

Corporate Plan

2011 – 2013

17 December 2010

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TABLE OF CONTENTS

TABLE OF EXHIBITS	7
1 EXECUTIVE SUMMARY.....	11
1.1 INTRODUCTION AND TIMING OF THE CORPORATE PLAN	11
1.2 OBJECTIVES OF NBN CO	12
1.3 MAJOR ISSUES RELATED TO OBJECTIVES	13
1.4 NBN CO TARGETS FOR JUNE 2013	15
1.5 NBN CO VOLUME ROLLOUT	16
1.6 EXTERNAL BENEFITS.....	16
1.7 STEPS IN DELIVERING THE NATIONAL BROADBAND NETWORK.....	17
1.8 PART OF A 30-YEAR VIEW AND 9.5-YEAR DEPLOYMENT	22
1.9 SUMMARY OF FINANCIAL FORECASTS: PLAUSIBLE SCENARIOS	25
1.10 GOVERNMENT POLICY DECISIONS.....	26
2 BUSINESS ENVIRONMENT	29
2.1 THE ROLE OF NBN CO IN TRANSFORMING THE AUSTRALIAN TELECOMMUNICATIONS INDUSTRY	29
2.2 CURRENT STATE OF AUSTRALIAN TELECOMMUNICATIONS INDUSTRY	31
2.3 WIRELESS-ONLY HOMES (RESIDENTIAL MARKET).....	32
2.4 AUSTRALIAN BROADBAND MARKET	33
2.5 KEY INDUSTRY TRENDS.....	35
2.6 BANDWIDTH DEMAND AND THE ROLE OF FIBRE	38
3 KEY ASSUMPTIONS.....	45
3.1 KEY ASSUMPTIONS IN THE CORPORATE PLAN.....	45
3.2 POLICY SENSITIVITIES	52
4 FORMATION AND CORPORATE STRUCTURE	53
4.1 BRIEF HISTORY	53
4.2 MANAGEMENT STRUCTURE AND KEY ROLES	53
4.3 HUMAN RESOURCE AND INDUSTRIAL RELATIONS.....	55
4.4 FINANCE, PROGRAM MANAGEMENT AND RISK	56
4.5 IT SYSTEMS.....	57
4.6 PROCUREMENT.....	57
5 NETWORK DESIGN AND TESTING.....	61
5.1 NETWORK DESIGN – KEY OBJECTIVES	61
5.2 MAJOR SUPPORT SYSTEMS AND FACILITIES	65
5.3 NETWORK DESIGN TESTING	67
5.4 FIRST RELEASE SITES	68
5.5 NBN TASMANIA	69
5.6 LAST 7%	69
5.7 TYPE 2 PASSIVE NETWORK DESIGN.....	72
5.8 BATTERY BACKUP.....	73
5.9 FUTURE PROOFING THE NBN	75
6 NETWORK CONSTRUCTION	77
6.1 CONSTRUCTION – KEY OBJECTIVES	77
6.2 ACHIEVABILITY OF KEY OBJECTIVES	78

6.3	MAIN ASSUMPTIONS OF THE DEPLOYMENT SCHEDULE	78
6.4	MODULAR DEPLOYMENT	79
6.5	GEOGRAPHIC COVERAGE PRINCIPLES	79
6.6	CONSTRUCTION POLICIES.....	79
6.7	QUALITY CONTROL AND CONTINUOUS IMPROVEMENT	81
6.8	CONSTRUCTION PARTNER SELECTION PROCESS	82
6.9	SUPPLY CHAIN MANAGEMENT.....	82
6.10	WORKFORCE PLANNING – SKILLS AND ASSURANCE.....	83
6.11	SUMMARY OBJECTIVES FOR CONSTRUCTION.....	83
7	COMMERCIAL OPERATIONS	85
7.1	ACCESS SEEKER AND END-USER ACQUISITION.....	85
7.2	NETWORK OPERATIONS AND MAINTENANCE.....	87
7.3	OPERATIONAL READINESS.....	88
7.4	SUMMARY OBJECTIVES FOR COMMERCIAL OPERATIONS	89
8	PRODUCT DEFINITION AND PRICING	91
8.1	PRODUCT & PRICING APPROACH	91
8.2	PRODUCT SUMMARY	91
8.3	FIBRE PRODUCT	93
8.4	WIRELESS PRODUCT	95
8.5	SATELLITE PRODUCT	96
8.6	PRODUCT DEVELOPMENT AND PRODUCT ROADMAP	97
8.7	PRICING	100
8.8	COMPARISON WITH EXISTING AUSTRALIAN WHOLESALE MARKET PRICING	104
8.9	COMPARISON WITH INTERNATIONAL PRICING CONSTRUCTS.....	106
8.10	SPECIAL ACCESS UNDERTAKING WITH THE ACCC	106
8.11	SUMMARY OBJECTIVES FOR PRODUCT DEVELOPMENT ROADMAP.....	107
9	REVENUE FORECASTS	109
9.1	SUMMARY OUTCOMES.....	109
9.2	FOUNDATIONS OF NBN Co’s REVENUE MODEL.....	113
9.3	ADDRESSABLE MARKET	114
9.4	TAKE UP OF BASIC SERVICES.....	115
9.5	RESIDENTIAL AND BUSINESS MARKETS	118
9.6	BENCHMARKING SPEED AND USAGE GROWTH	120
9.7	WIRELESS AND SATELLITE REVENUES.....	131
9.8	RISKS OF THE REVENUE FORECASTS.....	132
10	FINANCIAL FORECASTS	133
10.1	SUMMARY FINANCIAL FORECASTS	134
10.2	DEPLOYMENT PROFILE	134
10.3	TYPE OF DEPLOYMENT FOR THE FIBRE NETWORK: AERIAL VERSUS UNDERGROUND	135
10.4	CAPITAL EXPENDITURE	135
10.5	OPERATING EXPENDITURE.....	135
10.6	WORKING CAPITAL.....	136
10.7	FY2011 BUDGET.....	136
10.8	TAXATION.....	137
11	FUNDING NBN CO.....	139
11.1	DETERMINING NBN Co’s FUNDING REQUIREMENT OVER 3 YEARS AND 30 YEARS.....	139

11.2	FUNDING THE FY2011 TO FY2013 PERIOD.....	140
11.3	PART OF LONG-TERM FUNDING SCENARIOS	141
11.4	ACHIEVABILITY OF DEBT FUNDING	142
11.5	COST OF CAPITAL	143
12	RISK MANAGEMENT	145
12.1	RISK MANAGEMENT SYSTEM.....	145
12.2	CORPORATE PLAN RISKS.....	146
	GLOSSARY OF TERMS.....	151

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TABLE OF EXHIBITS

EXHIBIT 1.1: PREMISES PASSED OR COVERED (INCREMENTAL YEAR-ON-YEAR)	15
EXHIBIT 1.2: PREMISES WITH ACTIVE SERVICE (INCREMENTAL YEAR-ON-YEAR)	15
EXHIBIT 1.3: HIGH LEVEL FTTP TIMELINE TO 30 JUNE 2013	19
EXHIBIT 1.4: CRITICAL DATES FOR THE PROGRAMME PLAN	20
EXHIBIT 1.5: HIGH LEVEL WIRELESS & SATELLITE TIMELINE TO 30 JUNE 2013	21
EXHIBIT 1.6: LONG-TERM TIMELINE	22
EXHIBIT 1.7: SELECTED TARGETS AND PROJECTIONS OF THE FULL DEPLOYMENT PERIOD (FY2011-FY2021)	23
EXHIBIT 1.8: PROFIT AND LOSS (CUMULATIVE, \$ BILLION) (NOMINAL DOLLARS)	24
EXHIBIT 1.9: FUNDING SUMMARY (CUMULATIVE, \$ BILLION) (NOMINAL DOLLARS)	24
EXHIBIT 1.10: SENSITIVITY ANALYSIS IMPACT ON IRR (%)	25
EXHIBIT 1.11: SENSITIVITY ANALYSIS IMPACT ON PEAK FUNDING (\$ BILLION, NOMINAL DOLLARS, LEVERED FUNDING INCLUDING FUNDING COSTS)	25
EXHIBIT 2.1: INDUSTRY DRIVING FORCES	30
EXHIBIT 2.2: NBN CO'S WHOLESALE SERVICES	31
EXHIBIT 2.3: TELECOM INDUSTRY REVENUE SHARE FY2010	31
EXHIBIT 2.4: RESIDENTIAL WIRELESS-ONLY HOMES (ACTUAL) (%)	32
EXHIBIT 2.5: FIXED AND WIRELESS BROADBAND SUBSCRIBERS (ACTUAL) ('000S)	33
EXHIBIT 2.6: FIXED BROADBAND SUBSCRIBERS MARKET SHARE (%)	34
EXHIBIT 2.7: SIOS BY PRODUCT BY CARRIER (JUNE 2010 - ACTUAL) ('000S)	34
EXHIBIT 2.8: BASIC FIXED LINE REVENUES (VOICE AND BROADBAND) (\$ MILLION) (NOMINAL DOLLARS)	35
EXHIBIT 2.9: LEADING ISP'S REPORTED ON-NET BROADBAND ARPUS (\$/MTH) (NOMINAL DOLLARS)	37
EXHIBIT 2.10: FIXED BROADBAND AND TOTAL INTERNET USAGE (GB/MTH)	37
EXHIBIT 2.11: INTERNATIONAL INTERNET BANDWIDTH (2006 TO 2010) (TBPS)	37
EXHIBIT 2.12: DOWNLOAD SPEEDS SINCE 1985	38
EXHIBIT 2.13: BANDWIDTH AND DELIVERY TECHNOLOGIES	39
EXHIBIT 2.14: ADSL: SPEED AND DISTANCE	40
EXHIBIT 2.15: SAE/LTE TRIAL RESULTS FOR LTE	41
EXHIBIT 2.16: HFC COVERAGE AND CONNECTIONS	42
EXHIBIT 2.17: POSSIBLE HFC UPGRADE PATH	42
EXHIBIT 3.1: KEY ASSUMPTIONS - ENVIRONMENT	45
EXHIBIT 3.2: KEY ASSUMPTIONS - PRODUCT, PRICING AND REVENUE	48
EXHIBIT 3.3: KEY ASSUMPTIONS - NETWORK FEATURES	49
EXHIBIT 3.4: SENSITIVITY IMPACT OF KEY POLICY ASSUMPTIONS	52
EXHIBIT 4.1: NBN CO MANAGEMENT STRUCTURE	53
EXHIBIT 4.2: NBN CO DIVISIONAL STRUCTURE	54
EXHIBIT 4.3: NBN CO FINANCE GROUP	56
EXHIBIT 5.1: INFRASTRUCTURE COMPONENTS	61
EXHIBIT 5.2: GPON NETWORK OVERVIEW	62
EXHIBIT 5.3: NBN CO FTTP FOOTPRINT SCENARIOS	64
EXHIBIT 5.4: TRANSIT BACKHAUL RINGS (PROPOSED ONLY*)	65
EXHIBIT 5.5: NETWORK DESIGN TESTING	67
EXHIBIT 5.6: FIRST RELEASE SITES	68
EXHIBIT 5.7: NBN CO WIRELESS FOOTPRINT AND SATELLITE EARTH STATIONS (PROPOSED ONLY*)	71
EXHIBIT 5.8: NBN CO SATELLITE COVERAGE	72
EXHIBIT 5.9: TYPICAL CONNECTION CONFIGURATION FOR NTU, BATTERY BACKUP AND CORDED HANDSETS ..	73
EXHIBIT 5.10: TYPICAL CONNECTION CONFIGURATION FOR NTU, BATTERY BACKUP AND CORDLESS HANDSETS	74
EXHIBIT 5.11: GPON EVOLUTION ROAD MAP	75

EXHIBIT 6.1: DEPLOYMENT SCHEDULE TO FY2021	77
EXHIBIT 6.2: ANNUAL ROLL-OUT COMPARISON WITH OTHER COUNTRIES	78
EXHIBIT 6.3: FTTP NETWORK DIMENSIONS – REPLICATING MODEL	79
EXHIBIT 6.4: NBN CO HSE FRAMEWORK.....	80
EXHIBIT 6.5: FIBRE PREMISES PASSED TARGETS ('000S).....	83
EXHIBIT 7.1: NBN CO NETWORK OPERATIONS FUNCTIONS	87
EXHIBIT 7.2: FIBRE PREMISES CONNECTED TARGETS ('000S).....	89
EXHIBIT 8.1: OVERVIEW OF THE FIBRE, WIRELESS & SATELLITE PRODUCT CONSTRUCT	92
EXHIBIT 8.2: OVERVIEW OF THE NBN CO PRODUCT TRAFFIC CLASSES	93
EXHIBIT 8.3: ILLUSTRATION OF WHERE THE NFAS PRODUCT FITS INTO THE DELIVERY OF AN END-TO-END INTERNET SERVICE	94
EXHIBIT 8.4: PIR SPEEDS AVAILABLE ON FIBRE	94
EXHIBIT 8.5: TRAFFIC CLASSES AVAILABLE ON THE FIBRE ACCESS CIRCUIT	94
EXHIBIT 8.6: OVERVIEW OF THE NBN CO WIRELESS PRODUCT.....	95
EXHIBIT 8.7: TRAFFIC CLASS 4 PEAK INFORMATION RATE SPEEDS AVAILABLE ON WIRELESS	95
EXHIBIT 8.8: TRAFFIC CLASSES AVAILABLE ON THE WIRELESS ACCESS CIRCUIT.....	95
EXHIBIT 8.9: ILLUSTRATION OF WHERE THE NSAS PRODUCT FITS INTO THE DELIVERY OF AN END-TO-END INTERNET SERVICE	96
EXHIBIT 8.10: TRAFFIC CLASS 4 AVAILABLE ON SATELLITE AND ASSOCIATED ACCESS CIRCUIT PRICING.....	97
EXHIBIT 8.11: TRAFFIC CLASSES AVAILABLE ON THE SATELLITE ACCESS CIRCUIT	97
EXHIBIT 8.12: NBN CO PRODUCT DEVELOPMENT PHASES.....	98
EXHIBIT 8.13: TRAFFIC CLASS 4 AVC PIR CHARGES (INCLUDING UNI) (\$/MONTH PER SERVICE) (EXCLUDING GST)	101
EXHIBIT 8.14: ACCESS PRODUCT PIR RATES OVER TIME (OPTION A (1) PROFILE) (NOMINAL DOLLARS).....	101
EXHIBIT 8.15: AVC CIR CHARGES - TRAFFIC CLASS 1 & 2 & 3 (\$/MONTH) (EXCLUDING GST).....	102
EXHIBIT 8.16: FORECAST CVC PRICING BY DATA USAGE (\$ PER MBPS PER MONTH) (NOMINAL DOLLARS).....	103
EXHIBIT 8.17: NNI PORT CHARGES (EXCLUDING GST)	103
EXHIBIT 8.18: ESTIMATED RETAIL PRICING AND DATA DOWNLOAD DISTRIBUTION BY TECHNOLOGY (INCLUDING GST)	105
EXHIBIT 8.19: POINT COOK FIBRE PRICING COMPARISON WITH NBN CO (INCLUDING GST).....	105
EXHIBIT 8.20: KEY OBJECTIVES FOR PRODUCT DEVELOPMENT ROADMAP.....	107
EXHIBIT 9.1: OPTION A (1) AND OPTION A (2) MAJOR ASSUMPTIONS	109
EXHIBIT 9.2: OPTION A (1) REVENUE PLAN - SUMMARY RESULTS	110
EXHIBIT 9.3: OPTION A (1) FIBRE REVENUE COMPONENTS (\$ MILLION) (NOMINAL DOLLARS)	111
EXHIBIT 9.4: OPTION A (2) REVENUE PLAN - SUMMARY RESULTS	111
EXHIBIT 9.5: OPTION A (2) FIBRE REVENUE COMPONENTS (\$ MILLION) (NOMINAL DOLLARS)	112
EXHIBIT 9.6: REVENUE PLAN MODELLING APPROACH	113
EXHIBIT 9.7: MARKET SIZING FORECAST SUMMARY (PREMISES).....	114
EXHIBIT 9.8: GROWTH IN PREMISES (PREMISES)	115
EXHIBIT 9.9: BROWNFIELDS FTTP DEPLOYMENT COVERAGE SCHEDULE	115
EXHIBIT 9.10: CALCULATING TAKE-UP OF BASIC SERVICES AT FY2025	116
EXHIBIT 9.11: FIBRE REVENUE FOR BUSINESS, RESIDENTIAL AND OTHER PRODUCTS (\$ MILLION) (NOMINAL DOLLARS)	118
EXHIBIT 9.12: RESIDENTIAL FIBRE SUBSCRIBER SPLIT BY AVC SPEED TIERS	118
EXHIBIT 9.13: BUSINESS FIBRE SUBSCRIBER SPLIT BY AVC SPEED TIERS	119
EXHIBIT 9.14: AUSTRALIAN AVERAGE DATA USAGE PER USER, HISTORICAL PROFILE	120
EXHIBIT 9.15: AUSTRALIAN DATA USAGE JUNE 2010	121
EXHIBIT 9.16: HONG KONG BROADBAND INTERNET TRAFFIC (TB)	122
EXHIBIT 9.17: HONG KONG BROADBAND INTERNET TRAFFIC – HISTORICAL PROFILE.....	122
EXHIBIT 9.18: HONG KONG BROADBAND INTERNET GB/USER – HISTORICAL PROFILE	123

EXHIBIT 9.19: HONG KONG BROADBAND INTERNET GB/USER – HISTORICAL PROFILE	123
EXHIBIT 9.20: GLOBAL IP TRAFFIC, 2009-2014	125
EXHIBIT 9.21: SPEED HISTORICAL PROFILE AND MARKET EXPECTATIONS ACCORDING TO ALCATEL-LUCENT ..	126
EXHIBIT 9.22: DATA USAGE OPTION A (1) AND OPTION A (2) PROJECTIONS	127
EXHIBIT 9.23: AVERAGE SPEED OPTION A (1) AND OPTION A (2) PROJECTIONS	128
EXHIBIT 9.24: OVERALL FIBRE SUBSCRIBER SPLIT BY AVC SPEED TIERS AND AVERAGE SPEED.....	129
EXHIBIT 9.25: BROADBAND USE CASES	130
EXHIBIT 9.26: BROADBAND SPEED REQUIREMENTS VARY FOR DIFFERENT APPLICATIONS	131
EXHIBIT 9.27: SATELLITE AND WIRELESS REVENUE (\$ MILLION) (NOMINAL DOLLARS)	132
EXHIBIT 10.1: KEY FINANCIAL PERFORMANCE INDICATORS (NOMINAL DOLLARS).....	133
EXHIBIT 10.2: CRITICAL DATES IN FINANCIAL FORECASTS	133
EXHIBIT 10.3: SUMMARY FINANCIALS (NOMINAL DOLLARS)	134
EXHIBIT 10.4: PREMISES PASSED AND CONNECTED BY FY2021	134
EXHIBIT 10.5: CAPITAL EXPENDITURE (\$ MILLION) (NOMINAL DOLLARS).....	135
EXHIBIT 10.6: OPERATING EXPENDITURE (\$ MILLION) (NOMINAL DOLLARS).....	135
EXHIBIT 10.7: FY2011 CAPITAL EXPENDITURE BUDGET (\$ MILLION) (NOMINAL DOLLARS)	136
EXHIBIT 10.8: FY 2011 OPERATING EXPENDITURE (\$ MILLION) (NOMINAL DOLLARS)	136
EXHIBIT 11.1: NBN CO'S UNLEVERED FUNDING REQUIREMENT (\$ BILLION) (NOMINAL DOLLARS)	139
EXHIBIT 11.2: NBN CO'S FORECAST EQUITY FUNDING REQUIREMENT (\$ MILLION) (NOMINAL DOLLARS)*	140
EXHIBIT 11.3: NBN CO'S FUNDING PROFILE (DEBT AND EQUITY) TO FY2028 (\$ BILLION)	141
EXHIBIT 11.4: NBN CO'S FORECAST EBITDA AND ESTIMATED CUMULATIVE DEBT CAPACITY TO FY2028 (\$ BILLION)	141
EXHIBIT 11.5: NBN CO'S FORECAST EQUITY FUNDING REQUIREMENT (\$ MILLION) (NOMINAL DOLLARS).....	142
EXHIBIT 11.6: INDICATIVE WACC PROFILE (NBN CO COMPARED TO 10-YEAR BOND RATE AND 5-YEAR BBSW) (%)	143
EXHIBIT 11.7: WACC VALUES UNIVERSE	144

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1 EXECUTIVE SUMMARY

1.1 Introduction and Timing of the Corporate Plan

This Corporate Plan (**Corporate Plan** or the **Plan**) sets out the key objectives and priorities for NBN Co Limited (**NBN Co** or **the Company**) for the three years from 1 July 2010 to 30 June 2013.

