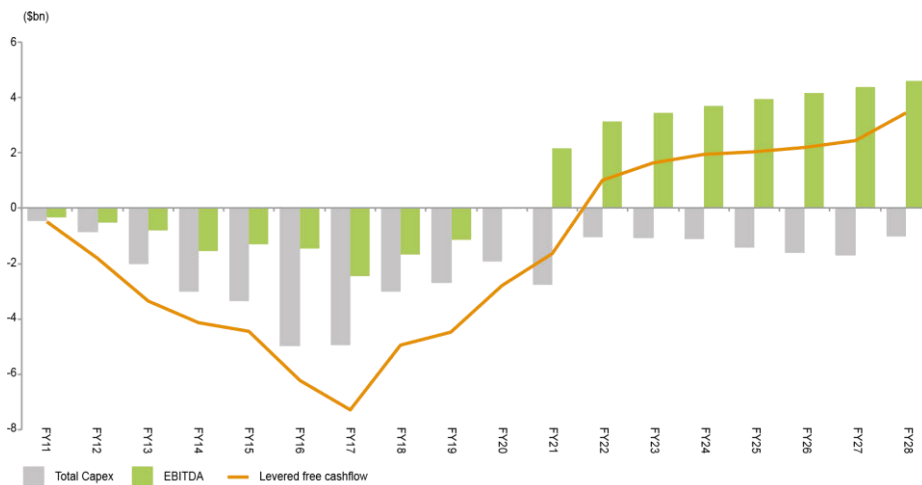
Exhibit 4-7: Trade-off between revenue timing and steady state amount for Scenario 6, Revenue trajectory A



After the rollout is complete, the Optimised Multi-Technology Mix scenario has an EBITDA margin of around 60 percent in FY28 – in line with expectations for a wholesale-only telecommunications company.

The exhibit below shows the EBITDA and capital expenditure profile of a fully optimised rollout over time. Due to the substantial change in number of customers one year after the end of the rollout, NBN Co is expected to become profitable and cash-flow positive in FY22.

Exhibit 4-8: Cashflow, EBITDA and Total Capex for Scenario 6, Revenue Trajectory A



Under both Revenue Trajectories (A and B), peak funding is expected to be ~\$41 billion. The table below outlines the key components of the peak funding. The table highlights that around \$15 billion will be spent by the end of FY14 or is committed as of November 2013.

Exhibit 4-9: Peak funding build up for Scenario 6

Peak Funding Build Up					
Contributions to total funding (\$billion)	Cumulative to FY14	Additional Committed	Total 'Committed'	Not yet Committed	Total Peak Funding
Total funding up to end of FY13	(5.1)	-	(5.1)	-	(5.1)
+ Total Capex	(3.0)	(0.6)	(3.6)	(23)	(27)
+ Operating profit/(loss) before customer connect costs	(1.5)	(5.2)	(6.7)	11	4
+ Customer activation-linked costs	(0.1)	(0.1)	(0.2)	(12)	(12)
+ Financial movements	0.5	-	0.5	(2)	(1)
Total	(9)	(6)	(15)	(26)	~(41)

4.4.2 Variations in business priorities and sensitivities

As described above, the Optimised Multi-Technology Mix scenario optimises for minimising peak funding and maximising long-term profitability, while delivering 50Mbps to a significant proportion of the fixed line footprint. The Strategic Review noted that NBN Co could make a range of other choices, including placing a greater emphasis on providing more premises with >50Mbps broadband by the end of CY19. For example, by prioritising faster FTTN rollout over more profitable FTTP and FTTdp rollout and fully utilising construction capacity even when not financially attractive, modelling indicates that NBN Co could deliver >50Mbps broadband to as many as 92 percent of all Australian premises (i.e. 99 percent of the fixed line footprint) over similar timeframes to the Optimised Multi-Technology scenario. This would require ~\$7 billion more in peak funding.

NBN Co will decide on its priorities after consultation with industry, Government and other stakeholders.

The Strategic Review also considered a scenario where NBN Co does not employ any HFC network. Based on those findings, the review found using HFC, at least in some capacity, is optimal for realising NBN Co's objectives.

4.4.3 Retail and wholesale pricing to deliver appropriate economic returns

None of the scenarios described achieve the internal rate of return (IRR) of 7.1 percent set out in the Corporate Plan.

On the higher revenue case (Trajectory A), in which nominal ARPU grows roughly in line with inflation over time, the Revised Outlook has an IRR of 2.5 percent. The Radically Redesigned FTTP scenario has an IRR of 4 percent, and the Optimised Multi Technology Mix scenario generates the highest IRR, at 5.3 percent. Under the lower revenue case (Trajectory B), in which nominal ARPU

remains flat for more than 25 years, the Revised Outlook does not indicate a positive return, the Radically Redesigned FTTP scenario has an IRR of 1.7 percent, and the Optimised Multi Technology Mix scenario has an IRR of 3.1 percent.

If NBN Co was required to deliver the 7.1 percent IRR envisaged in the Corporate Plan, it would need to increase prices from those set out in both Revenue trajectories shown, subject to any necessary regulatory and contractual changes.

The simple analysis below indicates the minimum price increases needed to deliver a 7.1 percent IRR. In reality, prices would need to increase much more than described below, because as prices increase more people and businesses would stop using the NBN, preferring to use alternative, mobile-only services, especially for voice calls and basic internet with small monthly data usage. To compensate for that lost revenue, NBN Co would need to increase prices again, and so on.

By way of illustration only, this analysis would require price increases, across all NBN Co packages and across the years assuming no change in product uptake or mix. It also assumes that RSPs pass on this price rise dollar-for-dollar (adding GST, but without adding any margin to the increase).

The required minimum price increase to deliver a 7.1 percent IRR are also illustrated with the impact on a 50/20Mbps service, assuming a current cost to consumers of ~\$75-95 per month.⁹³ The prices here are used for illustrative purposes only.

- The Revised Outlook would require price increases of 50-80 percent (e.g. \$27-43 more per month for a 50/20 Mbps service on top of the illustrative ~\$75-95 today)
- The Radically Redesigned FTTP scenario would require increases of 35 to 60 percent (e.g. \$19-33 more per month for a 50/20 Mbps service on top of the illustrative ~\$75-95 today)
- The Optimised Multi Technology Mix scenario would require increases of 20 to 40 percent (e.g. \$10-20 more per month a 50/20 Mbps service on top of the ~illustrative \$75-95 today).

If NBN Co was required to achieve an IRR closer to the current long term government bond rate, for example 4.5 percent, under some scenarios NBN Co would still need to increase prices.

- The Revised Outlook would require price increases of 20 to 45 percent (e.g. \$10-24 more per month for the illustrative 50/20Mbps service)
- The Radically Redesigned FTTP scenario would require increases of 5 to 30 percent (e.g. \$3-15 more per month for 50/20Mbps)
- Price increases may not be required under the Optimised Multi Technology Mix scenario and prices could be decreased depending on the context. If underlying revenues were otherwise following Trajectory A, in which in which nominal wholesale ARPU grows roughly in line with inflation over time, the economics of NBN Co relative to a benchmark of 4.5 percent would be strong enough to allow further price reductions (equivalent to ~\$3 per month on the illustrative 50/20Mbps service). If underlying revenues were otherwise not keeping up with inflation (as in Trajectory B), inflation linked price increases might be needed to support a 4.5 percent benchmark rate of return.

Price increases will improve the PBT of NBN Co and therefore the IRR. If the Government wishes to avoid these price increases and still enable an IRR of 7.1 percent, it could provide a specific direct subsidy to NBN Co.

⁹³ Note, cheaper 50/20Mbps plans are available with relatively low download quotas.