The Corporate Plan is a critical part of the process of designing, building and operating the National Broadband Network (**NBN**) and achieving the Government's objective of providing affordable superfast broadband to all Australians, including through structural reform of the Australian telecommunications industry.

The purpose of the Corporate Plan is to identify and address:

- 1 The key objectives set by the Government for NBN Co during the term of the Corporate Plan;
- 2 The key assumptions made by NBN Co in developing the Corporate Plan;
- 3 How NBN Co will measure its achievement of core financial and operational objectives;
- 4 The major challenges expected to be faced by NBN Co in meeting its objectives;
- 5 The critical risks to the Company, and strategies for mitigating those risks;
- 6 The critical Government policy issues that will impact NBN Co's ability to achieve its objectives;
and
- 7 The financial forecasts, including funding requirements during the term of the Corporate Plan.

The Corporate Plan is prepared in accordance with the requirements of the Commonwealth Authorities Companies Act 1997 and Governance Arrangements for the Commonwealth Government Business Enterprises (June 1997).

The Corporate Plan was prepared with regard to the timing objectives set by the correspondence from Shareholders Ministers between June and December 2010.

1.2 Objectives of NBN Co

1.2.1 Key Objectives

The Government has stated its broad objectives for the NBN as follows:

“The new superfast network will:

- *Connect homes, schools and workplaces with optical fibre (fibre to the premises or ‘FTTP’), providing broadband services to Australians in urban and regional towns with speeds of 100 megabits per second – 100 times faster than those currently used by most people extending to towns with a population of around 1,000 or more people;*
- *Use next generation wireless and satellite technologies that will be able to deliver 12 megabits per second or more to people living in more remote parts of Australia;*
- *Provide fibre optic transmission links connecting cities, major regional centre and rural towns;*
- *Be Australia’s first national wholesale-only, open access broadband network;*
- *Be built and operated on a commercial basis by a company established at arm’s length from the government and involve private sector investment; and*
- *Be expected to be rolled-out, simultaneously, in metropolitan, regional and rural areas.”¹*

To design, build and operate the broadband network required as the foundation of the Government’s NBN policy the Government established NBN Co on 9 April 2009 as a Company under Corporations Law and operates under the Commonwealth Authorities Companies Act, 1997.

NBN Co’s understanding of its objectives has been enhanced by correspondence from the Government. NBN Co’s objectives can be summarized as:

1. The network should be designed to provide an open access, wholesale only, national network;
2. The technologies utilised should be Fibre to 93% of premises (including Greenfields developments) (defined in this Plan as the **Fibre Network**), Fixed Wireless to 4% of premises (delivering at least 12Mbps) (defined in this Plan as the **Fixed Wireless Network** or **Wireless Network**), and Satellite to 3% of premises (defined in this Plan as the **Satellite Network**);
3. NBN Co should offer uniform national wholesale pricing over the network, from a PoI to a premises, on a non-discriminatory basis; and
4. The expected rate of return should, at a minimum, be in excess of current public debt rates.

¹ Senator the Hon. Stephen Conroy, 7 April 2009, Joint Media Release – Prime Minister, Treasurer, Minister for Finance, Minister for Broadband, http://www.minister.dbcde.gov.au/media/media_releases/2009/022.

1.3 Major Issues Related to Objectives

This Corporate Plan is based on the premise that the Government's intention is to build the NBN as the sole fixed line network from premises to PoI, other than fixed line infrastructure already in existence as at 1 January 2011, and on the assumption that Telstra will structurally separate and migrate its customer base to the NBN. This Corporate Plan therefore assumes that appropriate mechanisms will be established by the Government to prevent the NBN from being "cherry-picked" in commercially attractive areas.

1.3.1 Cherry Picking

In building the NBN to meet the objectives set by the Government, NBN Co recognises that there are segments of the market that are not commercially viable. There are also areas of the market where an FTTP rollout would be commercially viable and, hence, attractive to other market participants. These areas include Greenfields estates and denser suburbs with a high income demographic.

Given NBN Co's initial focus on regional areas and the need to cross-subsidise non-commercially viable market segments, NBN Co will not be able to compete effectively with cherry pickers, who focus on commercially attractive areas only.

The Plan assumes effective regulatory protection to prevent opportunistic cherry picking as set out in the Government's Statement of Expectations. New fibre networks built after 1 January 2011 for residential and small business purposes will need to be Layer 2, wholesale only and open access. NBN Co will retain the option of overbuilding infrastructure. The Government will consider the introduction of a levy, if necessary, to prevent opportunistic Cherry Picking.

1.3.2 Points of Interconnect (PoIs)

In designing the network, NBN Co has made design trade-offs, some of which have implications for industry structure. The most significant of these network design trade-offs relates to the number and location of Points of Interconnect (**PoIs**).

In proceeding with a network design based on 14 centralised PoIs, NBN Co placed priority on achieving minimum wholesale input costs for Access Seekers, eliminating any single point of failure above the Fibre Distribution Hub and providing for rapid traffic growth in all backhaul links due to increasing video applications.

NBN Co has now reflected the Government's policy choice of a semi-distributed PoI model in this plan. NBN Co has worked with the ACCC to apply the ACCC "competition criteria" for PoI locations. The application of the ACCC's criteria has resulted in 120 PoIs,² and this has been reviewed by the ACCC.

In addition:

- NBN Co has reflected the Government's decision that the Company should implement an internal cross-subsidy to provide uniform national wholesale pricing over the network, from a PoI to a premises.

² If additional PoIs are required to be established over time, the implications to the Business Model of an increase in PoIs will need to be considered.

- NBN Co is proceeding on the assumption that the ACCC will make access determinations for currently regulated transmission routes (with effect from 1 January 2011) and that the ACCC will also monitor pricing on currently exempted routes and, if necessary, will act promptly to re-examine exemptions in the event that pricing on those routes is not aligned with the ACCC's access determinations for regulated routes.

Since NBN Co has been designing and planning on the basis of 14 centralised Poles since May 2010, there is an impact on deployment timing, costs and End-User take-up of moving to a semi-distributed Pole model, which has now been reflected in this Plan.

1.3.3 Unbundling and Separation

NBN Co has proceeded with its network and system design on the basis that it would provide a layer 2 bitstream service only, using predominantly a GPON architecture. The company is not preparing for the provision of layer one services, layer one unbundling, functional or structural separation.

However, as directed by Government, a trial of 'Home Run' architecture will take place in a Greenfields site in 2012 and NBN Co will establish an asset register and cost allocation methodology for asset and cost, but not revenue accounting.

1.4 NBN Co Targets for June 2013

Within the broader objectives outlined above, NBN Co has identified a number of specific high level deployment targets to be achieved by 30 June 2013.

These targets have been prepared from NBN Co Management's high level assessment of the of the change to 120 Pols rather than 14 Pols and the limitations a semi-distributed Pol system places on the sequence in which geographies can be rolled out. The targets and roll-out sequencing are informed by NBN Co's presumption that it will be the sole provider of fixed line network from premises to Pol, in effect roll-out sequencing will be based on engineering and national factors, instead of a need to compete with other carriers pre-emptively cherry-picking attractive markets.

Exhibit 1.1: Premises Passed or Covered (incremental Year-on-Year)

	FTTP Brownfields	FTTP Greenfields Build	FTTP Greenfields BOT	Satellite First Release	Wireless	Total
June 2011	13,000	-	45,000	165,000	-	223,000
June 2012	132,000	7,000	120,000	-	14,000	273,000
June 2013	805,000	63,000	84,000	-	269,000	1,221,000
Total	950,000	70,000	249,000	165,000	283,000	1,717,000

Source: NBN Co

Note: Premises rounded to the next thousands.

A premise is passed / covered when the shared network and service elements are installed, accepted, commissioned and ready for service which then enables an end user to order and purchase a broadband service from their choice of retail service provider.

Exhibit 1.2: Premises with Active Service (Incremental Year-on-Year)

	FTTP Brownfields	FTTP Greenfields Build	FTTP Greenfields BOT	Satellite First Release	Wireless	Total
June 2011	-	-	35,000	-	-	35,000
June 2012	5,000	5,000	92,000	13,000	1,000	116,000
June 2013	255,000	55,000	64,000	20,000	25,000	419,000
Total	260,000	60,000	191,000	33,000	26,000	570,000

Source: NBN Co

Note: Premises rounded to the next thousands.

A premise is activated when a valid service order is received to install the dedicated optic fibre cable connection to the premises, optical network termination unit and reliable power supply unit with battery backup option (for Fibre premises).

These targets are indicative as the rollout is dependent on:

- **The availability of exchange facilities for the location of the semi-distributed Poles;**
- **Negotiations yet to finalise on commercially attractive terms the procurement of Greenfields Build-Operate-Transfer (BOT); and**
- **Securing contracts with suppliers and construction contractors on competitive terms and conditions.**

1.5 NBN Co Volume Rollout

Following the ramp-up into volume rollout described in the section above, a full deployment rate of almost 6,000 premises passed per day is planned for FY2014. A significant risk to achieving this planned rate, and hence, the volume deployment plan, is a possible economy-wide shortage of available construction resources at an acceptable cost. In particular, this will be dependent on the overall market demand for labour. NBN Co will work with the training industry to ameliorate the impacts of possible labour shortages.

A second issue which could impact on the number of new Greenfields premises available to be connected is the capacity of the housing construction industry. If new start housing was to be significantly impacted by labour shortages there would be a consequent impact on NBN Co's financials.

1.6 External Benefits

The Government has established NBN Co to design, build and operate a broadband network that satisfies the four objectives laid out in Sub-Section 1.2.1, *Key Objectives*.

It is NBN Co's understanding that once the NBN is available the Government will want to pursue the achievement of public policy objectives in the areas of healthcare, education, aged care and other areas, as deemed appropriate by Government. These additional services and policy objectives are not part of NBN Co's remit and hence, do not form part of NBN Co's Corporate Plan.

Sub-Section 1.2.1, *Key Objectives*, notes that the Government, as owner of NBN Co, must achieve a rate of return from its investment in NBN Co in excess of current public debt rates. This means the Government must receive its capital back plus interest.

This Corporate Plan sets out how this will be achieved.

NBN Co, which is the corporate entity charged with designing, building and operating the underlying broadband infrastructure, is an enabler of the Government's broader NBN policy objectives.

The Government has made numerous statements regarding the benefits Australian society can expect as a result of having access to the NBN Co (in addition to the financial return the Government will have as owners of NBN Co).

Numerous community and industry bodies have also made comments regarding the benefits specific communities and industries can expect as a result of having access to the NBN Co network.

It is not part of NBN Co's role to determine the nature, magnitude or prioritisation of these additional benefits, commonly known as 'externalities'.

Nevertheless, NBN Co intends to identify relevant market developments and trends for vertical segments in order to inform its product roadmap prioritisation. This is described in Section 8.6, *Product Development & Product Roadmap*, of this document. NBN Co anticipates commissioning an external company to undertake an analysis of the commercial impact of these trends.

1.7 Steps in Delivering the National Broadband Network

1.7.1 Achievability of the Programme Plan Timeline and Objectives

The major objectives and timeline described in this section have been informed by the recent policy decisions and announcements from the Shareholder.

Dependencies remain with regards to the execution of Government policies (and other matters external to NBN Co) as well as the progress of the negotiations with Telstra.

Therefore, the timeline and objectives may become impacted and would need to be revisited if these dependencies are not finalised within the timeframe NBN Co has currently assumed (as described in this Plan).

1.7.2 Annual Updates

The assumptions made by the Company, which underpin the Plan, together with the business strategies and development of capabilities of the business, how the Company will measure its achievement of the financial and operational objectives, and the management of risk and mitigation strategies, will be reviewed on a regular basis to take into account ongoing developments. Accordingly, it is anticipated that the Plan will be updated at least once a year.

1.7.3 ACCC Special Access Undertaking (SAU) Process

NBN Co's announced intention is to lodge a Special Access Undertaking (**SAU**) for approval by the Australian Competition and Consumer Commission (**ACCC**). NBN Co's proposed approach to the SAU is further detailed in Section 8.10, *Special Access Undertaking with the ACCC*, below.

NBN Co has previously indicated its view that the SAU could be finalised and lodged with the ACCC once key policy matters such as the number and location of Pols and the approach to uniform national wholesale pricing were finalised. Further, while the current regulatory regime provides for SAUs, NBN Co considers that it would be preferable if it did not lodge its SAU until both the Competition and Consumer Safeguards Bill (**CCS Bill**) and the NBN Companies and Access Arrangements Bills have been passed and have commenced. Together, these Bills contain amendments which affect the way NBN Co will operate and the powers of the ACCC in relation to the SAU.

Now that policy decisions with regards to Pols and uniform wholesale national pricing have been made, and assuming that the CCS Bill commences in the form that it was passed and that the NBN Companies and Access Arrangements Bills are also passed and commenced in the first quarter of 2011, NBN Co is assuming the following timeline in relation to its SAU:

- Lodgement on or before 31 March 2011 at the earliest (or as soon as feasible after the Bills commence);
- The ACCC is subject to a statutory timeframe of 6 months to accept or reject the SAU, subject to extensions of time and 'stop clocks' (for example while the ACCC is waiting for information it may request from NBN Co); and
- Accordingly, it is unlikely that NBN Co will have an approved SAU in place until the final calendar quarter of 2011.

NBN Co is actively engaging with the ACCC in developing the SAU.

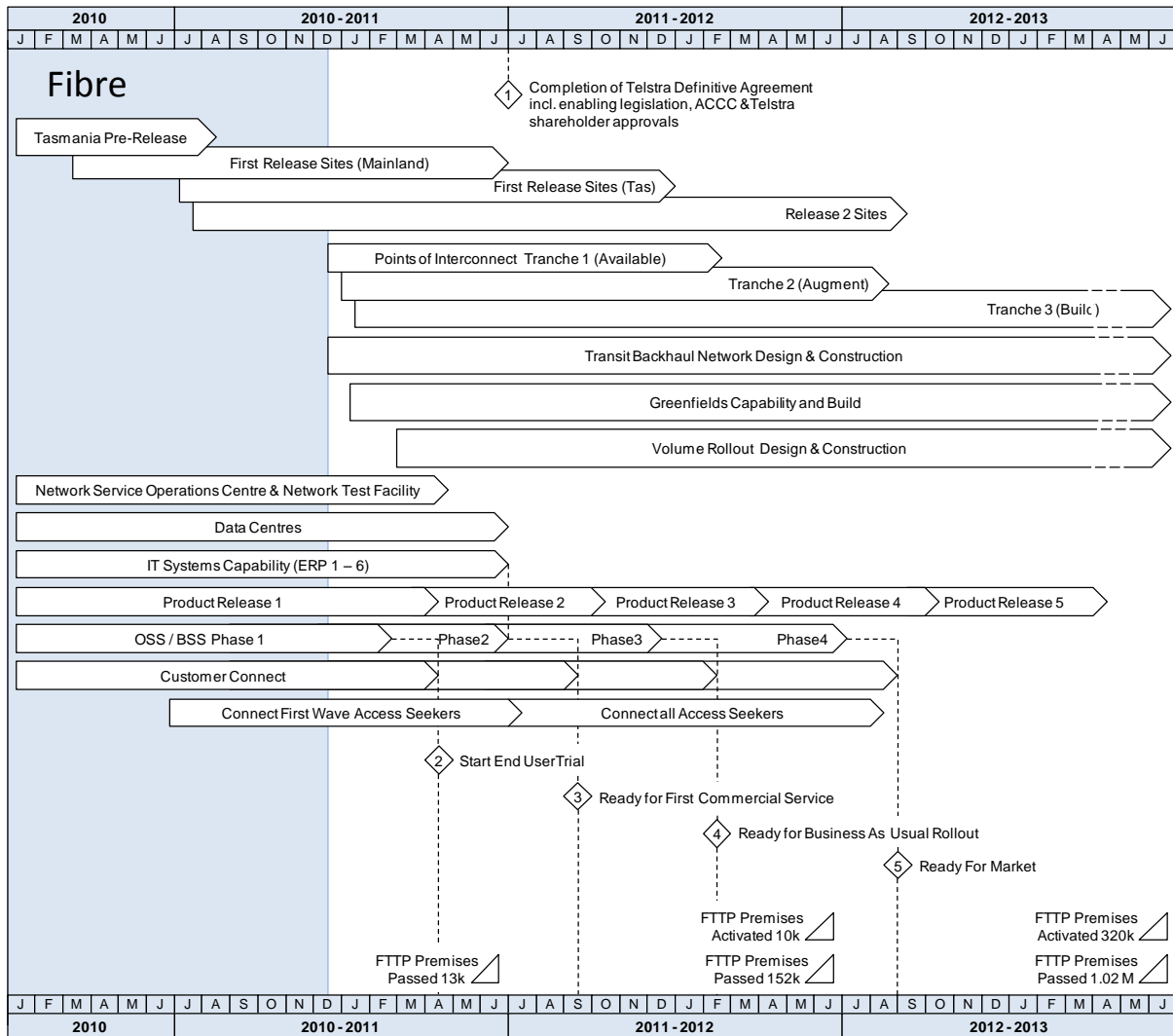
1.7.4 Timeline and Critical Dates

There are five broad areas of work required in the delivery of the National Broadband Network:

1. Establishing NBN Co;
2. Network Design and Testing;
3. Network Construction;
4. Commercial Operations; and
5. Product Definition and Pricing.