- Under the Revised Outlook this would need to be a \$1.9 - 2.5 billion subsidy per year, rising in line with inflation every year to FY40, assuming it was first paid in FY15.
- For the Radically Redesigned FTTP scenario this amount would be \$1.3 - 1.9 billion.
- For the Optimised Multi Technology Mix scenario this amount would need to be \$0.7 - 1.3 billion.

4.4.4 IRR Calculation

The exhibit below shows how the IRR is calculated. Scenario 6 yields an IRR of 5.3% between FY10–40.

Exhibit 4-10: Calculation of IRR on Scenario 6



For ease of comparison, the Strategic Review uses the IRR approach used in the Corporate Plan, measured over 30 years FY10 to FY40 including a 'terminal value'. The IRR is the discount rate for which the net present value of operating cash flows and a terminal value is equal to zero. Expressed a different way, for Scenario 6 the operating cash flows plus a “mechanical” valuation for the business at FY40, known as a 'terminal value', together result in an IRR for the project of 5.3%.

Annual cash flows include operating earnings (broadly revenues minus costs), minus tax payments for the year; cash spent on capital expenditure in the year; and any changes in working capital. It does not include any cost or earnings relating to interest, or any accounting cost for depreciation or amortisation.

A terminal value for the NBN Co business is calculated by the Corporate Plan as 6 times the EBITDA in FY40. Based on an EBITDA in FY40 of \$7.5 billion in 2040 dollars, the terminal value has been “mechanically” calculated at \$45 billion in FY40.

4.5 Contractual, regulatory, and policy issues

The Strategic Review has considered a range of contractual, regulatory and policy issues related to the scenarios. In general, the further NBN Co departs from its current approach to rollout, the greater the degree of change that will be needed to contractual relationships and the regulatory environment, and the more challenging these changes will be. This will take time and resources, and has the potential to delay new construction activity and customer migration.

Where the change of a document requires the ACCC approval (such as the Telstra DAs, Structural Separation Undertaking, Telstra Migration Plan and NBN Co SAU), the ACCC's decision as to whether to grant approval will depend on a complex independent regulatory judgement and is likely to require industry consultation. The Strategic Review noted that this may fundamentally change the timelines outlined in Exhibit 4-12.

4.5.1 Assumptions on government policy

In general, the Strategic Review has assumed that current policies either remain unchanged or will apply in a similar way to HFC and FTTN/dp technologies as they do to FTTP. Specifically, the following assumptions have been made:

- NBN Co's obligation to build a NBN passing all premises at significant cost continues to be balanced by legislative obligations on other infrastructure providers that do not have the same obligation to serve all premises in an area. Material changes to the amount of overbuilt network, where high-value customers are served by others and high costs customers are left to NBN Co, could result in significantly lower EBITDA post-rollout for NBN Co and significantly higher government funding required; and
- The roles and responsibilities of NBN Co and RSPs would remain largely unchanged. However, NBN Co recognises that some practical changes to operational process will be required (e.g. customer activations, including any migration of HFC customers).

The Strategic Review also assumes when moving to a different technology mix that the voice USO will remain in force, and that a disconnection or migration framework continues to apply with Telstra and Optus.

4.5.2 Key areas to address

The key areas for NBN Co to address in moving to any new model include:

- **Contracts and associated regulation** – All scenarios will require variations to the Telstra DAs, for example, in order to effect NBN Co's changed construction and delivery model, as well as to provide for the use of technology other than FTTP (depending on the scenario). The modified DAs will need the ACCC approval (potentially along with approval of changes in Telstra's SSU and Migration Plan). This will also require industry consultation. There may be some level of renegotiation of the Optus HFC Agreement (with any changes requiring the ACCC approval). Finally, in some scenarios, changes to the technology mix may require the development of additional supply terms with RSPs (with consultation), the Network Services Master Agreements with construction partners, and to procurement contracts with equipment & OSS/BSS vendors;
- **Regulation of NBN Co** – There are a number of changes to existing legislation, regulation and Ministerial policy instruments that may be needed, which could include the Schedule 3 (Telecommunications Act 1997) carrier powers and immunities (including the Low Impact Facilities Determination (the LIFD)). Changes in NBN Co's rollout techniques, network technology, and the role and responsibilities of RSPs may also require changes to industry

codes and standards. Substantial changes to NBN Co's business model may require amendments to the SAU, but that these are unlikely to be a substantial impediment to change; and

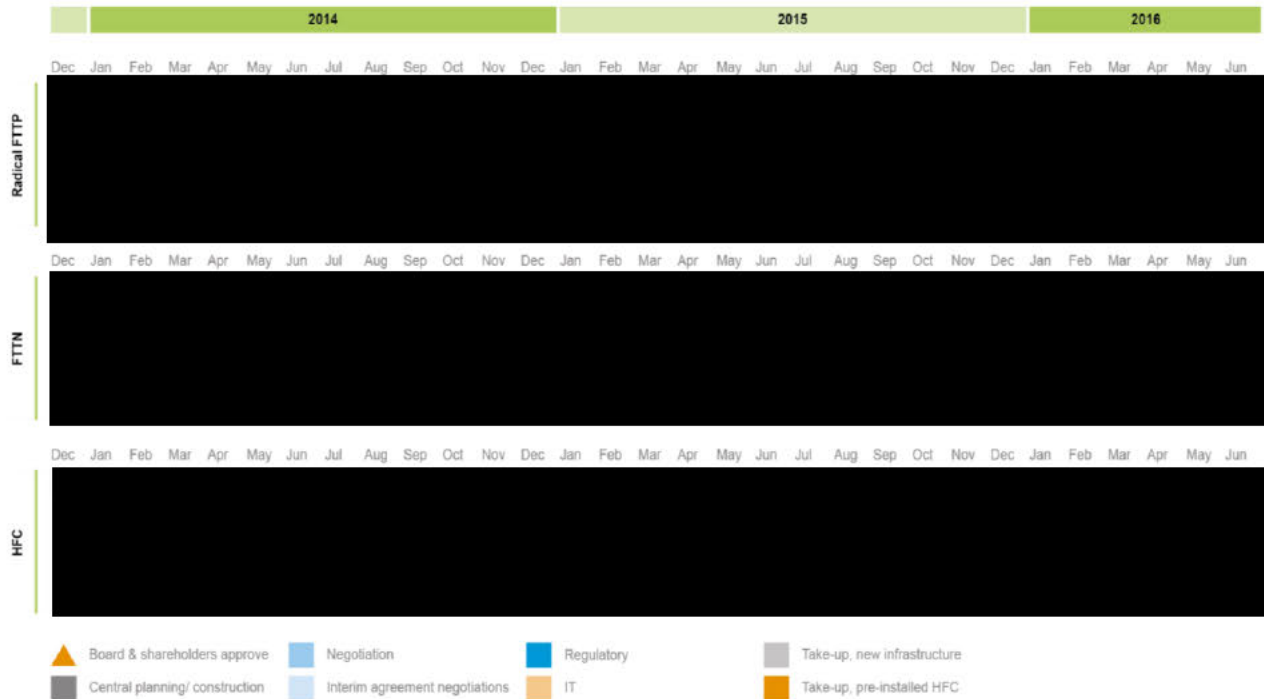
- Government policy** – Revisions would need to be considered to a large number of government policies if NBN Co changes its approach to network rollout. Policy issues include CPE, battery-backups, Fibre in New Developments, future upgrade pathways, prioritisation of rollout locations, and the delivery of voice services. Broader potential policy issues include achieving broadband-friendly Commonwealth, State and Territory building codes, and improving the quality of the GNAF.