The first area, Establishing NBN Co is now substantially complete, subject to the passing of enabling legislation. The corporate structure and key roles and responsibilities within NBN Co are discussed in Section 4, *Formation and Corporate Structure*. The period covered by the FY2011-FY2013 Corporate Plan primarily addresses the other areas: Section 5, *Network Design and Testing*, Section 6, *Network Construction*, Section 7, *Commercial Operations*, and Section 8, *Product Definition and Pricing*.

Exhibit 1.3: High Level FTTP timeline to 30 June 2013



Source: NBN Co

Note: The dates stated above do not include the timing delays as a result of legislative timing and the requirement to hold an 8-week consultation process regarding Points of Interconnect.

NBN Co has identified five critical dates in the overall programme plan for FTTP:

Exhibit 1.4: Critical Dates for the Programme Plan

Critical Date	Activity	Objectives
April 2011	Start End-User Trial	Capability to connect at least one mainland based Retail Service Provider (RSP) with up to 400 trial End-Users offering a free subset of products to test preparedness. All NBN Co support with manual processes.
June 2011	Completion of Telstra Definitive Agreements	All Conditions Precedent satisfied, including enabling legislation, and required approvals.
September 2011	Ready for First Commercial Service	Capability to fulfil, activate and assure a limited number of products with multiple RSPs. Supported with a combination of basic semi-automated and manual processes.
February 2012	Ready for Business as Usual Roll-out	Capability to fulfil, activate and assure an increased number of products with multiple RSPs. Supported with a combination of advanced semi-automated and manual processes.
August 2012	Ready for Market	Fully automated systems, no limitation in activating as a percentage of premises passed. Multiple RSPs certified; critical volume available and predictable. Operations capability can fulfil and assure the NBN Co suite of products at scale.

Source: NBN Co

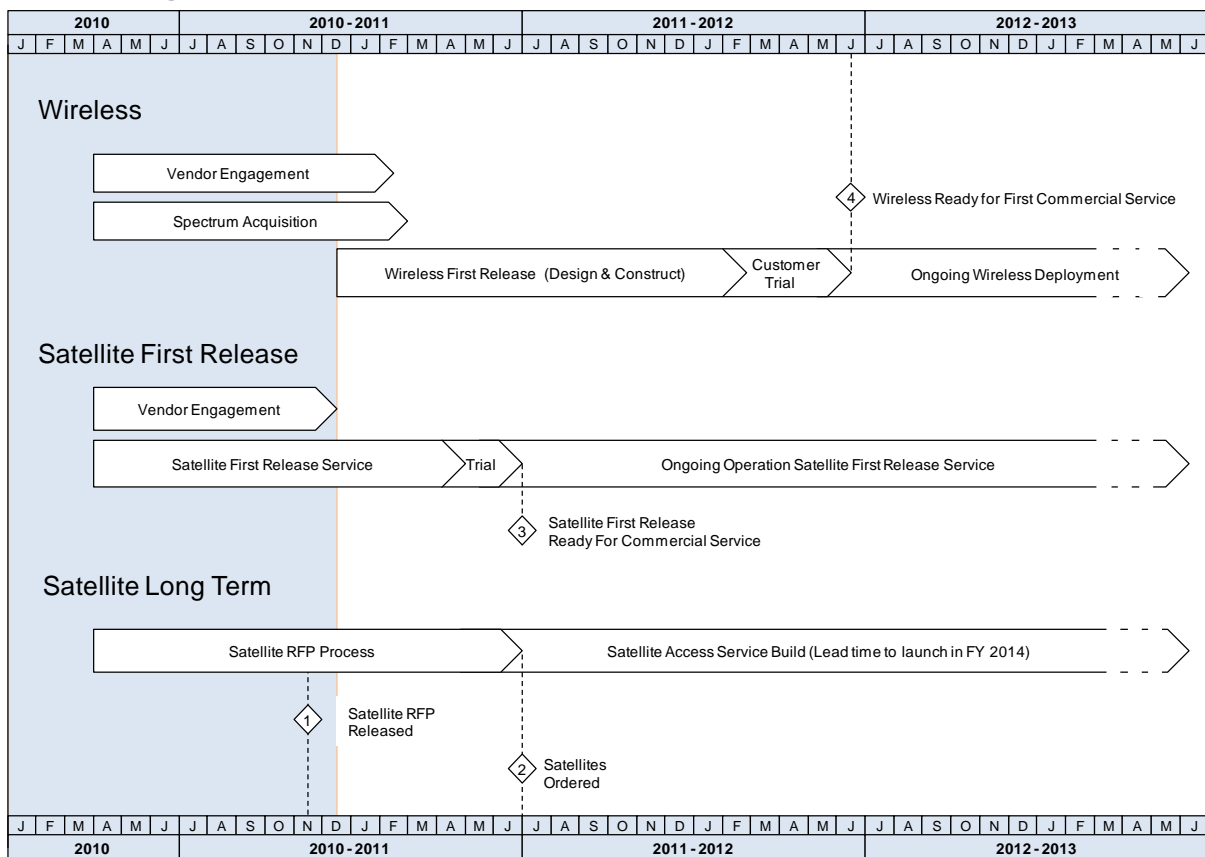
The period to August 2012 will be focussed on the establishment of key systems required to support the roll-out of the NBN. This includes detailed testing of NBN Co's network design and construction methodologies through the establishment of a test lab, the early roll-out of FTTP in twelve First Release Sites (see Section 5.4, *First Release Sites*) (five mainland First Release Sites and seven sites in Tasmania). It also encompasses completion of essential support systems - including OSS/BSS and ERP - that need to be in place before full scale Access Seeker activations can commence.

NBN Co is currently scaling up the FTTP deployment from the First Release Sites (**FRS**) to full-scale network construction. It is anticipated that, following evaluation of the lessons learned from the First Release Sites, a series of 'Release 2 Sites' already announced (14 new sites on mainland in addition to 5 first release sites), will be used to refine construction methodologies and systems once the OSS/BSS and other critical support systems are in place and operational. Detailed design of the Release 2 Sites (FRS augmentation) has commenced in November 2010. The planning of the Tasmanian First Release Sites and for the mainland Second Release Sites is currently being reviewed in light of the move to a semi-distributed PoI model. The availability of the 120 semi-distributed Pols will impact the current planning for First Release and Release 2 Sites; NBN Co is currently investigating how best to mitigate this impact.

During FY2011, NBN Co will also be designing and constructing the wireless solution and preparing for the satellite procurement for the 'Last 7%'. NBN Co is currently progressing with negotiations for wireless spectrum acquisition. After an expedited procurement process, the Company expects construction of the main wireless network to start in December 2011, following a series of proof of concept and First Release sites aimed at finalising key decisions around spectrum and wireless network build options.

The long lead times in satellite construction and launch mean that NBN Co does not expect to have its own satellites in orbit until FY2015. However, the Company expects to be able to offer an interim satellite solution, called Satellite First Release Sites, from June 2011 using spare capacity on existing satellites in order to provide continuity following on from the existing Government Australian Broadband Guarantee (ABG) program expected to cease on 30 June 2011.

Exhibit 1.5: High Level Wireless & Satellite Timeline to 30 June 2013



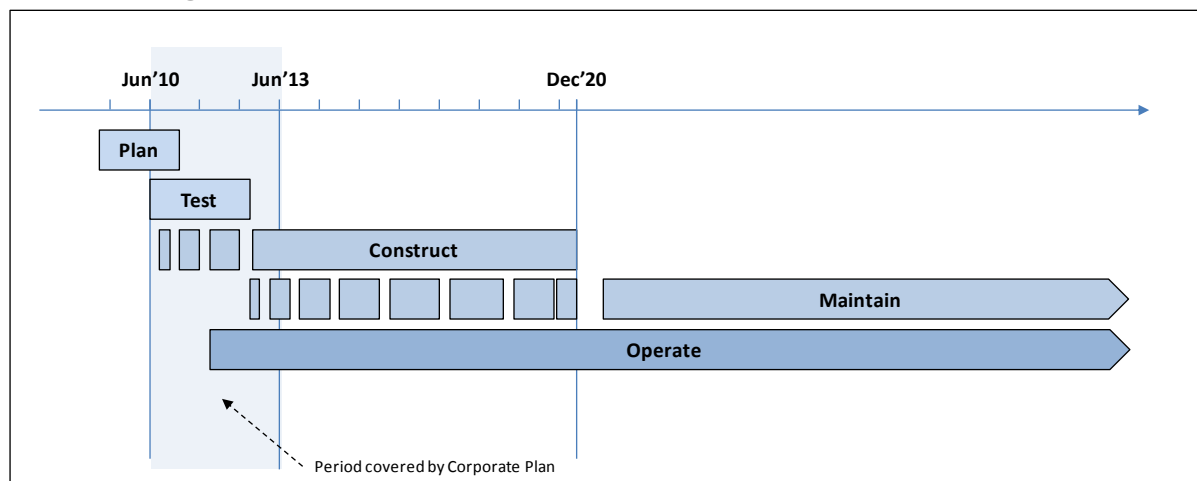
Source: NBN Co

Note: The dates stated above have not included any provision for timing delays.

1.8 Part of a 30-year View and 9.5-Year Deployment

The construction of the NBN is estimated to take 9.5 years to complete in a Telstra deal scenario (see Section 3, *Key Assumptions*), since NBN Co has access to existing underground infrastructure, exchange space and transit backhaul. The economic viability of NBN Co requires a long-term view extending well beyond this period, typical of any major infrastructure project. It is therefore important that the 3-year Corporate Plan is viewed in the context of the long-term business model for NBN Co.

Exhibit 1.6: Long-Term Timeline



Source: NBN Co

The Corporate Plan is an integral part of NBN Co's 30-year business model, which has been developed to assess the long-term viability of the Company, to articulate clear long-term objectives for the Company and to determine the long-term funding needs of NBN Co.

Whilst the Corporate Plan focuses on the 3 years from 1 July 2010 to 30 June 2013, Section 10, *Financial Forecasts* and Section 11, *Funding NBN Co*, specifically address the Corporate Plan in the context of the 30-Year business model. High level assumptions underlying the Corporate Plan are included in Section 3, *Key Assumptions*.

1.8.1 The Corporate Plan Projections and the NBN Full Deployment

The Corporate Plan targets are developed to achieve full deployment by December 2020, which would be nine and a half years from the Telstra agreements becoming unconditional by end June 2011. The major outcomes of the full deployment objectives are illustrated in Exhibit 1.7.

The forecasts include a substantial element of replacement and maintenance capital expenditure to achieve technological robustness of the three platforms (fibre, wireless and satellite).

Exhibit 1.7: Selected Targets and Projections of the Full Deployment Period (FY2011-FY2021)

Targets & Projections	Full Deployment Key Metrics (Rounded) (Nominal Dollars)
Coverage	<ul style="list-style-type: none"> ▪ 13 million premises covered by FY2021, 93% by the Fibre Network (12 million), 7% by the Wireless Network or the Satellite Network.
FTTP Network Characteristics	<ul style="list-style-type: none"> ▪ 181,000km of Gigabit-capable Passive Optical Network (GPON) (physical distances). ▪ 25% of premises in the local network to be passed aurally. ▪ 57,000km of Transit Backhaul.
Greenfields	<ul style="list-style-type: none"> ▪ NBN Co to pass all Greenfields developments by the end of the deployment, representing 2 million premises in the fibre footprint. ▪ NBN Co sub-contracts the roll-out and operation of fibre networks in new developments; the networks are built to meet the technical specifications of the NBN and operated on an open access basis.
Capital Expenditure (to Dec 2020)	<ul style="list-style-type: none"> ▪ \$35.9 billion total Capex to the end of deployment period (of which \$1.3 billion for Replacement & Maintenance and \$10.0 billion for fibre connections).
Revenues (to Dec 2020)	<ul style="list-style-type: none"> ▪ \$20.8 billion total forecast revenues.
Operating Expenditure (to Dec 2020)	<ul style="list-style-type: none"> ▪ \$21.8 billion total forecast operating expenditure; of which \$13.7 billion are related to decommissioning and infrastructure payments.³
Cumulative EBITDA (to Dec 2020)	<ul style="list-style-type: none"> ▪ \$(1) billion of cumulative EBITDA to be funded prior to the end of the deployment period.
Levered Funding (to FY2021)	<ul style="list-style-type: none"> ▪ Estimate of \$27.5 billion of Government equity. ▪ Estimate of \$13.4 billion of debt funding. ▪ Together, a total funding requirement of \$40.9 billion (including funding costs).
Internal Rate of Return (IRR)	<ul style="list-style-type: none"> ▪ 7.04% rounded to 7.0%.

Source: NBN Co

³ Based on Telstra Financial Heads of Agreement (**FHOA**), signed 20 June 2010. Nominal Dollars in year when incurred.

The financial targets of the Plan can be summarised in the following simplified profit and loss accounts and applications and sources of funds for the period to FY2013 and to December 2020, respectively.

Exhibit 1.8: Profit and Loss (Cumulative, \$ Billion) (Nominal Dollars)

To the End of the 3-Year Corporate Plan (July 2010 to June 2013) (Cumulative \$ Billion – Nominal Dollars)				To the End of the Full Deployment (July 2010 to December 2020) (Cumulative \$ Billion – Nominal Dollars)			
Profit & Loss (Cumulative, July 2010 to June 2013)				Profit & Loss (Cumulative, July 2010 to December 2020)			
	(\$bn)		(\$bn)		(\$bn)		(\$bn)
Operating Expenses	2.0	Revenues	0.2	Operating Expenses	21.8	Revenues	20.8
Cumulative EBITDA	(1.8)			Cumulative EBITDA	(1.0)		

Source: NBN Co

Exhibit 1.9: Funding Summary (Cumulative, \$ Billion) (Nominal Dollars)

To the End of the 3-Year Corporate Plan (July 2010 to June 2013) (Cumulative \$ Billion – Nominal Dollars)				To the End of the Full Deployment (July 2010 to December 2020) (Cumulative \$ Billion – Nominal Dollars)			
Funding Summary (Cumulative, July 2010 to December 2013)				Funding Summary (Cumulative, July 2010 to December 2020)			
	(\$bn)		(\$bn)		(\$bn)		(\$bn)
FY2010 Cash Flow	0.1	Equity	9.2	FY2010 Cash Flow	0.1	Equity	27.5
Cumulative EBITDA (July 2010 to June 2013)	1.8	Debt	-	Cumulative EBITDA (July 2010 to December 2020)	1.0	Debt	12.9
Capital Expenditure	7.0	Interest Earned	0.0	Capital Expenditure	35.9	Interest Earned	0.1
Working Capital	(0.3)			Working Capital	0.0		
Distributions to Equity	-			Distributions to Equity	-		
Cash Interest Paid	-			Cash Interest Paid	2.8		
Tax	-			Tax	-		
Cash at Bank	0.6			Cash at Bank	0.6		
Total Applications	9.2	Total Sources	9.2	Total Applications	40.5	Total Sources	40.5
				Last 6 Months Funding Requirement to FY2021	0.4	Last 6 Months Debt Funding to FY2021	0.4
				Total Applications to FY2021	40.9	Total Sources to FY2021	40.9

Source: NBN Co

Note: Distributions to Equity: the Corporate Plan embeds an assumption of debt raising, which if successful will provide a mechanism to distribute surplus cash and repay equity over time after the end of the Construction period.

Debt Funding: it has been assumed that Debt Funding equivalent to 33% of total funding required over the period FY2011-FY2021 would be raised; if actual debt raised at the time was lower than projected, then Equity Funding by Government would need to be increased.

1.9 Summary of Financial Forecasts: Plausible Scenarios

Detailed financial forecasts are provided in Section 10, *Financial Forecasts*. Based on the assumptions set out in this Plan, NBN Co expects to generate a financial return in excess of current public debt rates under most plausible scenarios (see Exhibit 1.10).

All plausible scenarios assume NBN Co is the sole provider of fixed line network from premises to Poles and variations are built on:

- **Construction scenarios** based on high, medium and low assumptions of distances, labour and material productivity rates as well as civil costs; and
- **Demand and Average Revenue Per User (ARPU) scenarios** based on high, medium and low revenue per user and residential wireless substitution. In particular, plausible scenarios vary around revenue variables such as wireless substitution for the residential market, initial pricing of the Fibre products (speeds and usage) and growth of demand over time compounded with price decreases.

Further analysis of Internal Rate of Return (IRR) and other sensitivities is included in Section 3, *Key Assumptions*, for policy dependencies, Section 9, *Revenue Forecasts*, and Section 10, *Financial Forecasts*.