4.5.3 Time required to resolve for contractual, regulatory and policy matters

The timing of contractual, regulatory and policy changes is extremely difficult to estimate accurately. Any delays to these changes could add up to 6-12 months to NBN Co's rollout timelines.

Exhibit 4-10 presents a view of the possible time required for NBN Co and its shareholders to resolve the contractual, regulatory, and policy issues associated with each possible rollout technology, and begin new construction activity and new customer activations. The view makes a number of fundamental assumptions: that Telstra will be open to negotiating, that the ACCC has no unresolvable concerns, and that the government proactively assists the approval processes (through enabling regulation and legislation, and Ministerial instructions).

Exhibit 4-11: Sequencing of key activities (not indicative of network completion date)



The use of each technology type raises different issues for NBN Co. These include:

For FTTP, potentially:

- Moderate amendments to the Telstra DAs may be needed to provide for a new rollout architecture and deployment strategy, including the terms under which Telstra undertakes remediation activities, together with an analysis of whether the slower deployment described in section 2 raises any issues;
- Renegotiations with constructors to deliver a redesigned construction operating model, together with revisions of enabling legislation, regulation, and government policy as discussed above; and
- Provision for increased rights of access for rollout activities..

For FTTN/dp, potentially:

- Renegotiation of the Telstra DAs to include access to Telstra's copper network, and the use of less Telstra pit, duct and other infrastructure by NBN Co (as well as for other changes discussed above). NBN Co might also consider pursuing an interim agreement with Telstra to allow an earlier start to FTTN construction activity, with the ACCC approval;
- Changes to the Network Services Master Agreements with constructors and the supply terms with RSPs;
- Approval of new industry standards for any of the contemplated changes, including to allow vectored VDSL2 on the copper network;
- Resolution of policy issues including: fibre on demand, the method for delivering voice services, and the difficulty of multiple RSPs delivering services to a single premises on FTTN; and
- The use of FTTN/dp requires electricity to be provided to the distribution point street cabinets.

For HFC, potentially:

- Renegotiation of both the Telstra DAs and Optus HFC Agreement to provide for access to the Telstra and/or Optus HFC network infrastructure (as determined by NBN Co after further consideration), and obtaining the ACCC approval for these changes;
- Changes to the master agreements with the constructors and the development of additional supply terms with RSPs;
- Consider novation of Facilities Access Agreements between Telstra, Optus, and utilities companies (that allow access to street poles and other infrastructure that support the ongoing maintenance of the HFC network);
- Approval of new industry standards for the relevant CPE and other technology;
- Policy issues including: Review and if necessary expand the Schedule 3 carrier powers and immunities to include maintenance and upgrade of street poles and other infrastructure that support HFC and the method for delivering voice services; and
- Provision for increased rights beyond the existing LIFD and access for rollout activities.

5

Strategic direction

5 Strategic direction

5.1 Multi-technology network approach

The Strategic Review recommended that NBN Co considers developing an Optimised Multi-Technology Mix approach to rolling out the NBN that balances fast deployment of 50Mbps broadband to the highest practical number of Australians, with better per premises economics.

This broad strategic direction has been considered in terms of choices which provide optimised technology for each geographic area, achieves download speeds of ~50Mbps to 90 percent of the fixed line footprint by the end of 2019 and provides the most cost-effective deployment, requiring around \$41 billion peak funding.

5.1.1 Optimising decisions for each geographic area

A multi-technology approach would deploy FTTP, FTTN, FTTB/dp and HFC in addition to Fixed Wireless and Satellite. It is based on optimising decisions about which technology to use for each distribution area. The optimisation decision process would be updated every six to twelve months to reflect then current technology, commercial results, and construction approaches.

A high-level assessment of a multi-technology approach suggests that the eventual optimal mix of technologies in the fixed line footprint could be in the range of:

- FTTP to ~20-26 percent of premises;
- FTTN/dp/B to ~44-50 percent;
- HFC to ~30 percent; and

Fixed Wireless and Satellite will be used outside the fixed line footprint, along with some FTTN/dp.

The eventual mix of technologies will be determined by decisions taken over time for each distribution area, accounting for relevant factors.

5.1.2 Network performance outcomes from the multi-technology approach

The Strategic Review identified that by using an optimised mix of all technologies, it will be possible for NBN Co to deliver download speeds of ~50Mbps to at least 90 percent of the fixed line footprint by the end of 2019. However, due to the significantly delayed status of the current rollout, and the constraints of contractual and regulatory change and construction and project management capacity, the Strategic Review does not see a viable path to NBN Co delivering 25Mbps to ~100 percent of the fixed line footprint by 2016.

5.1.3 Cost effective deployment

The Strategic Review found the optimised multi-technology approach to be the most cost effective way to deliver 50Mbps to at least 90 percent of the fixed line footprint by 2019, requiring around ~\$41 billion peak funding. Consistent with the pre-existing equity funding agreement with the Government, the optimised multi-technology approach would require some debt funding before NBN Co is EBITDA positive, to meet a cap of \$29.5 billion in accordance with the Government's policy statement on the provision of public capital. Given the relatively low IRR of the optimised model the economics of the business will need to be carefully managed to provide a positive IRR.

At this level of peak funding, the Strategic Review found the costs of the multi-technology optimised model to be significantly lower than the peak funding estimated for the Revised Outlook rollout of ~\$73 billion.

5.2 Critical factors for strategy execution

5.2.1 Ongoing optimisation of technology deployment

The Strategic Review identified that NBN Co will need to develop the methodology and business processes to determine at a local level which technology will be employed and when. This methodology will need to be applied as part of NBN Co's regular planning and operational processes, every six to twelve months. The Strategic Review suggested that NBN Co will need to consider inputs, such as the latest information regarding uptake, demand and price realisation for each technology and each end-customer segment, the performance outcomes and the build cost for each technology by geography.

NBN Co also recognises the need to incorporate any tested and approved changes to architecture, design rules and operational approaches to avoid using different technologies in an inconsistent way. These planning and operational processes can then be used to provide ongoing visibility to industry and Delivery Partners on a committed and well-planned rollout.

5.2.2 Industry, regulator and government relationships

In order to begin the ramp-up to a multi-technology model, the Strategic Review recommended NBN Co start a number of enabling actions such as seeking (interim) agreements with Telstra on copper and preparing for broader negotiations with Optus, Telstra, and NBN Co's design and construction partners. Actions for regulatory approvals (e.g. with the ACCC) will also need to commence. It is considered likely that these will take some time to complete.

Renegotiation of the Telstra DAs and Optus agreement will be required. [REDACTED]

To support the strategic direction outlined, NBN Co will also need to move proactively to address a number of legislative, regulatory and policy issues discussed in the Strategic Review. Some issues are essential in order to implement the strategic direction, while others are opportunities to reduce costs, delays or other risks in the NBN rollout.

5.2.3 Plan and design optimised network

To move towards a multi-technology model, the architecture for the components of the optimised network will need to be designed, field-trials conducted, architecture refined and, product specifications, migration processes and the first releases for alternative technology locked down. An inventory of network design documents will be required to ensure a steady flow into detailed design work undertaken by contractors. The Strategic Review identified that NBN Co will need to develop a multi-technology access network architecture where (access) technologies can operate somewhat independently (at the physical layer).

Rolling technology, cost and demand review processes for distribution areas to be built beyond a 12 month horizon will need to be established. In addition, the Strategic Review found that NBN Co will need to confirm the impact on remediation of the new approach, noting significantly less duct and pit remediation effort may be needed from Telstra due to less fibre being laid and due to proposed changes to the architecture of the FTTP part of the build. Decision rules and incentives to improve the remediation process will also be required.

The Fixed Wireless and Satellite footprint were not covered in detail through the Strategic Review, but will need to be reviewed to determine what changes may be needed to base station or satellite deployment.

5.2.4 Set-up and scale the build, activation and operations

The Strategic Review found that executing the optimised multi-technology approach will require NBN Co to consider a number of changes across its operational functions, including procurement, delivery, OSS/BSS and operations.

Changes will need to include designing and implementing the new delivery model, creating a construction Program Management function, simplification and standardisation of the deployment process with clear design rules, automation of processes across all areas of network operations and a move towards longer-term contracts with 12 month committed forward program over an exclusive distribution area. The Strategic Review also recommended re-sequencing activities to rolling, ideally contiguous, work fronts across a more limited geography to streamline mobilisation of sub-contractors.

The Strategic Review noted the potential to engage or partner with Telstra to perform tasks in areas where it has capabilities, such as design partnership, specialist skills (e.g. splicing, copper jointing, testing) and copper cut-over planning.

Furthermore, it will be necessary to extend existing OSS/BSS systems and associated operational processes to support HFC.

5.2.5 Transforming NBN Co to deliver a multi-technology approach

The building of a national broadband network is a huge, complex undertaking. The Strategic Review has identified that the current organisation has some very significant limitations in terms of performance, capabilities and culture. The strategic direction to broaden the portfolio from the existing three technologies (FTTP, Fixed Wireless, and Satellite) to utilise the copper and HFC networks further increases the complexity of the NBN undertaking.

In order to achieve its objectives, a major transformation of NBN Co is required. This transformation should address: reinforcing and aligning the leadership and governance; investing to lift and leverage capabilities in key areas such as dealing with partners, project management and capabilities in copper and HFC; and defining an operating model with clear accountabilities and performance metrics overall and by function.

A transformation infrastructure and operating cadence will need to be established to co-ordinate the program of work, to undertake further analysis and detailed design, and to drive change. The program of work needs to be defined and resourced, in-flight initiatives will be assessed and where appropriate stopped in order to focus the organisation. A communications and change management program needs to be defined, describing the new organisation and approach and ensuring the necessary behavioural changes. A comprehensive stakeholder engagement plan will need to be defined and put into action.

Complexity is best managed by strong leadership aligned around a clear direction. Clear executive accountabilities are required, combined with a strong transformation infrastructure which actively manages an integrated program of work. This will enable the complexity to be broken into discrete but related initiatives with plans, adequate resourcing and visible outcomes which can be measured. For example, an early and important achievement will be to change the approach to construction as described earlier. Changing the culture and re-directing and re-focusing the organisation will take several months and will be critical to success.

6

Next steps

6 Next steps

This section sets out the immediate and longer term next steps following the completion of the Strategic Review.

Subsequent to this review, the Board and Executive Management of NBN Co will begin to work with the Minister Shareholders and Departments on the revised SOE for NBN Co. It is noted that NBN Co requires a revised SOE in order to develop and finalise its next Corporate Plan. The Corporate Plan needs to be approved prior to 1 July 2014. As such, it is critical for the next steps subsequent to the review to maintain momentum, both in the build of the network, and in the process of determining the new direction for the organisation.

6.1 Immediate next steps

NBN Co will commence a number of next steps that NBN Co understands are not contingent on a revised SOE.

6.1.1 Engage with Government

The Government has indicated it is undertaking other reviews impacting on NBN Co, including an independent cost-benefit analysis and review of regulation related to the availability of high-speed broadband in Australia. NBN Co will, as required, positively engage to assist these reviews.

It is understood that these reviews, along with the Strategic Review, will inform and shape a revised SOE for NBN Co. A revised SOE is required for the completion of a new Corporate Plan for NBN Co, which is planned to be finalised before the end of FY14.

NBN Co will engage with the Government to develop the revised SOE and understand any Government policy positions which impact on the rollout of the national broadband network.

6.1.2 Mobilise the transformation agenda

The transformation effort – analysing and confirming at the next level of detail, the strategic direction laid out in this report, commencing the development of a new Corporate Plan, and making a series of key decisions – will be critical to future success. NBN Co has already mobilised the transformation agenda, with the appointment of a Head of Strategy & Transformation and establishment of a Transformation Program Office (TPO).

Key decisions will be required on a range of topics including: precise technology requirements, the copper network operating model, choice of HFC network(s), the greenfields model, the approach for provision of voice services and CPE, review of the current Fixed Wireless and Satellite footprint, customer migration approach and fibre on demand.

In-flight initiatives will be assessed and where possible streamlined to free up capacity. Revised KPIs, organisational data and metrics will be developed to improve management information.

The TPO will coordinate and monitor the transformation program of work, manage NBN Co wide strategic issues and drive change. A critical responsibility of the TPO will be to work with NBN Co leadership to implement the next steps outlined in this review and provide visibility and transparency to the Board and Shareholders on progress.

6.1.3 Implement changes to the FTTP construction delivery model

NBN Co will continue to deploy FTTP through 2014 to maintain momentum and provide transparency to its delivery partners.

NBN Co will implement changes to the construction delivery model to ensure an effective rollout of the multi-technology approach. NBN Co will seek to implement a number of initiatives to improve the efficiency and effectiveness of the delivery model including simplification of the SOR and negotiation of longer term contracts.

In addition, NBN Co will begin development of an updated procurement strategy with a robust specification review, as an enabler to renegotiations with suppliers, with early consideration of long lead-time items.

NBN Co has received a proposal from the Tasmanian Government which suggests greater use of aerial in FTTP deployment. NBN Co will explore this suggestion as one way of improving momentum.

6.1.4 Prepare for multi-technology approach

NBN Co recognises that it will need to expand its capabilities to deploy a multi-technology approach, especially in relation to copper and HFC.

In line with the Strategic Direction, NBN Co will also need to commence the next level of planning and evaluation of different ways to operationalise a multi-technology approach. This will require considerable work by technology, and by geography.

The validation of forecast revenue will be a key input to decisions on the final technology mix for deployment. A draft product roadmap will be developed which reflects the transition from FTTP to an optimised multi-technology solution. The roadmap will outline a clear migration path.

The move to an optimised multi-technology mix may require changes to the current product and pricing strategy. NBN Co will continue to scope a range of product and pricing models based on an optimised multi-technology mix deployed in different distribution areas. NBN Co will engage widely with industry participants to develop the product offerings and detailed product roadmap (incorporating technology options, current and anticipated policy commitments and customer strategies).

It is recognised that the high-level cost and revenue models that have been considered through this review will require further development and that this will include running further refinements to the models. NBN Co will, as part of its next steps provide a view on structure and level of pricing.

Trials will be conducted on the different technologies available. NBN Co has commenced trials of FTTN and FTTB technologies. The trials will provide important information to input into the most effective way to deploy technologies which will be concluded in the new Corporate Plan.

NBN Co will need to agree with Telstra as part of any renegotiation the assessment of the quality of the copper network and where possible start undertaking this assessment.

6.1.5 Prepare for commercial negotiations and commence discussions

The renegotiation of the Telstra DAs and Optus HFC Agreement will be required in order to meet a revised SOE. In addition, a new product roadmap and pricing models may necessitate variations to the SAU and WBAs. Further, moving to a changed construction operating model and the introduction of simplified rates schedules will require renegotiation of agreements with construction partners.

NBN Co will begin preparation for these commercial renegotiations. As part of this preparation, NBN Co will review its internal commercial capability. It is understood that these steps will take some time to complete.

6.1.6 Undertake a review of Fixed Wireless and Satellite

NBN Co will undertake a detailed review of its Fixed Wireless and Satellite programs. The review will consider strategic options available to NBN Co to cost effectively provide coverage to areas outside the fixed footprint, as well as considering the optimal model to provide this coverage.