Exhibit 1.10: Sensitivity Analysis Impact on IRR (%)

Internal Rate of Return (IRR)			
Scenarios	High Construction Costs	Mid Construction Costs	Low Construction Costs
Mid Demand - high ARPU	7.6%	8.3%	8.8%
Mid Demand - mid ARPU	6.3%	7.0%	7.6%
Low Demand - low ARPU	5.3%	6.1%	6.7%

Source: NBN Co

Note: Internal Rate of Return (IRR) rounded to 1 decimal point.

Exhibit 1.11: Sensitivity Analysis Impact on Peak Funding (\$ Billion, Nominal Dollars, Levered Funding including Funding Costs)

Peak Funding (in \$ billion)			
Scenarios	High Construction Costs	Mid Construction Costs	Low Construction Costs
Mid Demand - high ARPU	43.1	39.5	36.5
Mid Demand - mid ARPU	44.6	40.9	37.9
Low Demand - low ARPU	44.3	40.6	37.5

Source: NBN Co

Note: Peak Funding corresponds to peak total funding requirement over the period FY2011-FY2021. It includes assumed interest costs for debt funding, and therefore refers to levered funding. It is expressed in nominal terms, i.e. funding at the time it is forecast to be incurred.

These returns would not attract investors from the start but may be acceptable to the Government.

The NBN Co Executive team is expected to manage the dynamics of the business to converge to the central case over time.

1.10 Government Policy Decisions

The policy decisions made by the Government in relation to the NBN to date have been communicated to NBN Co and are reflected in the CCS Bill and NBN Companies and Access Arrangements Bills. Recently, the Government has communicated to NBN Co a number of decisions in relation to outstanding policy matters.

The most recent decisions have been integrated into this Plan and they relate to:

- **Points of Interconnect (Pols) and the Implementation of Uniform National Wholesale Pricing (UNWP)** – based on the work undertaken by NBN Co, under the guidance of the ACCC, has resulted in a list of 120 Pols to be deployed by NBN Co;
- **NBN Co’s Role in New Real Estate Developments (Greenfields)** – NBN Co, itself or using subcontractors, will provide fibre in developments that fall within its long term fibre footprint for the following:
 - All ‘broadacre’ developments (new housing developments);
 - ‘Infill’ developments (housing development sites within existing urban areas) in areas where it has rolled out its fibre network in a region; and
 - ‘Infill’ developments in which 100 or more premises are built within a 36-month period in areas where NBN Co has not yet rolled out its network;

as per the Policy Statement issued on 9 December 2010;⁴

- **Greenfields Pits & Pipes** – legislation to be introduced in early 2011 that will make it mandatory for developers who are corporations to install fibre ready pit and pipe (including conduit lead-ins) in new developments, and to provide access to this infrastructure;

Home Run Greenfields Fibre Trial – to be conducted in a new development, by early 2012. The Government has confirmed that there will be no requirement to conduct a trial in a Brownfields site. The plan assumes it will conduct a Greenfield’s trial and any decision on any home run architecture would be made following this trial. The Plan assumes there will be no need to provide for Layer 1 unbundling and Home Run architecture following the Greenfields trial. The Plan would require substantial additional Capex adjustment and significant network and OSS/BSS redesign should NBN Co subsequently be directed to deploy Home Run architecture or provide for Layer 1 unbundling;

- **Accounting Separation and Preparing for Future Structural Separation** –Government has requested NBN Co to prepare for possible future structural separation by implementing

⁴ http://www.dbcde.gov.au/broadband/national_broadband_network/fibre_in_new_developments.

accounting separation in consultation with the ACCC, covering assets and costs, but not revenues;

- **Facilities Access and Carrier Powers and Immunities** - The Government has agreed, subject to the outcome of public consultation progress other practical measures to facilitate the rollout to be developed in consultation with NBN Co and other stakeholders.
- ;
- **Battery Backup** –the provision of a battery backup for all Fibre Network Termination Units (NTUs) in which battery backup is installed for free at the time of the NTU install;
- **Definition of Premises and Coverage** – the Government has agreed to the definition of premises that NBN Co is required to connect (and count towards the coverage target) as described in Section 3, *Key Assumptions*.
 - This means there will be no requirement to provide backhaul to third party mobile base stations outside NBN Co’s optimal FTTP/transit backhaul footprint, although NBN Co may choose to do so on commercial terms.
 - NBN Co notes that the Government requires NBN Co to connect payphones that are activated in compliance with the Universal Service Obligation. NBN Co has not conducted any costing of this requirement in this Plan as further information will be required from the Government for that analysis;
- **Interim Satellite Solution** – NBN Co will submit to the Government an interim satellite (First Release Satellite) solution for commercial services starting from 1 July 2011; and
- **Cherry Picking** – The Government will provide effective regulatory protection to prevent market participants entering the FTTP market and cherry picking the most commercially attractive areas ahead of the NBN build. The viability of the project is dependent upon this protection; and
- **Trade Practices Act (TPA) Protection** – The Government will provide any required legislative (or regulatory as appropriate) protection to NBN Co in order for the Company to implement the semi-distributed PoI model (including the cross-subsidy required by the Government to achieve universal national wholesale pricing by NBN Co).

To prepare this Corporate Plan, it has been necessary for NBN Co to utilise assumptions in relation to Government policy decisions; these assumptions are further detailed in Section 3, *Key Assumptions*.

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2 BUSINESS ENVIRONMENT

Current forecasts anticipate that there will be more than 50 million End-Users connected by FTTx technologies worldwide by the end of 2010 vs. 43 million at the end of 2009, mostly in Asia.⁵

The key observations emerging from global FTTx deployments as identified by Ovum⁶ include:

- Government policy plays an instrumental role in overall FTTx development;
- Open access network models are seen as being important in driving fibre competition at the retail level, with copper access seekers needing fibre wholesale products and a clear migration path to fibre;
- Retail pricing structure for fibre products is based around bundled (cheap or free) voice, fast broadband access and multi-channel TV. Retail price relativities are determined by broadband speed, broadband usage limits, and size and quality of the overall package bundle;
- Cost effective fibre builds and connections remain a continuous focus for operators; and
- FTTx development is a long-term play with competition from cable operators to remain strong in markets where cable is entrenched. Advanced mobile networks could provide a competitive threat.

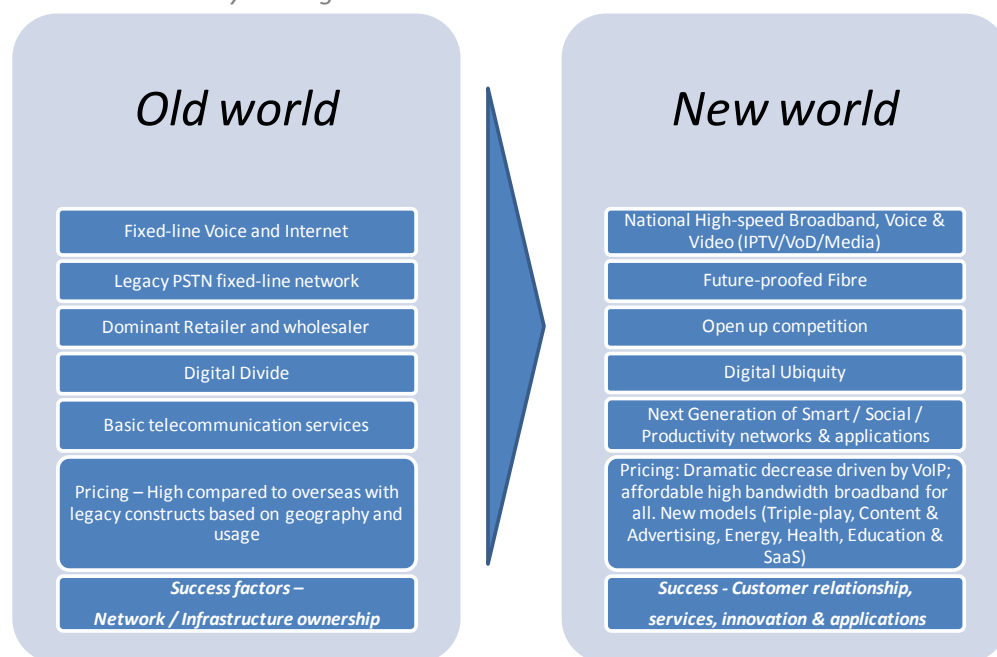
2.1 The role of NBN Co in transforming the Australian telecommunications industry

The establishment of NBN Co and the roll-out of the National Broadband Network is a key element of the Federal Government's plan to transform the Australian telecommunications market. The NBN will deliver a significant, once in a generation restructuring of the industry, resolving the current infrastructure and investment bottlenecks that have seen Australia fall behind its international peers.

⁵ Idate FTTx Markets , May 2010, 2009-2014.

⁶ Ovum "International Experience of the introduction of fibre based access services" - Feb 2010.

Exhibit 2.1: Industry Driving Forces



Source: NBN Co

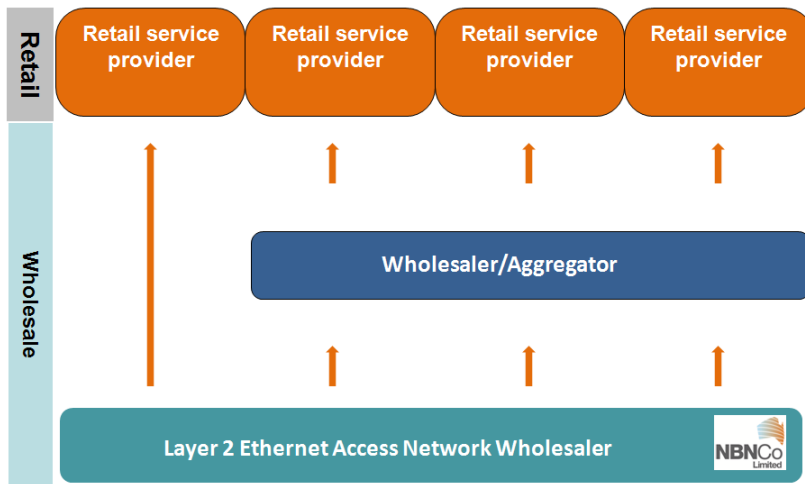
The NBN will also facilitate a major reallocation of capital in the telecommunications industry, which has historically been dominated by high Public Switched Telephone Network (**PSTN**) voice revenues. The decline of PSTN voice revenue is already underway, and is expected to accelerate with the advent of high quality Voice over Internet Protocol (**VOIP**) delivered over the NBN. However, declining voice revenues are expected to be substituted by increasing broadband revenues, as business models continue to shift from toll calling charges to access charges (see Exhibit 2.8). In addition, the significant investment by Internet Service Providers (**ISPs**) in Digital Service Line Access Multiplexers (**DSLAMs**) and other equipment in order to provide broadband services over copper is expected to be redirected to content, service differentiation and value added services over the NBN, fuelling the development of new applications and innovation that will drive consumer demand.

As a wholesale provider of services with no participation in the retail market, NBN Co is intended to address the problems currently arising from the primary infrastructure owner and wholesale access provider retaining the ability to directly compete against its wholesale customers in the retail sector. This structural separation should allow greater certainty for industry participants at all levels.

NBN Co will provide Layer 2 wholesale services only, providing flexibility to support a range of wholesale and retail business models. Larger RSPs are expected to acquire Layer 2 products from NBN Co and use their own infrastructure to provide retail services to their End-Users. Smaller RSPs may opt to use a Layer 3 intermediary for incremental wholesale services. The diversity of possible business models is expected to result in lower barriers to entry for RSPs and to open up competition both in the major population centres and in regional areas.

Exhibit 2.2: NBN Co's Wholesale Services

Wholesale and Retail Business Models

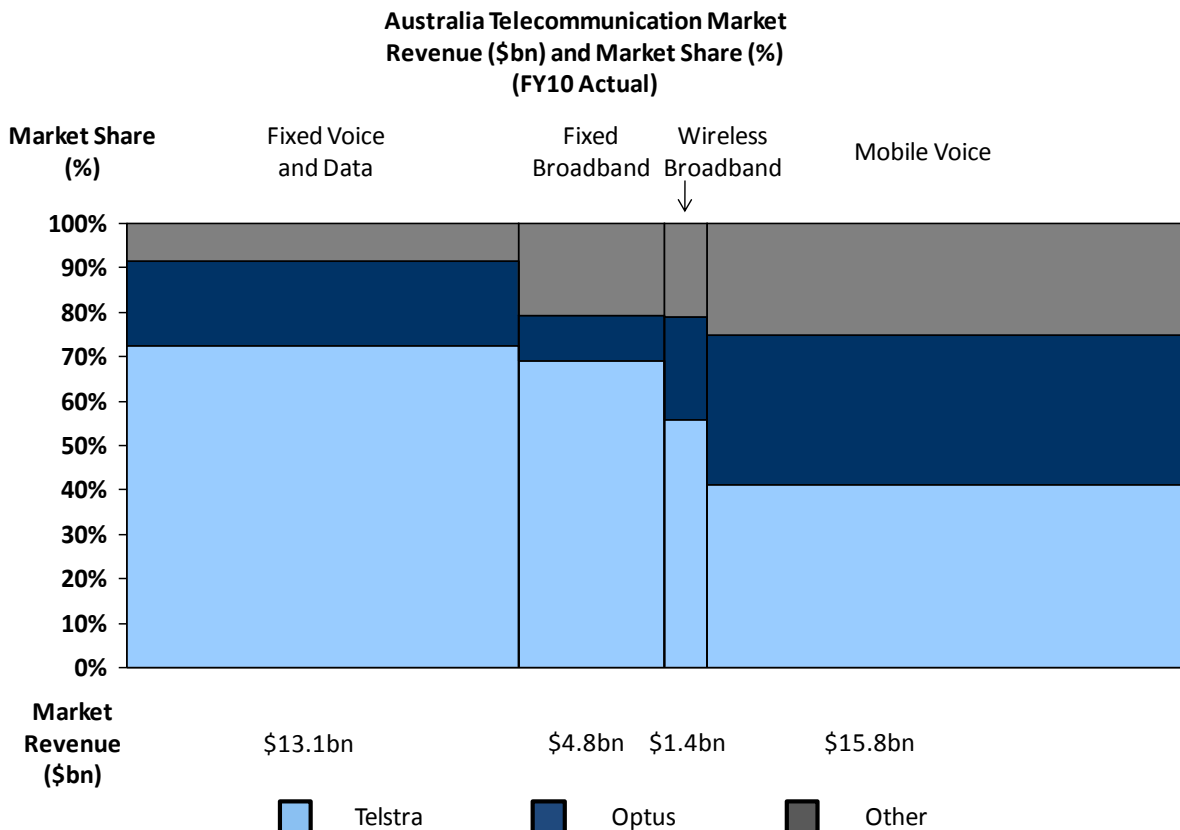


Source: NBN Co

2.2 Current State of Australian Telecommunications industry

The Australian telecommunications market generated revenues of \$35 billion in the year to 30 June 2010 (FY2010) and has been growing at 4-5% per annum over the last 4 years. The allocation of total revenues for FY2010 is shown in Exhibit 2.3.

Exhibit 2.3: Telecom Industry Revenue Share FY2010



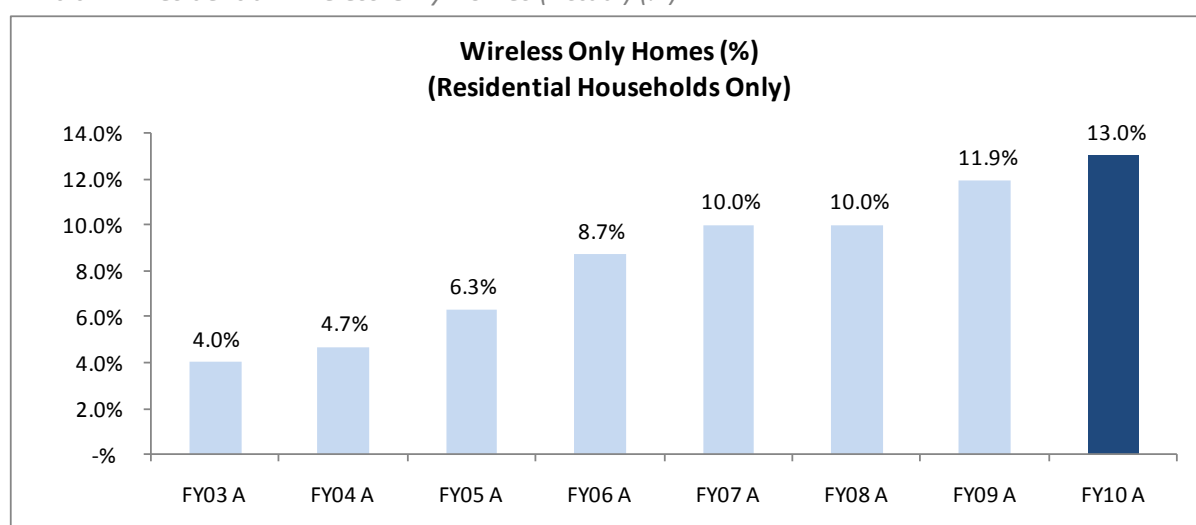
Source: NBN Co, Company Reports

The retail and wholesale telecommunications market (fixed voice, fixed broadband, fixed data, wireless broadband, mobile voice and wholesale) is dominated by the incumbent, Telstra, with approximately 57% revenue market share. Optus is second with 25%, followed by VHA at 12% and AAPT at 2%. No other market participant has more than 2% market share.⁷

2.3 Wireless-Only Homes (Residential Market)

Advances in mobile telephony and aggressive pricing by mobile operators have radically reshaped the industry over the past 5 years, with wireless revenues (voice plus data) now accounting for 49% of total telephony revenues. This has been accompanied by a rise in ‘wireless-only’ homes (i.e. residential household population with no fixed line), which now account for approximately 13% of residential premises according to Roy Morgan research, as illustrated in Exhibit 2.4.