6.1.7 Assess IT capability

It will be necessary, based on the findings of the Strategic Review, to upgrade or replace some of NBN Co's foundation IT capabilities and systems. Changes to network technology mix will drive changes in IT requirements particularly in the OSS/BSS program. A broader IT review will be undertaken to identify those systems that require upgrade or replacement to meet the future needs of the organisation and to agree an upgrade path.

NBN Co will increase the frequency and detail, of its external reporting of key operational and financial metrics. To this aim, NBN Co will commence a reporting and information assessment to identify the future reporting and information requirements.

6.1.8 Focus on people and organisational change

The Strategic Review has identified a number of organisation and culture related issues that must be addressed immediately to improve the efficiency and effectiveness of NBN Co. The Board is expected to announce the appointment of a new CEO. One of the tasks of the new CEO will be to review the current organisation and culture, and set its future direction.

In addition, an immediate priority will be to identify critical capability gaps, address overlapping roles, and realign responsibilities within the organisation. The company will need a substantial concerted effort and investment to make the changes required in CY14. Organisational capabilities will be reviewed and lifted, not just in relation to copper and HFC.

NBN Co has also commenced a formal leadership assessment to ensure that capable and unified leadership is an enabler of the desired organisational change.

6.1.9 Implement a revised governance approach

NBN Co recognises the importance of robust and transparent internal governance, control and reporting processes to maintain strong accountability.

To this end, NBN Co will review and, where necessary, enhance internal governance, risk management and control processes with a specific focus on increasing the commercial weighting on all relevant decisions.

6.1.10 Engage and consult widely with stakeholders

NBN Co will commence a program to engage and consult widely with stakeholders concerning the findings of the Strategic Review. This engagement will include the Department of Communications, Department of Finance, ACCC and ACMA, as well as industry representatives, peak bodies, RSPs, suppliers, infrastructure and access providers, communities and other relevant groups.

6.2 Medium term next steps

To implement the Strategic Direction, NBN Co will require a revised SOE. Pursuant to that, NBN Co has identified a number of interdependent medium term changes that are likely to require a high level of governance in order to manage the competing demands of various stakeholders. These next steps are outlined below.

6.2.1 Corporate Plan

NBN Co will develop a new Corporate Plan to reflect the new SOE. Subject to Government decisions on the SOE, the new Corporate Plan will need to include revised revenue and cost expectations to deliver an optimised multi-technology approach. In addition, a revised funding strategy will be required.

NBN Co will undertake the necessary analysis to confirm future funding requirements and develop a future funding strategy with Government. This will include an assessment of funding available under the revised SOE, the forecast revenue and cost model, pricing in a revised SAU and the optimal financing to meet the needs of the organisation.

6.2.2 Whole of business operating model

NBN Co will define a new operating model to transform activity across the organisation pursuant to its revised SOE. The future operating model will need to incorporate changes arising from a multi-technology approach and new network design criteria. It would include a new contracting model with respect to access or purchase of existing assets (e.g. copper). It will also be necessary to continue to refine the construction delivery model to leverage existing industry capacity.

For OSS/BSS, the new operating model will necessitate a more effective governance and planning process to align construction, IT and business change and modifying existing OSS/BSS systems and associated operational processes to support copper, HFC and FTTN.

The model will necessarily consider organisational changes to improve efficiency and productivity along with the redefinition of the processes, culture and risk management practices that will support execution and delivery of the NBN.

6.2.3 Finalisation of technology mix and network design principles

NBN Co will define the optimal multi-technology approach, related deployment plan and upgrade path as guided by a revised set of network design criteria. These criteria will be shaped by the revised SOE, funding model and the social and economic cost-benefit analysis. This is highly interdependent with the renegotiation of the Telstra DAs and Optus HFC Agreement (where applicable). NBN Co will undertake government and industry consultation prior to any final determination on technology mix, to ensure collective alignment of priorities.

NBN Co will commence detailed evaluation and consideration of the new network design criteria, whilst continuing to sustain FTTP rollout to those areas where construction has commenced.

6.2.4 Renegotiation with Telstra and/or Optus, vendors, contractors and RSPs

Pursuant to the revised SOE, NBN Co will need to conclude negotiations to vary the Telstra DAs and/or the Optus HFC Agreement. These agreements will continue to underpin the infrastructure of the NBN and as such are critical to the success of the program.

Throughout negotiations, NBN Co will appropriately engage with the ACCC, the Department of Communications, the Department of Finance and other key stakeholders to seek input on key areas.

In addition, NBN Co will need to undertake negotiations with other parties to implement the revised SOE.

6.2.5 Engagement of stakeholders in relation to potential regulatory changes

As a result of the revised SOE, there are likely to be a number of regulatory impacts, including:

- ACCC approval for any amendments to the Telstra DAs and the Optus HFC Agreement;
- ACCC approval in respect of any appropriate variations to the SAU;
- Legislative and regulatory changes to provide powers to NBN Co, for example, with respect to Body Corporates, MDU access, and utility infrastructure access;
- Changes to the LIFD regime to enable the efficient rollout of the NBN;
- Potential revision to a number of Ministerial directions and policy; and
- Revision to a number of new and existing Communication Alliance and ACMA codes and standards.

Improved geo-coding of Australian addresses would greatly assist the rollout of the NBN. This will require collaboration between the Government, industry and NBN Co.

NBN Co will work closely with the ACCC, ACMA, the Department of Communications, Department of Finance, industry bodies and RSPs to seek appropriate support.

6.2.6 Ongoing changes to the construction delivery model

NBN Co will continue to make ongoing changes to the construction delivery model that will be required to execute the optimised multi-technology approach. These will include:

- Continued simplifying and standardising the deployment process with clear design rules, standardised specifications and processes, an industry-standard design environment (for example AutoCAD (computer-aided design program)) and a relevant construction methodology and operating manual for contractors on the ground; and
- Further developing capabilities in dealing with Delivery Partner and building capabilities relevant to copper and HFC. Even if the copper and/or HFC technology build and operations were to be managed by a third party with specialist capability, NBN Co will need to build copper and HFC technology expertise to effectively manage relevant third parties.

6.2.7 IT and network operations improvements

Improvements will need to be made to IT and network operations.

NBN Co will need to extend its existing OSS/BSS systems and associated operational processes to support the multi-technology approach. For example, this might include migrating data from Telstra and/or Optus for HFC networks to address master data, adding modules to configure and enable layer 2 integration, modifying systems to handle change, fault and order management integration with Telstra and/or Optus and finally in-sourcing HFC inventory, activations, design, network management and assurance services onto NBN Co OSS/BSS (over time).

In addition, NBN Co will need to automate processes across all areas of network operations.

6.2.8 Ongoing organisation and culture change

In order to support the implementation of the revised SOE, NBN Co will continue its organisation transformation, with a renewed focus on the long term direction, organisational structure and overall workforce model. This will further reinforce the capabilities and behaviours required to support the future operating model and be a key enabler of culture change.