Exhibit 2.4: Residential Wireless-Only Homes (Actual) (%)



Source: Roy Morgan; NBN Co

NBN Co has commissioned Ovum to undertake a comprehensive examination of wireless-only homes in Australia.⁸ Ovum evaluated the drivers and inhibitors of wireless substitution, with current estimates of wireless-only households found to be hovering around the range of 11-12% for the residential market (these relate only to households with no fixed line voice service); a 1% lower estimate than Roy Morgan’s research. Ovum noted that there is a range of estimates for residential wireless-only homes:

- 1) In Telstra’s FY2010 update to the market, Telstra indicated that 12% of Australian households were now mobile only;
- 2) Roy Morgan’s research indicates 13% in FY2010 per Exhibit 2.4 above; and
- 3) Ovum estimates that the rate is 10.8% with 4% of that amount having fixed broadband and mobile telephony, e.g.: naked DSL and cable broadband subscribers.

This is significant as it implies that 37% of these households have a ‘naked’ broadband service (either cable or DSL), which makes the ‘true’ residential wireless-only homes percentage at 7% (based on

⁷ For the 12 months to June 2010, NBN Co estimates.

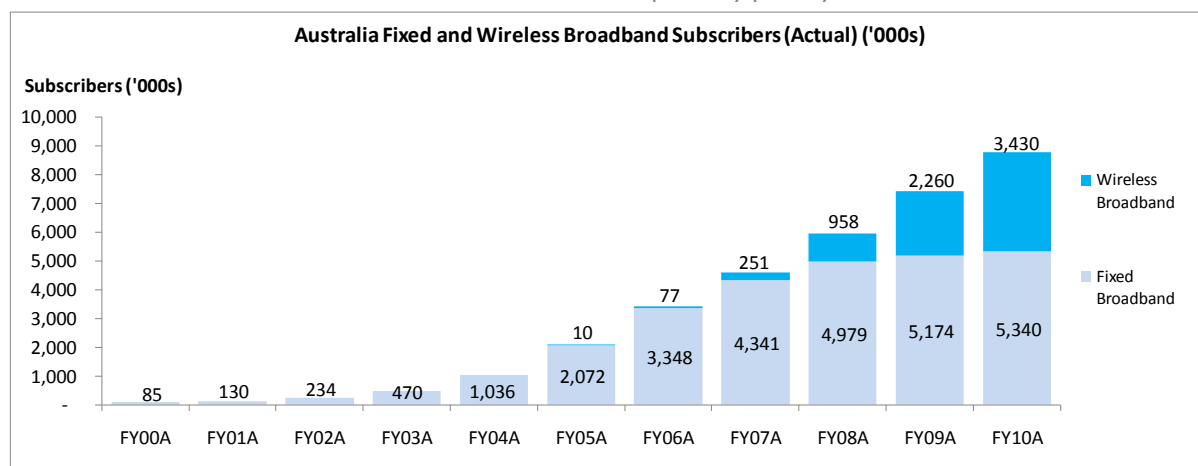
⁸ Ovum, *Australian Wireless-Only Homes Study*, October 2010.

11% residential voice and 4% 'naked' broadband End-Users). Ovum provided a forecast of Australian wireless-only homes in the residential market, with a central scenario at 15.6% by 2020 for 'true' mobile only households (excluding 'naked' DSL and cable) and two lower and upper boundary scenarios. This modelling supports NBN Co's sensitivity analysis, which is discussed later in the Section 9, *Revenue Forecasts*.

2.4 Australian Broadband Market

Consumer broadband services commenced in Australia in 1997 with Telstra's cable service, and with the first copper-based DSL services launched in 2000 by both Telstra and Optus. The fixed line broadband market had grown to 5.34 million subscribers by June 2010, with annual revenues of \$4.8 billion. However, most of the growth in broadband has been driven by wireless during the past 3 years.

Exhibit 2.5: Fixed and Wireless Broadband Subscribers (Actual) ('000s)



Source: NBN Co, Company Reports

At 30 June 2009 there were approximately 638 internet service providers in the Australian market,⁹ of which:

- 529 offered fixed-line DSL services;
- 148 offered fixed-line ADSL2+ services ;
- 47 offered satellite broadband services; and
- 287 offered wireless broadband services (233 fixed-wireless and 54 mobile wireless).

The fixed broadband retail market in Australia is dominated by Telstra, as shown in Exhibit 2.6. As of 30 September 2010,¹⁰ out of 5,067 Telstra exchanges, only 561 (11%) had one other Unconditioned Local Loop Service (**ULLS**) and/or Line Sharing Service (**LSS**) access seeker (a service provider with DSLAM infrastructure) and only 426 (8%) are deemed to be 'competitive' (i.e. with 2 or more RSPs

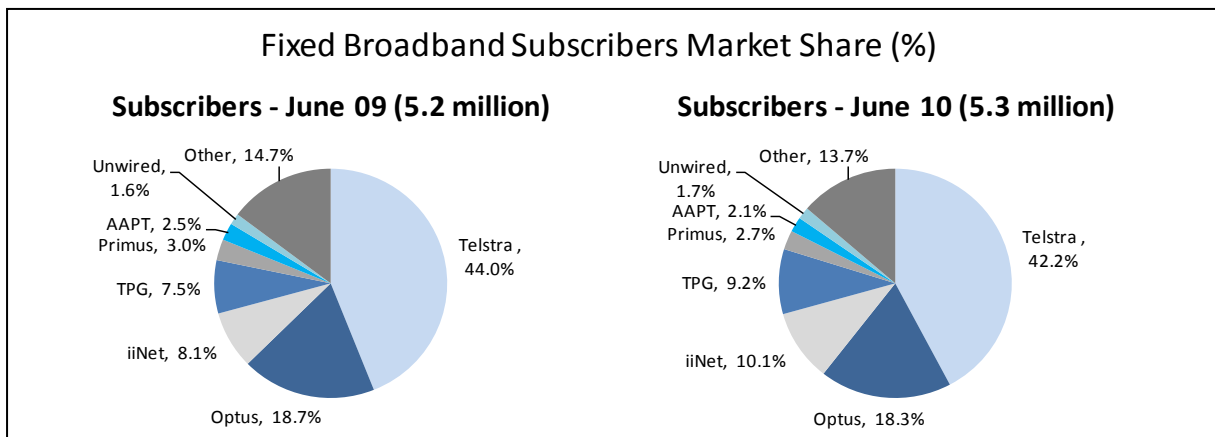
⁹ ACMA Communications report 2008-09.

¹⁰ ACCC, Snapshot of Telstra's Customer Access Network - September 2010, <http://www.accc.gov.au/content/index.phtml/itemId/853523>.

having installed DSLAM equipment used for ULLS and LSS). RSPs with competitive infrastructure fall into three categories, for example:

- National RSPs Telstra, Optus, iiNet, TPG, Primus and Internode
- Regional RSPs Adam Internet, TransACT, Amcom, Eftel
- Micro/Niche RSPs TSN, OntheNet, Wideband, Westvic

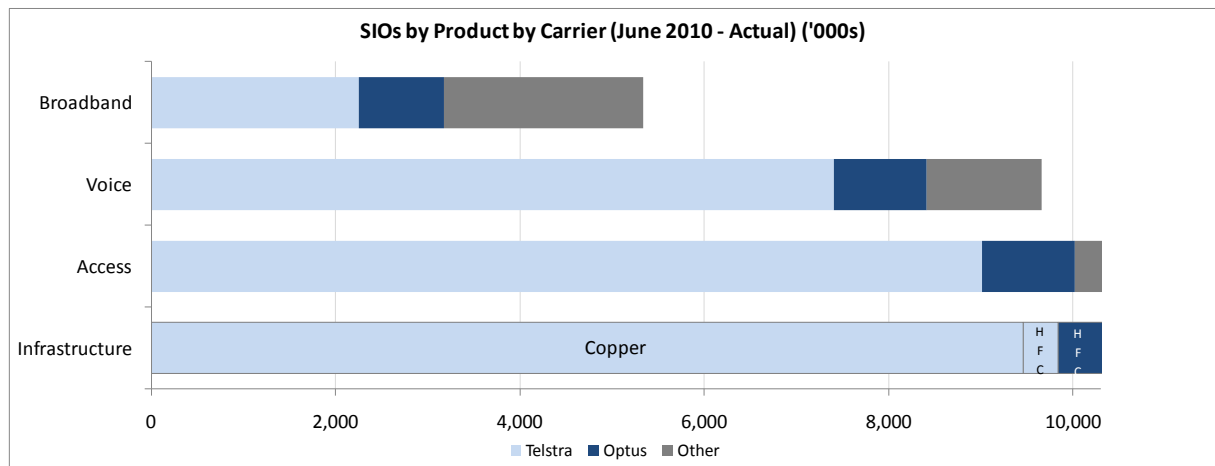
Exhibit 2.6: Fixed Broadband Subscribers Market Share (%)



Source: NBN Co, Company Reports

The market is even more concentrated at the delivery network level, with RSPs having limited choice given the non-existence of HFC-resale from both Optus and Telstra, leaving Telstra’s copper network infrastructure as an RSP’s only means of wholesale delivery at scale.

Exhibit 2.7: SIOs by Product by Carrier (June 2010 - Actual) ('000s)



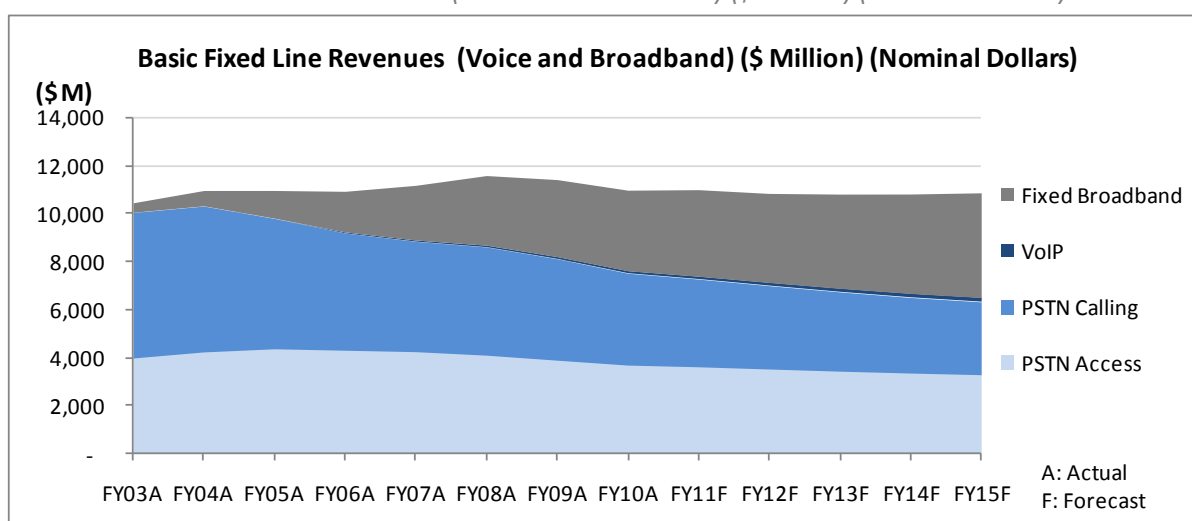
Source: NBN Co, Company Reports

2.5 Key Industry Trends

The Australian fixed-line telecommunications market is likely to remain highly concentrated in the near-term, largely driven by the incumbent's legacy market power, integration and network ownership. The retail broadband market continues to be dominated by Telstra, followed by Optus, although a third tier of smaller players such as iiNet and TPG are gaining ground through aggressive End-User acquisition, infrastructure investment and market consolidation.

Broadband is expected to remain the dominant fixed-line revenue growth driver over the next five years. Recent fixed broadband average revenue per user (**ARPU**) growth has been driven by data downloads more than increased speeds. However, strong usage growth is expected to continue with real-time "on-demand" traffic increasing with Video-on-Demand (**VoD**), audio/video streaming, VoIP among the fastest growing services.

Exhibit 2.8: Basic Fixed Line Revenues (Voice and Broadband) (\$ Million) (Nominal Dollars)



Source: NBN Co, Company Reports

As illustrated in Exhibit 2.8, the total pool of basic fixed line revenues (in this case only including voice and fixed broadband, and excluding ISDN and corporate IP and data revenues, etc) has remained relatively stable in recent years, with estimated annual growth of 1.4%. A significant change over the past decade has been a restructuring of the fixed line revenue pool, driven by two key trends:

- Conversion of voice revenues from toll-based to access-based. This trend has been driven by Telstra as a response to the rising competition to toll revenues from mobile usage and VoIP. The proactive increase in line rental charges has largely offset the declines in local and long distance ARPUs; and
- The rise of fixed broadband services. In the six years to FY09 fixed broadband penetration has risen from 6% to 62% and now represents over 30% of fixed line revenues.

Because NBN Co is an access provider, the progressive trend in market pricing towards charging for access supports the Company's business model, which treats voice as but one of the services provided over modern communications networks.

The overall spend on fixed services has been trending upwards and is expected to continue to do so while the breadth of services able to be provided increases. The introduction of the NBN is expected to reinforce this trend.

Mobile broadband is expected to continue to grow in the medium term. The pricing of wireless broadband has successfully targeted the sub-\$40, low end of the broadband market while offering comparable speeds to ADSL1 fixed broadband services. Much of mobile broadband demand is expected to be complementary to fixed line services, and over time it is anticipated that consumers' demand for higher speed will translate into a greater dependence on FTTP infrastructure for new applications and services.

Competitive DSL infrastructure competition is occurring, although this has been largely limited to the most densely populated and commercially attractive areas. Infrastructure investment growth is likely to slow, with competitive DSL infrastructure now covering an estimated 66% of the population.

The retail broadband market continues to become increasingly competitive. The industry's investment in capacity (DSL ports, international cables and national backhaul) has reduced ISPs' usage related costs allowing large increases in data allowances. TPG, via its acquisition of Pipe Networks, has led this trend by reducing its cost base and passing on savings to End-Users. In response Telstra has had to cut prices significantly, accepting a reduced margin to stem the loss of market share.

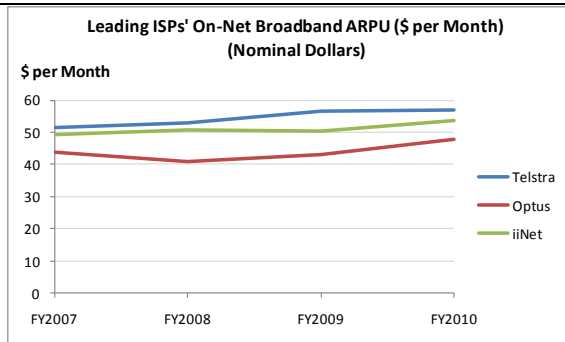
In FY2008 and FY2009, the ACCC's Telecommunications Report¹¹ indicated that:

- In FY2008, the price indices for DSL and cable broadband services fell -5.2% and -5.9% respectively, and then
- In FY2009, the price indices for DSL broadband services fell -0.4% while cable broadband services increased +0.2%.

In this environment, broadband ARPU has continued to show growth driven by increasing usage. Telstra, Optus and iiNet have seen their On-Net fixed broadband ARPUs growing ahead of inflation, at about 3% per year since FY2007, as illustrated in Exhibit 2.9.

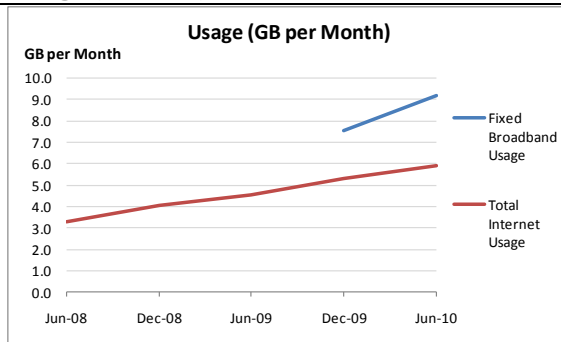
¹¹ ACCC Telecommunications reports 2008-09, Page 134 <http://www.accc.gov.au/content/index.phtml/itemId/956397>.

Exhibit 2.9: Leading ISP's reported On-Net Broadband ARPUs (\$/Mth) (Nominal Dollars)



Source: Company Reports

Exhibit 2.10: Fixed Broadband and Total Internet Usage (GB/Mth)

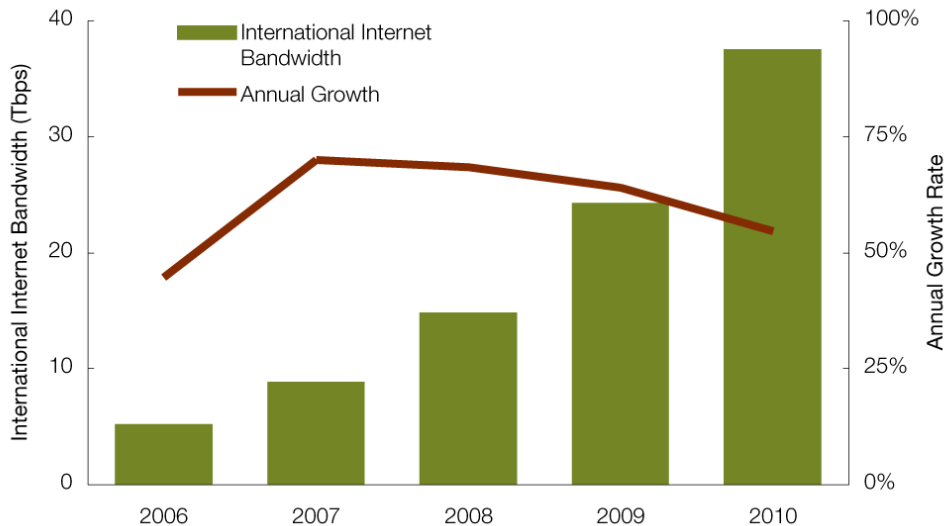


Source: ABS – Internet Activity – 8153.0, June 2010-10-07

Note: Total Internet Usage includes Fixed and Wireless Broadband Usage

Usage continues to increase rapidly. The ABS has reported in the six months to June 2010, the average per user monthly volume of traffic downloaded on a fixed broadband connection increased 21% to 9.2GB.¹² This continues the long-term trend of circa 50% annual growth in internet traffic, a trend consistent with international experience (Exhibit 2.11). (See Section 9.6.1, *Usage and Speed Facts* for more detail.) It should be noted that Exhibit 2.9 does not reflect the increase in spend resulting from the continued migration of services from narrowband (i.e. dial-up) to broadband.

Exhibit 2.11: International Internet Bandwidth (2006 to 2010) (Tbps)



Source: Global Internet Geography Executive Summary, research by TeleGeography 2010

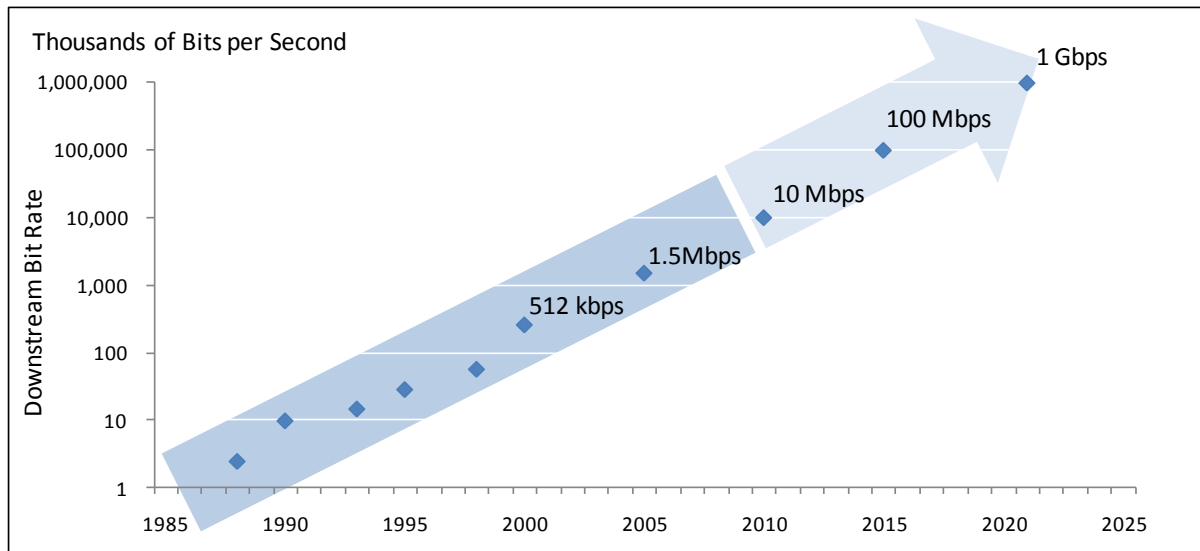
Note: Data represents Internet Bandwidth connected across international borders as of mid-year. Domestic routes are excluded.

¹² Internet Activity, Australia, Jun 2010 <http://www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0/>

2.6 Bandwidth Demand and the Role of Fibre

Download speeds have increased exponentially since 1985, driven by the emergence of new cost-effective delivery technologies and new applications that take advantage of the availability of higher speeds. As illustrated in Exhibit 2.12, if the historic rate of increase is maintained over the next 15 years, download speeds in 2025 will be in excess of 1Gbps.

Exhibit 2.12: Download Speeds since 1985



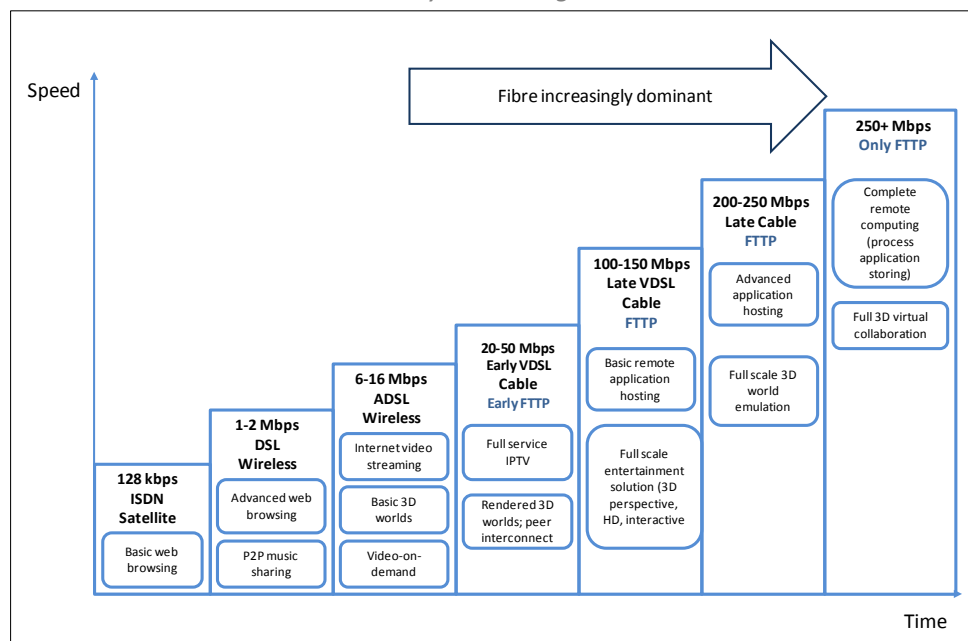
Source: NBN Co, Alcatel-Lucent (refer Exhibit 9.21)

There are currently five main technologies being used to deliver broadband to residential consumers in Australia:

- Telstra's copper network (ADSL; ADSL 2+);
- Telstra and Optus HFC networks;
- Fibre (e.g. Greenfields);
- Wireless; and
- Satellite.

Whilst each of these technologies is able to compete effectively for a share of the broadband market at relatively low speeds (<5Mbps), technologies, other than fibre, have technical limitations that make delivery at higher speeds increasingly difficult.

Exhibit 2.13: Bandwidth and Delivery Technologies



Source: NBN Co

NBN Co believes that demand for bandwidth will continue to grow. As illustrated in Exhibit 2.13, as demand for bandwidth increases it will become increasingly difficult for any non-fibre delivery platform to compete, based on the current technology upgrade maps for each technology.

NBN Co will initially offer an entry level service on its fibre network of 12Mbps (see Section 8, *Product Definition and Pricing*), with incremental tiers up to a maximum of 1,000Mbps for standard GPON consumer services. Future technical upgrades are likely to see even higher speeds becoming available at increasingly competitive costs.

The main limiting factor in the early years of the NBN is expected to be the availability of applications that require high bandwidth. Without these applications, consumers have limited reasons for migrating to the speeds offered by the NBN, and price becomes the main factor in driving consumer choices. NBN Co's strategy is based on the expectation that as higher bandwidth becomes available, applications that take advantage of that bandwidth will be developed.

In the near term (1-5 years), applications such as Internet Protocol Television (**IPTV**) and Video-on-Demand (**VoD**) are expected to emerge in Australia, as they have in many other markets, which will only be possible on networks that offer sustained speeds of 10-20Mbps. In the medium term (5-10 years), applications such as remote hosting and 3D imaging that are already in development are expected to become mainstream, pushing bandwidth demands up towards 100Mbps. In the long-term (10+ years) there are already products in development – such as Ultra High-definition video (4320p)¹³ – that are expected to require speeds of 250+Mbps.

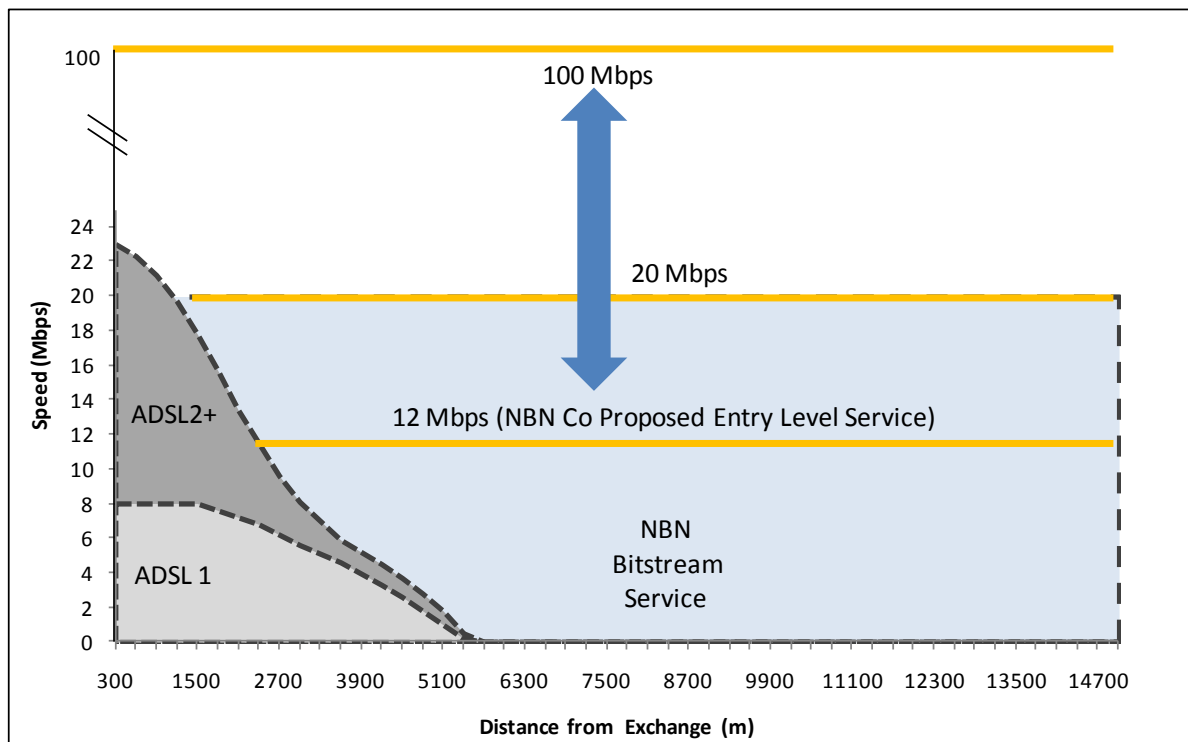
¹³ Information Technology & Innovation Foundation, ITIF, <http://www.itif.org/files/2009-needforspeed.pdf>, p.13.

2.6.1 Copper and ADSL

Fixed line copper has been the main platform for delivering broadband in Australia to date, using ADSL1 and most recently, ADSL 2+ technologies.

ADSL 2+ services are regularly advertised as offering speeds of up to 24Mbps, but actual speeds delivered are on average closer to 10Mbps, comparable to NBN Co's proposed entry level 12/1Mbps service. Advertised speeds are based on theoretical maximum speeds (i.e. good copper connections, low number of users, close to exchanges, etc.). However, a key distinction between all DSL technologies and fibre is the marked deterioration in performance of DSL the further the user is from the exchange, as illustrated in Exhibit 2.14.

Exhibit 2.14: ADSL: Speed and Distance



Source: NBN Co, 24Seven Consulting

Approximately 63% of premises served by ADSL2+ are more than 2 kilometres from the exchange,¹⁴ meaning that the maximum theoretical speed available for these premises is no more than 16Mbps on an advertised 25Mbps service – and considerably less for those further away.

NBN Co's FTTP entry level service will therefore be superior to existing average ADSL 2+ services for many consumers at today's speeds. And the limitations of copper as a delivery platform means that as speeds increase copper networks will no longer be a viable option.

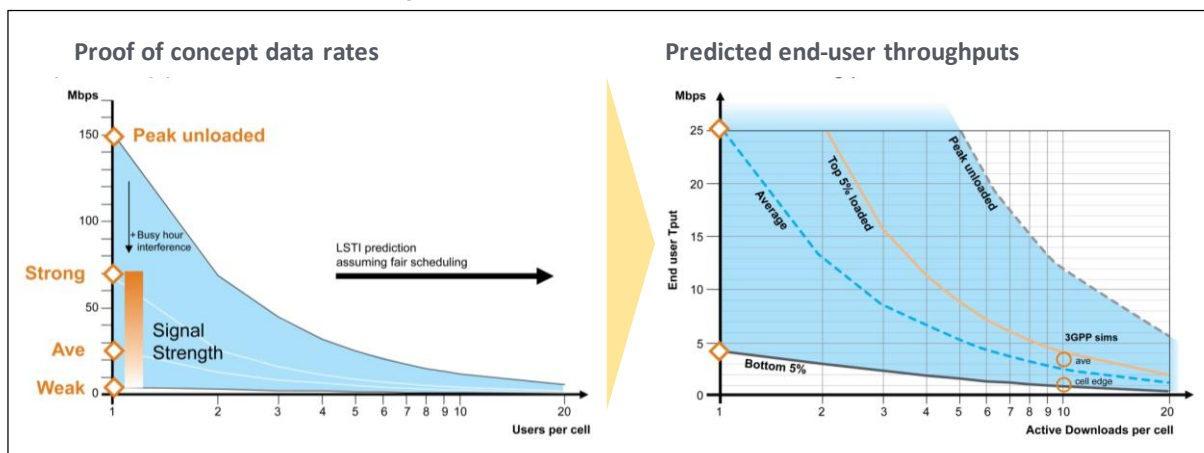
¹⁴ 24Seven Consulting – NBN commissioned analysis.

2.6.2 Wireless

Wireless broadband has emerged as the fastest growing segment of the market in Australia during the past 3 years. This trend is expected to continue in the short to medium term, as wireless continues to offer an inexpensive and convenient alternative to fixed line broadband.

The quality of wireless broadband services is highly sensitive to the number of users on a cell, meaning that advertised rates of 10-25Mbps often translate into actual rates of less than 2-3Mbps. Exhibit 2.15 illustrates this sensitivity for the next generation of wireless, highlighting that despite the promise of LTE providing 100Mbps, average actual user throughput will be considerably less.

Exhibit 2.15: SAE/LTE Trial Results for LTE



Source: LSTI Forum.org

For a fibre access network the throughput delivered is not impacted by distance, a weakness of both copper and wireless broadband services. The initial dimensioning of the fibre network will deliver speeds at or very close to the specified product speed (peak information rate or PIR). Traffic on the NBN may, however, slow due to contention because of the limited Connectivity Virtual Circuit (**CVC**) capacity purchased by the Retail Service Provider.

Wireless network speeds are limited by both distance and contention within a cell's coverage. This means that for much of the time, users on a wireless network may be experiencing speeds significantly less than the peak advertised speeds

Because wireless network performance is dependent on the number of users per cell, the ability of wireless to compete at higher bandwidths is largely determined by the number of base stations deployed. There are currently approximately 16,000 wireless base stations in Australia.

2.6.3 HFC

Australia currently has two major HFC networks passing approximately 2.9 million premises, owned and operated by Telstra and Optus. There is significant overlap between the two networks in Melbourne, Sydney and Brisbane, with overall coverage shown below:

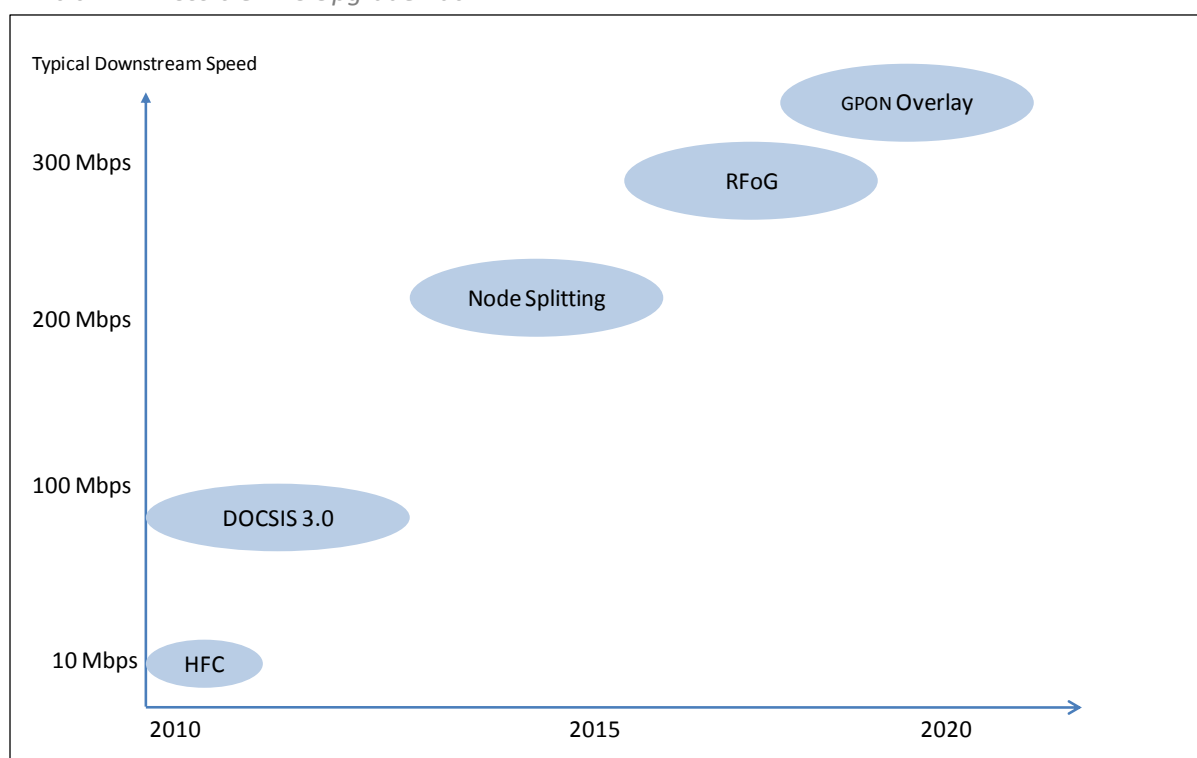
Exhibit 2.16: HFC Coverage and Connections

Premises ('mn)	One carrier	Both carriers	Total Passed	Subscribers
Telstra	0.5	2.2	2.7	0.4
Optus	0.2		2.4 ¹⁵	0.5
Total	0.7	2.2	2.9	0.9

Source: NBN Co

Both HFC networks (without DOCSIS 3.0 upgrade) currently offer typical speeds of up to 10Mbps downstream and 1Mbps upstream. Exhibit 2.17 shows the possible upgrade path for HFC over time.

Exhibit 2.17: Possible HFC Upgrade Path



Source: NBN Co

Telstra has upgraded its Melbourne HFC network to DOCSIS 3.0, announcing speeds of up to 100Mbps. The next possible upgrade would be node splitting, to reduce the number of End-Users who share the same segments of 750MHz coaxial network. Node splitting could be implemented as early as 2013-14, and would result in an increase in typical downstream speeds to 240Mbps, and upstream speeds to 12Mbps.

¹⁵ Optus HFC does not serve MDUs and some hard to reach SDUs, hence serviceable premises is approximately 1.4 million.