Annexures

Annexures

A.1 Glossary of Key Terms

Exhibit A.1-1: Abbreviations used in this report

Abbreviation	Definition
ABG	Australian Broadband Guarantee
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
ACMA	Australian Communications and Media Authority
ADSL	Asymmetric Digital Subscriber Line
ARPU	Average Revenue Per User
BSS	Business Support Systems
CMTS	Cable Model Termination Systems
CAGR	Compound annual growth rate
CPE	Consumer premises equipment
Corporate Plan	NBN Corporate Plan 2012-2015, dated 6 august 2012
DOCSIS	Data Over Cable Service Interface Specification
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexers
EAC	Estimate at Completion
EBITDA	Earnings before interest taxation depreciation and amortization
ERP	Enterprise Resource Planning
FAN	Fibre Access Node
FSAM	Fibre Servicing Area Module
FTTB	Fibre-to-the-building
FTTdp	Fibre-to-the –distribution-point
FTTN	Fibre-to-the-node
FTTP	Fibre-to-the-premises
FTTx	Fibre based
GBE	Government Business Enterprise
Gbps	Gigabits per second
GB	Gigabyte
GPON	Gigabit Passive Optical Network
HFC	Hybrid Fibre Coaxial
Independent Assessment	The independent assessment of NBN Co's operational and financial performance up to 30 September 2013 undertaken by KordaMentha
IPTV	Internet Protocol Television

Abbreviation	Definition
ISS	Interim Satellite Service
Kbps	Kilo-bits-per-second
LIFD	Low Impact Facilities Determination
LNDN	Local Network Distribution Network
LIC	Lead in conduits
LTD	Life-to-date
LTE	Long Term Evolution
LTSS	Long Term Satellite Service
MDU	Multiple Dwelling Unit
MIMO	Multiple Input-Multiple Output
NAP	Network access point
NBN	National Broadband Network
NBN Co	NBN Co Limited
NPV	Net present value
NFAS	Network Fibre Access Service
NSMAs	Network Services Master Agreements
NTD	Network Termination Device
Optus	SingTel Optus Pty Ltd and associated Optus entities
OSS	Operational Support Systems
P2P	Point to point
PCD	Premises connection device
PSAA	Per Subscriber Address Amount
RFP	Request for proposal
RSP	Retail service provider
SAU	Special Access Undertaking
SDU	Single dwelling unit
SOE	Statement of Expectations
SOR	Schedule of Rates
TD-LTE	Time Division Duplex variant of LTE
Telstra	Telstra Corporation Ltd
Telstra DA or DA	Telstra Definitive Agreements or Definitive Agreements
TPO	Transformation Program Office
TUSMA	Telecommunication Universal Service Management Agency
ULLS	Unconditional local loop service
USO	Universal Services Obligation
VDSL	Very-high-bit-rate DSL
VoIP	Voice over IP
WBA	Wholesale broadband agreement

Abbreviation	Definition
WiMax	Worldwide Interoperability for Microwave Access

Exhibit A.1-2: Glossary of key terms

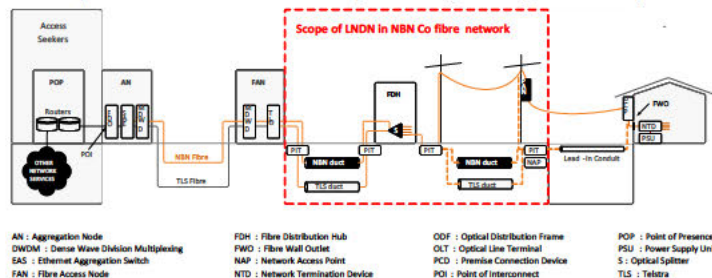
Term	Definition
Access seeker	A customer acquiring NBN Co wholesale services with the intention to supply broadband services to Retail Service Providers (RSPs) or End-Users.
Asymmetric Digital Subscriber Line (ADSL)	A technology for delivering high-speed data transmission over a copper pair. As the name suggests, it provides different downstream (network to End- User) and upstream (End-User to network) bandwidth.
Average revenue per user (ARPU)	The total revenue divided by the number of subscribers.
Brownfields	Pre-existing premises that will be covered by either Fibre, Fixed Wireless or Satellite services.
Build Drop	Where the connection from the street to the premises is carried out when the distribution and local segments of the fibre network are being built.
Business Support System (BSS)	The set of IT systems that will provide NBN Co with the capabilities to support access seekers, take orders, process bills and collect payments.
Capital Expenditure (Capex)	The cost of purchasing tangible and intangible assets.
Compound annual growth rate (CAGR)	“Year on Year” growth rate, over a specified period of time.
Cost Per Premises	The Cost Per Premises is calculated by the connection costs (including Drop, Activation and NTD) and LNDN costs divided by the Premises Passed. For further information see A.2 Definition of Cost Per Premises.
Dark fibre	Optical fibre with no active electronics attached.
Demand Drop	Where the connection from the street to the premises is carried out when an order for a service is received from a retail service provider.
Digital Subscriber Line (DSL)	A family of technologies that deliver high-speed data transmission over a copper pair.
Digital subscriber line access multiplexers (DSLAMs)	Network devices connecting End-User copper lines for the provision of DSL broadband service.
Distribution Fibre	Connection between the Fibre Distribution Hub and the FAN, for both Regional FANs and the Metropolitan FANs, as well as the connectivity between the non-adjacent Fibre Serving Area Modules in the Capital Cities and the Metropolitan FANs.
Data over cable service interface specification (DOCSIS)	A telecommunications standard that permits the addition of high-speed data transfer and internet access through HFC infrastructure
End user	Final downstream customers to NBN Co's Access Seekers.
Estimate at Completion (EAC)	The Estimate at Completion (EAC) for the access fibre network is NBN Co's best estimate, based on latest available information, of the final cost to design and construct those FSAMs where build has commenced. The EAC is calculated each month for all FSAMs where NBN Co has commenced build - i.e. where NBN Co has issued a contract instruction for construction activity (CICA). Typically the EAC is based on a

Term	Definition
	<p>Fixed Price Lump Sum (FPLS) which calculates the cost to construct an FSAM based on an agreed design with an agreed bill of quantities and materials at agreed rates. NBN Co then adds an allowance for provisional items such as aerial make-ready work, traffic management costs and additional costs related to digging. These amounts are included as an estimate only, and the final actual cost of these items are only known at the completion of the construction phase.</p> <p>During the course of the build NBN Co may receive claims from Delivery Partners for variations to the agreed design. The cost of all approved variations plus an assessment of the unapproved variations are added to the EAC. This may include a revisions to amounts originally included in the EAC as provisional items.</p> <p>In addition, NBN Co maintains a register of known commercial and legal risks. On a monthly basis an assessment of these risks is made and, where the financial impact of the risk can be reliably estimated, an appropriate amount is included in the EAC. The EAC does not include unsubstantiated commercial or legal claims where the amount cannot be reliably estimated.</p> <p>In addition to the EAC process, NBN Co also undertakes a review of construction contracts when preparing its financial statements.</p> <p>EACs are prepared in gross dollars and converted to a Cost Per Premises (EAC CPP) using the latest count of addressable GNAF (Geocode National Address File) premises for each FSAM.</p> <p>For comparison to the Corporate Plan the EAC CPP for access fibre specifically excludes NBN Co internal labour, the costs associated with connecting premises, costs of the transit network and the financial lease costs of the Telstra infrastructure. These costs are captured and reported separately.</p>
Fibre Access Node (FAN)	A facility that houses the active equipment providing services to a Fibre Serving Area. Note that Urban FANs will also provide a (POI) to Access Seekers.
Fibre Serving Area Module (FSAM)	A series of up to 16 Fibre Distribution Area linked in a double loop configuration. Typically, a single fibre sheath will connect the FSAM and (up to 16) Fibre Distribution Hubs back to a nominated FAN. An FSAM may cover a small town or a part suburb in the case of large cities. The number of premises contained in an FSAM is typically between 2,000 – 3,000, depending on location and network planning / topology.
Fibre to the basement (FTTB)	Network design in which the Fibre network is deployed to the building.
Fibre to the distribution point (FTTdp)	Network design in which the Fibre network is deployed to a distribution point near the premises.
Fibre to the node (FTTN)	Network design in which the Fibre network is deployed to the node.
Fibre to the premises (FTTP)	Network design in which the Fibre network is deployed to each premises.
Fixed Wireless	Network design in which network connections are provided through radio signals
Fibre to the x (FTTx)	FTTx is a generic term for any broadband network architecture using optical fibre to replace all or part of the usual metal local loop used for last mile telecommunications. The generic term was initially a generalization for several configurations of fibre deployment (FTTN, FTTdp, FTTB, FTTP...), all starting with 'FTT' but differentiated by the last letter, which is substituted by an x in the generalization.
Fair Use Policy (FUP)	In the context of internet usage, a fair use policy is the management of end-user downloads and uploads to ensure that all users to achieve an acceptable user experience on the Satellite Service.
Geocoded National Address File (GNAF)	GNAF lists all valid physical addresses in Australia. GNAF information is provided by PSMA Australia Limited.
Gigabit-capable Passive Optical Network (GPON)	An optical-access system based on Internet Protocol (IP) that lets multiple homes or businesses in a neighbourhood share fibre from a service provider's central office.

Term	Definition
Greenfields	A new development that can be either Broadacre or Infill Premises. Greenfields developments represent the growth of the premises market.
Hybrid Fibre Coaxial (HFC) Network	A network utilising both optical fibre and coaxial cable for the delivery of Pay TV, internet and voice services.
Internal Rate of Return (IRR)	The average annual total return from an investment over a specified time period, used to measure and compare the profitability of the investment.
Kilobits per second (Kbps)	A unit of measurement of transmission speed. One Kilobit Per Second is equal to 1,024 bits per second.
Lead in Conduit (LIC)	A lead-in conduit is the pipe or conduit carrying the lead-in cable between the customer's premises and the nearest pit.
Low Impact Facilities Determination (LIFD)	Low Impact Facilities are Telecommunications Facilities that comply with the provisions of the Telecommunications (Low-Impact Facilities) Determination 1997 (amended 1999). The Guidelines provide assistance with the siting and design of new facilities with the aim of minimising visual impact and achieving appropriate and acceptable outcomes.

The section of the NBN Co fibre network from the NBN Co FAN site to the last multipoint or network access point closest to the customer premises (see diagram below).

Local Network Distribution Network (LNDN)



Long Term Evolution (LTE)	Standardisation work by the 3rd Generation Partnership Project to define a new high-speed performance air interface for mobile communication systems. Commonly regarded as a 4G technology.
Megabits Per Second (Mbps)	A unit of measurement of data transfer speeds. One Megabit Per Second is equal to 1,024 kbps.
Multi dwelling unit (MDU)	Premises that contains more than one dwelling unit, which can range from duplexes to 200+ unit apartment blocks. Each dwelling unit is assumed as equivalent to one GNAF (e.g. a 50 unit apartment block will have 50 GNAFs).
Network access points (NAP)	The point at which Drop Fibre is connected to Local Fibre.
Network services master agreement (NSMA)	Contractual relationship between NBN Co and its construction contractors
Network termination device (NTD)	NBN Co's termination point on each premises, for residential fibre services currently featuring four Ethernet and two telephone interfaces.
Operating Expenditure (Opex)	The ongoing cost of running a business, system or product.
Operational Support	The set of systems that will provide NBN Co with the capabilities to provision, configure, manage, and

Term	Definition
Systems (OSS)	operate the NBN.
Optus HFC Agreement	The agreement between NBN Co and Singtel Optus Pty Ltd and other Optus entities (Optus) which was executed on 23 June 2011. The Optus HFC Agreement provides for the progressive migration of Optus HFC subscribers to the NBN as it is rolled out. NBN Co has agreed to make progressive payments to Optus, based on the number of Optus subscribers that migrate from its HFC network.
Point of Interconnect	The connection point that allows RSPs and WSPs to connect to the NBN Co access capability.
Point to Point (P2P)	A network design in which a dedicated access fibre connects individual premises directly to the fibre exchange.
Premises	Premises are defined as addressable locations which NBN Co is required to connect. The Statement of Expectations refers to this definition as the basis for measuring NBN Co's achievement of the Government's coverage objectives.
Premises activated	Premises are activated after receiving and provisioning a service order from a Retail Service Provider to install a new service at the premises.
Premises passed	All design, construction, commissioning and quality assurance activities in an FSAM have been completed for the Local network and Distribution network.
Retail Service Provider (RSP)	A third party provider of retail broadband services to End-Users.
Special Access Undertaking (SAU)	Division 5 of Part XIC of the Competition and Consumer Act 2010 (CCA), enables access providers, including NBN corporations (such as NBN Co), to voluntarily lodge written Special Access Undertakings with the ACCC. These undertakings specify terms and conditions upon which access providers propose to supply a listed carriage service or a service which facilitates the supply of a listed carriage service.
Special Services	Telstra retail and wholesale services as defined in the Telstra DAs, these include services for which there is no equivalent service on the NBN.
Statement of expectations (SOE)	Statement to NBN Co from its Shareholder Ministers setting out the expectations that the NBN should work to fulfil.
Telstra Definitive Agreements (DAs)	The suite of agreements entered into between NBN Co and Telstra on 23 June 2011 and which are described in the release issued by Telstra to the ASX on that day.
Transit Fibre	Connection between Points of Interconnect (POI) where the Retail Service Providers connect to the NBN, and the regional based FANs. Transit Fibre can also provide connectivity from the Metropolitan FANs to POIs if required.
Transit Network	The fibre rings which connect the regional FAN sites and the nearest POI, served by Transit Fibre.
Telecommunication Universal Service Management Agency (TUSMA)	The agency responsible for administering the universal service obligation and other public interest services.
Universal Service Obligation	Under the universal service obligation (USO), the primary universal service provider—Telstra—must ensure that all people in Australia are provided with equitable access to standard telephone services and payphones. This obligation applies to all areas in Australia including areas to be covered by the NBN. It continues during and after the NBN rollout.
Wholesale Broadband Agreement (WBA)	A document which sets out the terms and conditions of access to NBN Co's services and products and constitutes one of NBN Co's standard forms of access agreements.

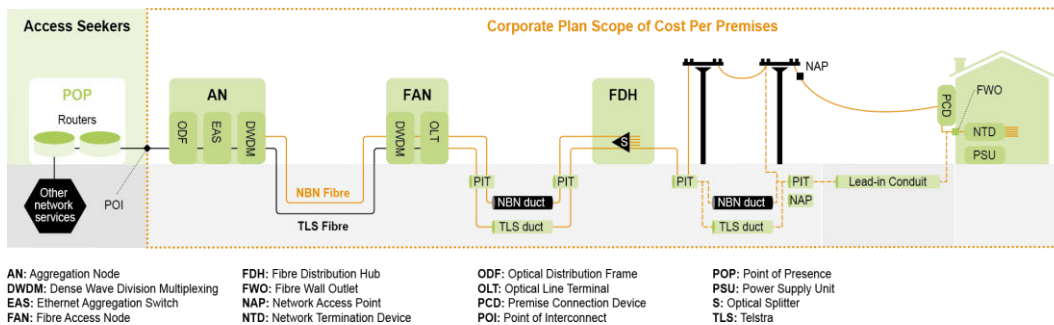
Term	Definition
Wholesale Service Provider (WSP)	A provider of wholesale services to RSPs.