Optus upgraded its HFC network throughout Sydney, Melbourne and Brisbane and commenced selling “premium speed packs” in August 2010. With a new modem, Optus has indicated that End-Users should be able to access locally hosted or cached content at around 80Mbps.

From a cost perspective, the major evolution would be to replace the existing outside plant coaxial network with FTTP and Radio Frequency over Glass (**RFoG**) technology. Once completed, an RFoG network would be very similar in performance to the passive fibre network which NBN Co will be building, offering typical speeds of over 300Mbps downstream and 50+Mbps upstream. However, the cost of an RFoG upgrade would require a multi-billion dollar investment for both companies.

The final upgrade would be a full GPON overlay, which would result in increased minimum speeds, from 50+Mbps under RFoG to 100+Mbps, and higher upstream speeds (to 15+Mbps).

In a fully competitive scenario (i.e. assuming no deal with Telstra, see Sub-Section 3.1.1, *Telstra Definitive Agreements*) it is likely that one of the existing HFC networks will be upgraded at least to encompass node splitting, thus being able to offer speeds of over 200Mbps to over 2 million premises but with substantially lower performance than GPON (lower upstream speeds and higher contention ratios). It is considered less likely, but still possible, that both networks would be upgraded, given the very substantial overlap between the two.

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3 KEY ASSUMPTIONS

3.1 Key Assumptions in the Corporate Plan

In formulating the Corporate Plan, NBN Co had to make a number of fundamental assumptions about the nature of its business and the environment in which it will operate. The key assumptions set out in Exhibit 3.1, Exhibit 3.2 and Exhibit 3.3 incorporate the latest Government decisions as well as NBN Co's expectations on the most likely outcomes for remaining policy decisions. These assumptions have been allocated into three categories:

- Environment;
- Product, Pricing and Revenue; and
- Network Features.

Exhibit 3.1: Key Assumptions - Environment

Environment	Key Assumptions
Coverage	NBN Co will cover all premises within Australia, of which: <ul style="list-style-type: none"> ▪ 93% will be covered by FTTP; and ▪ 4% will be covered by Wireless and 3% by Satellite.
Uniform National Wholesale Pricing (UNWP)	The Plan assumes uniform wholesale pricing from premises to Point of Interconnect (Pol), irrespective of the delivery platforms and across geographies for the entry level offering. ¹⁶
Regulatory Approval for SAU	The Plan assumes ACCC approval of a Special Access Undertaking as described in Section 8.10, <i>Special Access Undertaking with the ACCC</i> .
Wholesale Only	The Plan assumes no retail revenue.
Greenfields (New Real Estate Developments)	<p>The Plan assumes that NBN Co will service over time 100% of the new real estate developments (in this Plan called: Greenfields developments) in Australia by the end of the rollout.</p> <p>The Plan assumes developers will be required to provide pit, pipe and conduit lead-in at no cost to NBN Co.</p> <p>94% of premises growth (Greenfields) are within FTTP footprint, the remaining 6% are assumed to be serviced by Wireless or Satellite.</p> <p>In the Fibre footprint, 60% of Greenfields are Infills within the existing Brownfields FTTP footprint, 40% are Broadacre premises.</p> <p>For the purpose of the modelling, 50% of new developments are assumed to</p>

¹⁶ The Plan assumes that access seekers will face the same total wholesale cost from any premises to a NBN Co Point of Interconnect (**Pol**). The cost of backhaul transmission for the Service Provider will vary from its designated Point of Presence (**PoP**) to NBN Co's network entry point at the Pol.

Environment	Key Assumptions
	<p>require additional investment in Local and Distribution network infrastructure.</p> <p>The role of NBN Co in new developments will be to install fibre at the development phase for all premises in NBN Co's footprint in:</p> <ul style="list-style-type: none"> ▪ All Broadacre developments; ▪ All Infill developments where it has fibre that is ready for service and capable of connection; and ▪ Newly approved infill developments in which 100 or more premises are built within a 36-month period, in areas where NBN Co has not yet rolled out its network. <p>NBN Co's responsibilities will be in relation to developments which receive Stage 5 development approval from 1 January 2011 (relating to civil works) after that date and for which three months' notice has been given (by the developer to NBN Co). NBN Co will be responsible for the installation of fibre infrastructure in the developments including transit backhaul to a Point of Interconnect (POI).</p> <p>Telstra will be responsible for developments of less than 100 premises, pending NBN Co being ready to provide a fibre service in that area that is capable of connection to the premises.</p> <p>NBN Co intends to contract with third parties chosen through a procurement process to deliver FTTP solutions in all Broadacre developments and Infill developments involving more than 100 premises.</p> <p>NBN Co will be able to generate revenue from these Build-Operate-Transfer (BOT) networks as soon as the transfer payment is made and will count them as 'BOT' activations.</p> <p>NBN Co assumes that the Government will enact legislation as described in the policy announcement of 9 December 2010 in relation to the provision of infrastructure by developers, and for access to that infrastructure.</p> <p>Any failure to pass the legislation would add significant costs to the NBN build. NBN Co has planned to deploy to a total of 70,000 Build Greenfields premises in the years up to FY2013 (out of which 60,000 are forecast to be connected). These 'Build' premises are considered part of the Greenfields roll-out carried out by NBN Co. 'BOT' premises are the remainder of the Greenfields premises for which NBN Co will sub-contract third party fibre providers to build the network on NBN Co's behalf.</p>
USO Co	<p>The Plan assumes Telstra will continue its Universal Service Obligations (USO) for voice telephony services until premises (within the Fibre footprint) are disconnected from the copper network in accordance with the Financial Heads of</p>

Environment	Key Assumptions
	<p>Agreement. NBN Co assumes that it will be required to connect and provide services to USO payphones but has not yet made any specific provision for the cost of doing so.</p> <p>For premises outside the Fibre footprint, the Plan assumes USO Co will be established by July 2012 and will assume responsibility for the USO from July 2014, through entering into contractual agreements with Telstra for a 10-year period beyond July 2012. This will include providing basic voice services in areas provisioned by NBN Co's wireless and satellite services.</p>
<p>Powers and Immunities</p>	<p>The Plan assumes that NBN Co will be granted adequate powers and immunities, including to allow the Company to maximise aerial deployment coverage and minimise the roll-out timetable.</p> <p>Without such changes the Plan is impacted by the requirement to achieve development approvals from local authorities, negotiate access arrangements with utilities, particularly power utilities, and deal with all of the regulatory requirements around land access that may otherwise apply.</p> <p>NBN Co has begun a parallel mitigation strategy involving discussions with each power utility on mainland Australia (including commercial negotiations with the five covering the First Release Sites). NBN Co has also begun an engagement strategy with each State and Territory to develop regulatory and policy solutions to complement Commonwealth powers and immunities legislation.</p>
<p>Home Run Architecture</p>	<p>Government has determined that NBN Co should conduct a trial in a new development, by early 2012.</p> <p>The Plan assumes NBN Co is not required to deploy Home Run architecture and NBN Co has not made any preparations to do so (other than conduct the trial required in a new development).</p> <p>Implementing a home-run network has very significant cost implications, including due to the requirement for significantly larger amounts of fibre cabling and the physical space required in various network elements.</p>
<p>Future Possible Structural Separation and Layer 1 Unbundling</p>	<p>The Plan assumes NBN Co is not required to unbundle and offer Layer 1 products and has not made any preparations to this effect.</p> <p>While the NBN Companies Bill contains a regime for the possible future functional separation of NBN Co, this Plan assumes NBN Co is not required to undertake such separation, or structural separation.</p> <p>This is due to the current lack of clarity on the form and timing of any separation.</p> <p>For the purposes of this Plan, and as directed by Government, it is assumed that NBN Co will implement an accounting separation methodology covering its assets and costs, but not revenues, which will be developed in consultation with the ACCC.</p>

Environment	Key Assumptions
Cherry Picking	The Plan assumes effective protection are in place to guard against cherry picking for Greenfields development and low cost high revenue regions and the Government has indicated that it will require new fibre networks built after 2011 for residential and small business purposes to be layer 2, wholesale only and open access, NBN Co will retain the options of overbuilding infrastructure. The Government will consider the introduction of a levy if necessary to prevent opportunistic cherry picking. Testing of the impact of cherry picking has been done through a scenario of a 50% loss in Greenfields connections; refer to Section 3.2, <i>Policy Sensitivities</i> .
Backhaul Service to Mobile Base Station	The Plan assumes that NBN Co may offer carrier grade services on normal commercial terms to mobile operators in areas where NBN Co already has fibre, but will not build additional transit backhaul in areas beyond those specifically needed to service NBN Co's own requirements.
Availability of Wireless Spectrum	The Plan assumes that NBN Co will be able to secure enough spectrum to service its planned area of 4% of Australian premises covered by fixed wireless. The Plan assumes that 2.3GHz spectrum will be acquired and utilised by NBN Co, although alternative options will continue to be investigated and assessed.
HFC Networks	The Plan assumes that any Internet protocol-based services, voice services, broadband services or services requiring a return path transmission from the user will be progressively migrated from the Telstra HFC network onto the NBN Co network as the NBN is rolled out (as per the Financial Heads of Agreement).
Public Works Committee (PWC) Exemption	The Plan assumes that NBN Co's PWC exemption signed on 29 June 2010 will not be revoked at a future sitting of Parliament and/or that the exemption contained in the NBN Companies Bill will apply.
Availability of Funding	Federal Government equity is assumed to be available to cover all funding requirements until NBN Co is able to raise debt in its own right. Debt markets will provide circa 33% of funding to the end of FY2021.

Source: NBN Co

Exhibit 3.2: Key Assumptions - Product, Pricing and Revenue

Product, Pricing, Revenue	Key Assumptions
Telstra Definitive Agreements - Competitive Environment	The Plan assumes that the Telstra Definitive Agreements will be completed in accordance with the terms of the Financial Heads of Agreement and result in clarity of the decommissioning of existing networks and migration of existing Telstra End-Users onto the NBN Co platform.
Premises Definition	The Plan assumes that NBN Co will cover any building (or part of building) that meets one of the following criteria: <ul style="list-style-type: none"> ▪ Is used at an addressable location on an ongoing basis for residential, business (whether for profit or not), government, health, or educational purposes; ▪ Is defined as a school by the Department of Education, Employment, and

Product, Pricing, Revenue	Key Assumptions
	<p>Workplace Relations;</p> <ul style="list-style-type: none"> ▪ Is within a new development at an addressable location for which NBN Co is the 'wholesale provider of last resort'; or ▪ Currently has a standard telephone service or payphone activated as defined under the USO. <p>The Plan also assumes that NBN Co will be permitted to, but not required to (unless directed by Government), connect various categories of 'non-premises' such as traffic lights, ATMs etc, on a commercial basis.</p>
Multi-Dwelling Units (MDUs)	The Plan assumes that NBN Co will provide Multi-Dwelling Units (MDUs) that fall within the Fibre footprint with fibre-to-the-premise (FTTP) technology.
Premises Count and Growth	The Plan assumes opening premises count of 10.9 million in FY2010 and premises growth of 1.6% per annum (average FY2010 to FY2025).
Interim Satellite Solution	The Plan assumes that NBN Co will provide a Satellite First Release Service (SFRS), which will provide an interim solution for satellite services (ABG replacement) prior to the launch of its own satellites.
Vacant / Unconnected Premises	The Plan assumes vacant / unconnected premises of 12.4% at FY2025.
Wireless-Only Homes (Residential Market)	<p>The Plan assumes there are no wireless-only businesses.¹⁷</p> <p>The Plan assumes 13% of total residential occupied premises being wireless-only today, increasing to 16.3% by FY2025 and 16.4% by FY2040.</p> <p>In terms of total occupied premises (residential plus business), this implies 13% of total premises are wireless-only by FY2025.</p>
New Applications	The Plan assumes that new applications will fuel uptake and usage; for example, for the Education and Health sector.

Source: NBN Co

Exhibit 3.3: Key Assumptions - Network Features

Network Features	Key Assumptions
GPON	The platform for the 93% FTTP coverage will be a Gigabit Passive Optical Network (GPON) with some limited point-to-point capability for business users. A full Ethernet Point-to-Point (home run) network will not be built.
Layer 2 Bitstream	NBN Co will offer products in the Layer 2 (active) layer. Layer 1 and Layer 3 (or higher) products will not be offered, although some Layer 3 awareness (e.g. for

¹⁷ Businesses defined as any business excluding Small Offices Home Offices (**SOHOs**) operating from a residential premise.

Network Features	Key Assumptions
	multicasting) will be included.
Telstra Definitive Agreements - Availability of Passive Infrastructure	The Plan assumes that the Telstra Definitive Agreements will be completed in accordance with the terms of the Financial Heads of Agreement for use of existing passive infrastructure (conduits acquired, ducts, exchanges and backhaul leased where fit-for-purpose).
Points of Interconnect (Pols)	<p>NBN Co will be given responsibility to design and implement a network that delivers traffic to a number of Points of Interconnection (Pol) across regional and metropolitan areas.</p> <p>The Plan assumes that the Pols will initially be located in Fibre Serving Areas (FSAs) where competitive transmission services are available (a 'semi-distributed' Pol model) at the 120 locations identified under the ACCC's guidance (see section 1.3.2, <i>Points of Interconnect (Pols)</i> above).</p> <p>NBN Co will not charge differently for interconnection at any of the designated Pols – price is distance and location independent.</p> <p>RSPs will then acquire backhaul transmission services from one of the competitive transmission providers to take the traffic from the Pol to their Point of Presence (POP), generally in a capital city.</p> <p>For the purposes of the Plan, it is also assumed that the ACCC will make access determinations (using its new powers under the CCS Bill) in respect of pricing on currently declared transmission routes (with effect from 1 January 2011), which will reduce the current disparities in metropolitan and regional transmission costs faced by RSPs from the outset of the deployment period.</p> <p>It is also assumed that the ACCC will monitor pricing on currently exempted routes and, if necessary, will act promptly to re-examine exemptions in the event that pricing on those routes is not aligned with the ACCC's access determinations for regulated routes.</p> <p>If RSPs are unable to manage differences in transmission pricing across different regions then NBN Co assumes that further steps will be taken to achieve the Government's objectives in relation to wholesale pricing.</p> <p>NBN Co also assumes that the Government will provide any protections NBN Co requires from Parts IV and XIB of the Trade Practices Act 1974 (Competition and Consumer Act) in order to implement the Government's decisions in relation to Pols and uniform national wholesale pricing.</p> <p>NBN Co is aware that Uniform National Wholesale Pricing (UNWP) entails a level of cross subsidies between technology platforms and within the FTTP platform. However, NBN Co believes that infrastructure, by its very nature, factors in an amount of cross subsidisation between different End-Users, locations and usages.</p>

Network Features	Key Assumptions
Battery Backup	<p>NBN Co will install a Power Supply Unit (PSU) including a suitable battery at End-User premises to all Fibre Network Termination Units (NTUs).</p> <p>Maintenance of the battery including replacement will be the responsibility of the End-User or RSP.</p> <p>The Battery Backup solution will deliver power to the Analogue Telephone Adapter (ATA) within the NBN Co Network Termination Unit (NTU). Devices which require local power such as cordless phones or those connected to the NTU data ports will not operate during loss of mains power as they are not protected by the Battery Backup solution.</p>
Aerial vs. Underground	Usage of underground existing infrastructure, mostly from Telstra subject to fit-for-purpose; then aerial wherever possible.
Location of NTU	The Plan assumes 50% external NTU location and 50% internal.

Source: NBN Co

3.1.1 Telstra Definitive Agreements

The Corporate Plan is predicated on the assumption that a deal is finalised and approved between NBN Co and Telstra Corporation Limited (**Telstra**) in accordance with the Financial Heads of Agreement in relation to the following:

- Progressive disconnection of copper services and decommissioning of Telstra's fixed line copper and HFC networks as the NBN Co FTTP network is rolled out;
- Utilisation of existing Telstra exchange space;
- Utilisation of a significant portion of Telstra's existing ducts and conduits; and
- Access to dark fibre and managed services for backhaul.

Work is progressing on the preparation of definitive and binding agreements in relation to each of the above matters. For the purposes of the Corporate Plan. It has been assumed that these agreements will be successfully completed and approved by 30 June 2011. The Corporate Plan therefore assume that the decommissioning of Telstra's networks will occur, and that significant existing infrastructure will be available to NBN Co at the prices set out in the Financial Heads of Agreement.

The deal with Telstra as agreed under the Financial Heads of Agreement represents an improvement to the Corporate Plan relative to NBN Co's No Deal scenario, and substantially mitigates a number of the key risks identified in Section 12, *Risk Management* (notably in relation to demand forecasts and the cost and speed of deploying the FTTP network).

3.2 Policy Sensitivities

The Corporate Plan makes a number of assumptions on government policy issues. This section considers potential sensitivities in respect of two key policy assumptions:

Cherry Picking:

- NBN Co assumes that it will have to offer uniform wholesale pricing across Australia irrespective of the delivery technology and that NBN Co will be provided with effective protections against cherry picking for Greenfields and low cost / high revenue regions.
- NBN Co's financial model assumes that the Company will pass 100% of Greenfields and Brownfields premises in the fibre footprint by the end of FY2021 so as to achieve 93% fibre coverage.
- If NBN Co were to be 'cherry picked' by competitors in the most lucrative regions, and it resulted in a decrease of 50% of Greenfields connections (with 0.8 million fewer connections by end of deployment in December 2020), then the NBN projected returns would reduce to 5.4%, representing approximately 160bps negative delta. The effect on total funding (levered) would be an extra \$1.2 billion in total funding and \$1.7 billion additional requirement in Government equity. In addition to the impact of cherry picking in Greenfields, there would be an impact in the most commercially attractive areas of Brownfields. This would take the returns well below 5%. As a consequence, equity funding would be significantly increased.

Power & Immunities:

- NBN Co assumes that it will be granted powers and immunities, including to allow the company to maximise aerial deployment coverage and minimise the roll-out timetable.
- NBN Co's financial model assumes that the Company will pass 25% of the Brownfields premises through aerial deployment in the local network.
- If aerial deployment was constrained for example because of limited access to the aerial corridors, which can be estimated by limiting aerial to 10% of Brownfields premises in the local network, then the NBN projected returns would reduce to 6.8%, representing approximately 20bps negative delta. As a result, total funding (levered) would increase by \$1.8 billion and Government Equity by \$1.3 billion.