A.2 Definition of Cost Per Premises

NBN Co's August 2012 Corporate Plan includes a Cost Per Premises calculation that represents the Capital Expenditure required to pass and connect a premises. This cost includes all the network elements marked in Exhibit A-1. The formula for calculating the Cost Per Premises in the Corporate Plan is as follows:

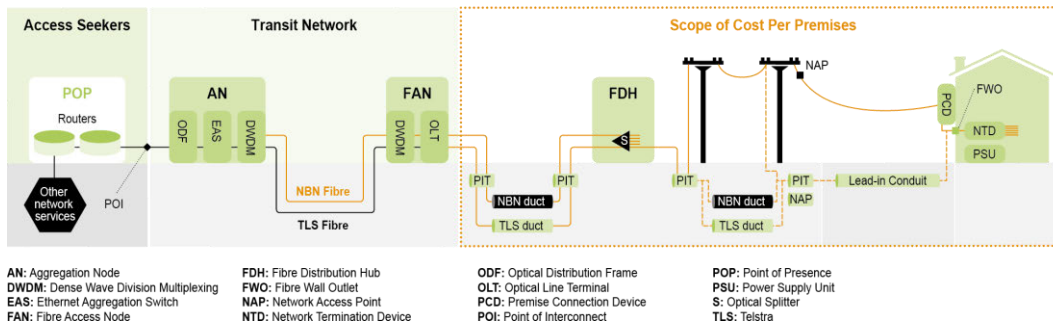
$$\text{Corporate Plan – Cost Per Premises} = \frac{\text{Connection Costs (Drop, Activation, NTD)} + \text{LNDN, Transit, FAN/Design \& Project Management}}{\text{Premises Connected} \times \text{Premises Passed}}$$

Exhibit A.2-1: Brownfields network elements (indicating costs included in Corporate Plan definition of Cost Per Premises)



One of the objectives of the Strategic Review is to identify alternate technologies to optimise the build of the NBN. The majority of the costs of building a high speed broadband network are in the access network (e.g. from the exchange building to the customer premises). The access technologies considered in each of the scenarios require different plant, equipment, build techniques and operating models. In order to ensure comparability between the scenarios it is necessary to compare the costs of access and customer connection only, as marked in the red dotted area in Exhibit A-2.

Exhibit A.2-2: Brownfields network elements (indicating costs included in Strategic Review definition of Cost Per Premises)



All Cost Per Premises Passed comparisons in this report are therefore calculated as follows:

Strategic Review – Cost Per Premises Passed =

Connection Costs (Drop, Activation, NTD) + LNDN Costs

Premises Passed

Where LNDN Costs for:

- FTTP: Network elements from the FAN, excluding the cost of the FAN, to the Multiport;
- FTTN: Network elements from the FAN, excluding the cost of the FAN;
- FTTdp: Network elements from the FAN, excluding the cost of the FAN, to the nearest distribution point to the premises; and
- HFC: Cable modem termination system (CMTS), including CMTS costs, to the customer drop

A.3 Referenced Tables

Table A.3-1: Chronology of key milestones

Date	Milestone
7 April 2009	The Australian Government announced that a new company, jointly owned by the Government and the private sector, would invest up to \$43 billion over eight years to build a NBN that would extend FTTP technology to at least 90 percent of Australian premises
16 July 2009	The Australian and Tasmanian Governments announced the start of the first stage of the network rollout in Tasmania, with the release of an open competitive tender for fibre optic cable by Aurora Energy
25 July 2009	The Tasmanian communities of Smithton, Scottsdale and Midway Point were announced as the first to receive the NBN, with services to become available in the second quarter of 2010
6 August 2009	McKinsey-KPMG appointed by Department of Broadband, Communications and the Digital Economy as Lead Advisor for the National Broadband Network Implementation Study
13 August 2009	The Australian and Tasmanian Governments announced the establishment of the company to rollout and operate the NBN in Tasmania and the appointment of its first four Board Directors
4 September 2009	The DBCDE published submissions received on consultations for the legislative framework for the NBN
15 September 2009	The Government announced a set of wide ranging reforms to existing telecommunications regulations with the objectives of addressing the vertical integration of Telstra and strengthening consumer safeguards (such as the Universal Service Obligation, Customer Service Guarantee and the Priority Assistance Arrangements)
18 December 2009	The Terms of Engagement between Telstra and NBN Co were formalised, including a preferred model for any subsequent agreement between the two organisations which would see a progressive transition from Telstra's copper access network to a FTTP NBN
17 December 2010	NBN Co publishes its first Corporate Plan (June 2011- June 2013)
20 December 2010	The Government released the SOE, which also comprised the Government's final response to the Implementation Study
23 June 2011	NBN Co announced it had signed binding Definitive Agreements with Telstra, subject to certain conditions precedent being met, including shareholder and regulatory approvals, to facilitate the rollout of a high speed national broadband network
23 June 2011	NBN Co announced that it had signed a binding agreement with Optus to migrate Optus' Hybrid Fibre Coaxial subscribers to the NBN
22 September 2011	NBN Co agreed the initial rollout plan of the NBN with Telstra, to inform the inaugural twelve month rollout plan

Date	Milestone
18 October 2011	NBN Co released its inaugural twelve month rollout plan
30 November 2011	The final executable version of the WBA was published.
29 March 2012	NBN Co released its first three year fibre rollout plan, with construction to commence or be complete for 3.5 million premises by mid-2015
6 August 2012	NBN Co releases the 2012-15 Corporate Plan

Table A.3-2: Tasmanian Trials Key Milestones

Date	Milestone
16 July 2009	Announcement of commencement of Stage 1 of the NBN rollout in Tasmania, to deliver wholesale-only, open access broadband network services in the second quarter of 2010
25 July 2009	Smithton, Scottsdale and Midway point announced as first towns for NBN in Tasmania
21 October 2009	Seven Stage 2 sites announced in Tasmania.
1 March 2010	Government announced an equity injection of \$100 million into NBN Tasmania to facilitate the further rollout in Stage
15 March 2010	Test Centre proof-of-concept opened and announced the first retail service providers to offer high speed broadband in Tasmania
28 April 2011	NBN Co announce agreement with construction company Conneq to rollout FTTP technology and that work was to commence to provide access to the NBN to 11,150 premises in the towns of Deloraine, Kingston Beach, George Town, Sorell, South Hobart, St Helens and Triabunna in the next stage of the rollout
30 June 2011	Commencement of construction in Sorell, the first of seven Tasmanian stage two sites

Table A.3-3: First Release Sites Key Milestones

Date	Milestone
2 March 2010	Announcement of First Release Sites on mainland Australia as part of live trials of network design and construction
8 July 2010	Second Release Sites Announced for NBN Rollout with construction scheduled for the second quarter of 2011
18 May 2011	The first switch-on of the NBN on mainland Australia, in Armidale, NSW with limited customers invited to trial services
29 July 2011	Second mainland site switched on in Kiama Downs/ Minnamurra (NSW)
1 October 2011	Customers covered by mainland first release sites are able to order services through the NBN

Table A.3-4: Other operational key milestones

Date	Milestone
17 February 2011	Announcement that NBN Co had acquired spectrum licences in the 2.3 GHz and the 3.4 GHz bands from Austar to support the roll out of the fixed wireless network
18 May 2011	The first switch-on of the NBN on mainland Australia in Armidale (NSW)
1 July 2011	NBN Co launched its Interim Satellite Service
29 July 2011	Second mainland site switched on in Kiama Downs/ Minnamurra (NSW)
3 August 2011	Five Wireless first release Sites announced
4 August 2011	The third mainland site goes live in Brunswick (VIC)
1 September 2011	The fourth mainland site goes live in Townsville (QLD)
6 September 2011	The fifth and final NBN first release site switched on in Willunga (SA)
7 September 2011	First new housing development was switched on in Bunya Estate in Western Sydney (NSW)
18 October 2011	Release of the twelve-month rollout schedule. Delivery of the transit schedule in line with the initial rollout plan with 26 FANs and aggregation node sites handed over from Telstra as of 31 December 2011
10 May 2012	NBN Co completed its first Dark Fibre Transit Ring located on the NSW Central Coast
6 September 2012	The government announced that NBN fixed wireless services were now available in Geraldton (WA)