Exhibit 3.4 shows the estimated sensitivity of NBN Co's IRR, Minimum Government Equity and Peak Total Funding to variations in these assumptions.

Exhibit 3.4: Sensitivity Impact of Key Policy Assumptions

Sensitivity	Deal v7.0	Sensitivity	Impact on IRR (%)	Impact on Minimum Government Equity (\$'bn)	Impact on Peak Total Funding (\$'bn)
Cherry Picking	NBN Co will receive effective regulatory protection from "cherry picking" by other FTTP suppliers.	0.8 million connections, representing 50% of Greenfields connections currently forecast, will be "cherry picked" by competitors.	(1.6)%	+1.7	+1.2
Powers & Immunities (e.g. % Aerial)	Aerial use in the Local Network will be at 25% of premises passed.	Aerial use in the Local Network will be restricted to allow only 10% of the network distances covered to use Aerial.	(0.2)%	+1.3	+1.8

Source: NBN Co

4 FORMATION AND CORPORATE STRUCTURE

4.1 Brief History

The establishment of a new company to oversee the design, construction and operation of a nationwide superfast broadband network was announced by the Hon Kevin Rudd MP, Prime Minister and the Hon Senator Stephen Conroy, Minister for Broadband, Communications and the Digital Economy, on 7 April 2009.

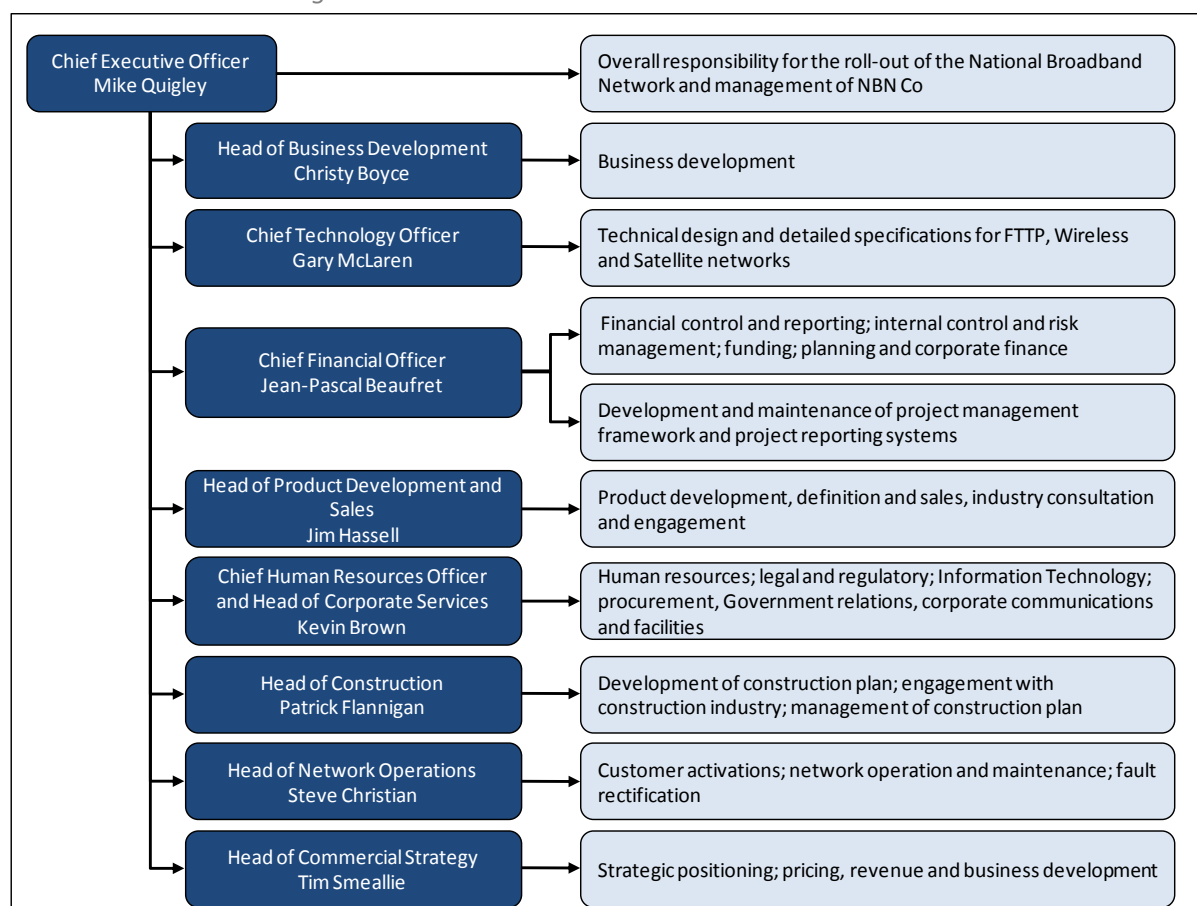
NBN Co was formally established under the Corporations Act on 9 April 2009. On 4 August 2009 NBN Co was determined by the Minister of Finance to be a Government Business Enterprise under the Commonwealth Authorities Companies Act, 1997. NBN Co is wholly-owned by the Commonwealth, represented by two Shareholder Ministers – the Minister for Broadband, Communications and the Digital Economy and the Minister of Finance and Deregulation.

Michael Quigley was appointed Chief Executive Officer and interim Executive Chairman to the NBN Co Board on 25 July 2009. Other Board appointments have been made progressively since August 2009, culminating with the appointment of Harrison Young as Chairman on 16 March 2010.

NBN Co's senior executive team was largely in place by September, 2009, with the final appointments being made by early 2010.

4.2 Management structure and key roles

Exhibit 4.1: NBN Co Management Structure



Source: NBN Co

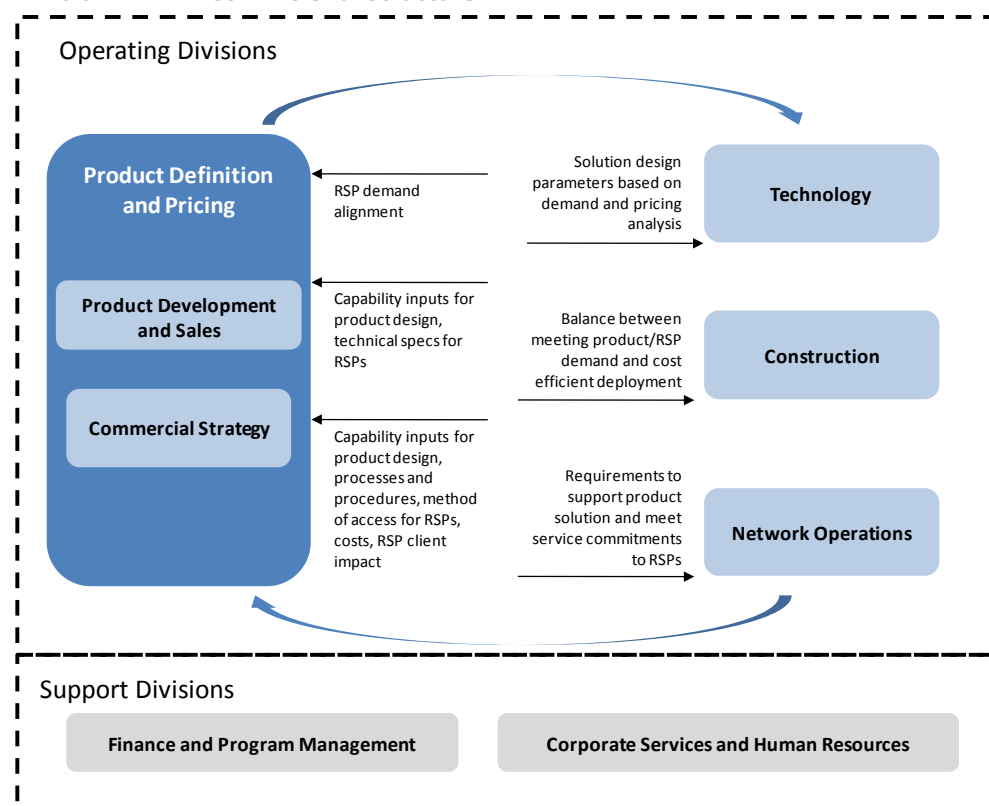
NBN Co's internal structure can be broadly divided into two areas:

Operating divisions Technology; Construction; Network Operations; Products Development & Sales; and Commercial Strategy.

Support divisions Finance & Program Management; Human Resources and Corporate Services, including Health, Safety & Environment (HSE) and Quality, refer to Section 6, *Network Construction*.

As illustrated in Exhibit 4.2 there is considerable interaction between the various divisions of NBN Co because of the high degree of interdependency between product design, network design, costs and pricing.

Exhibit 4.2: NBN Co Divisional Structure



For the purposes of the Corporate Plan, the operational objectives of NBN Co during the period to end FY2013 have been broken into four main components:

- Network Design and Testing (Technology);
- Network Construction;
- Commercial Operations; and
- Product Definition and Pricing.

Each of these four areas is examined in detail in Sections 5 to 8.

4.3 Human Resource and Industrial Relations

Developing a high performance organisation, whose employees are highly regarded by both the business community and government for their professionalism and delivery focus is the objective of NBN Co's Human Resources (**HR**) strategy. Integral to these objectives will be creating and maintaining a safe workplace which is core to the Company's Human Resources Strategy. NBN Co will achieve this through creating:

- Engagement and participation of all employees in the programs;
- A detailed safe system of work;
- Scorecards for lead and lag indicators;
- Comprehensive training for all employees;
- Behavioural programs to encourage safe actions;
- Detailed requirements of contractors;
- Incident Registers;
- Fatigue management;
- Alcohol and Drugs Program; and
- Active mentoring and auditing.

NBN Co will work with employees and their representatives, and adhere to the Fair Work Principles. It will establish collective agreements with relevant employees and unions on competitive terms and conditions. These agreements will be complemented by appropriate policies to assist employees to be productive, safe and will enable flexibility for working families.

NBN Co will require contractors to be responsible employers who provide safe work environments and efficient work practices. However, NBN Co will not impose onerous conditions on contractors that will distort labour markets, or unnecessarily increase costs. NBN Co will require contractors engaged in the construction of the NBN to demonstrate their ability to effectively manage employee relations matters, including compliance with the Fair Work Principles and National Code of Practice for the Construction Industry and the associated 2009 version of the implementation guidelines.

There are 3 key phases to establishing the Human Resources function at NBN Co to give effect to these objectives. The first phase is complete, and includes a remuneration framework, detailed recruitment processes, and policy documentation. A particular focus is on recruitment to increase channels to market, and ensure high quality hiring selection decisions, based on a detailed workforce plan.

The second phase of establishing the Human Resources function is scheduled to be complete by mid November and includes:

- Creating a HR service delivery approach in partnership with Accenture;

- Delivery of cost effective/scalable HR transaction processes;
- Establishing a talent framework;
- Entering into appropriate Industrial agreements;
- Deploying OHS Safe Systems; and
- Effective employee communication and interaction.

The third phase, targeted for early 2011, will integrate the above activities and enhance them with:

- A more comprehensive employee development/training program;
- A sophisticated OHS behavioural program;
- Introduction of performance based pay; and
- Implementation of a performance management framework.

4.4 Finance, Program Management and Risk

The co-ordination and management of a project on the scale of the NBN requires rigorous planning, reporting and risk management processes. These areas are covered by the Finance group, which includes specialist project management and risk management teams in addition to financial planning, management accounting and reporting, taxation and treasury specialists.

Exhibit 4.3: NBN Co Finance Group



Source: NBN Co

To ensure results are delivered with a high standard of safety and quality, on schedule and within budget, a dedicated Program Office has been established to coordinate and integrate the major Projects. The Program Office will also ensure compliance with standard protocols that allow consistent management across the program. While the Program Office is tasked with project supervision and monitoring, the business units remain responsible for project delivery.

4.5 IT Systems

Key support systems are described in Section 5, *Network Design and Testing*.

To ensure NBN Co realises its objective of being a low-cost wholesale service provider, it must ensure simplicity and align the organisation around end-to-end processes to eliminate unnecessary hand-offs. NBN Co Access Seekers will want to see true equivalence of access, giving fair opportunity to compete where and when they want.

In order to achieve these goals, and to further reduce operational costs for both NBN Co and its wholesale Access Seekers, the objective is to enable service providers using NBN Co's network to deploy services as if NBN Co's network was in fact their own network. This "virtualised" network concept is vital in ensuring NBN Co's wholesale Access Seekers are able to transact with NBN Co in a way that maximises the End-User experience for service activation, service management and billing whilst also meeting the requirements for equivalence across NBN Co's Access Seekers.

As for the main systems required (ERP and OSS / BSS), NBN Co has adopted a systems delivery approach explicitly focusing on:

- Delivery by highly aligned platforms/domains by process & technology;
- End to end alignment of delivery schedules;
- Adoption of industry standards; and
- Adopting standardised business driven releases and common technical infrastructure.

4.6 Procurement

Procurement Strategy

Procurement carries the responsibility for providing the best commercial outcomes from expenditure made in support of NBN Co's strategy. Best commercial outcomes are evaluated considering all relevant costs, benefits and risks on a whole of life basis (best value for money, using total cost of ownership).

NBN Co's procurement strategy was approved by the Board in December 2009 and is anchored on proven principles. These principles serve two purposes. Firstly, to guide the detailed activities of NBN Co and focus on the correct outcomes. Secondly, to demonstrate alignment to the essential probity, transparency and value requirements articulated by the Department of Finance and the Australian National Audit Office (**ANAO**).

NBN Co has developed a Buying Guide and a detailed Procurement Manual defining the practices, procedures and decision-making rules appropriate to its circumstances and commercial imperatives. These commercially-oriented practices differ in some ways from those prescribed for government departments but are consistent with government guidelines.

Sourcing is among the most critical procurement activities because NBN Co has to establish many high-value contracts with suppliers and must do so under the public eye and with careful attention to the principles of fairness, transparency, competition and value. This is done by following the

formal 10-step sourcing process set out in the NBN Co procurement manual for all major spend requirements. The 10-step process provides a detailed audit trail of each procurement initiative.

Procurement now has a team in place covering all key areas of the business – Construction, Network Technology, IT including BSS/OSS, Corporate requirements and procurement Operations.

A particular focus of the Procurement Operations team is introducing the new Oracle IT system which provides extensive functionality to support all Procurement activities including sourcing, contract management, supplier management, day-to-day buying and procurement performance reporting. All Purchase Orders go through the Oracle system.

Procurement – Strategic Supplier Relationships

NBN Co's intent is to harness the capabilities of Australian and global suppliers of equipment and services to build its network infrastructure efficiently, quickly and to the high quality standards required for a long operating lifetime. Consequently it is critical that NBN Co chooses its suppliers well and puts in place best practice long-term relationship management with its suppliers to ensure that they continue to perform strongly over many years.

A major ongoing Procurement initiative is the development of NBN Co's strategic supplier relationship model. NBN Co will maintain strategic relationships with selected suppliers whose performance is critical to the delivery of NBN Co's strategy or to the management of NBN Co's financial risk.

A program of regular performance review meetings at multiple levels is being established with each strategic supplier. Quarterly discussions are to be held with senior management to ensure that delivery responsibilities are clearly understood by both parties and any relationship issues are dealt with promptly and effectively.

Monthly management meetings are also to be held to review delivery performance and plan forward requirements. These meetings will be supported by supplier-specific performance reports from NBN Co's Oracle ERP system.

NBN Co's supplier profile by major spend category shows that by far the greatest financial exposure is in the categories of construction and installation contractors, and fibre network equipment, both passive and active. Other categories such as Network operational systems require less spend but are equally critical to the successful construction and operation of NBN Co's networks.

NBN Co faces three distinct classes of risk in connection with its strategic suppliers and will address each class of risk differently as part of its strategic supplier relationship model;

- Delivery risk – primarily from construction and installation contractors who are expected to build network elements on time, on budget and to specified quality standards
- Supply risk – primarily from suppliers of passive hardware and other basic products which must be provided on time without fail in large quantities wherever required by contractors and installers

- Technical risk – from suppliers of active equipment and supporting systems for the fibre, wireless and satellite networks which must meet demanding technical specifications and performance standards.

Cross-functional teams will manage these risks. Contract governance arrangements specifically encourage early communication of delivery issues and include step-in rights for NBN Co should a supplier encounter difficulties in performing its role. Two or more suppliers will be contracted wherever appropriate to reduce single-point-of-failure risks.

Other supplier management initiatives will include development of NBN Co's local supply base including expansion of some existing local production facilities and encouragement of new Australian capabilities in both products and services.

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5 NETWORK DESIGN AND TESTING



The design of the NBN Co network encompasses a number of elements covering the passive and active technologies necessary to deploy fibre, wireless and satellite based services to deliver broadband services to premises across Australia.

The network design and testing phase will put in place the necessary elements to allow NBN Co to commence construction of the main FTTP network. Manual activation of a small number of End-Users will commence in April 2011, with automated systems being introduced progressively through to June 2012, by which time fully automated activation at full scale will be enabled.

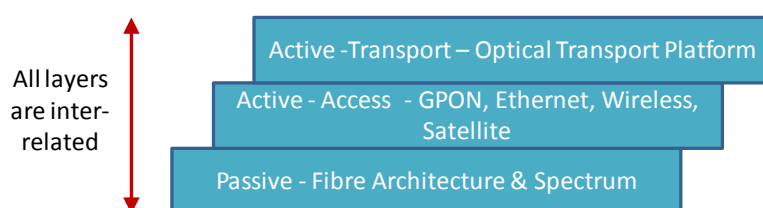
5.1 Network Design – Key Objectives

The overarching requirement is to design a network that meets the following objectives:

- Minimises cost for 93% and Last 7% coverage objectives;
- Delivers the NBN Co product requirements;
- Meets the network availability criteria required for NBN Co’s service level agreements;
- Ensures network asset lifecycles meet minimum objectives;
- Maximises re-use of existing infrastructure; and
- Provides a clear path for technology upgrade and ‘future proofing’.

Exhibit 5.1 below shows the hierarchical infrastructure components that are being covered by the Network Design.

Exhibit 5.1: Infrastructure Components



Source: NBN Co

The passive network elements, covering the fibre architecture and spectrum for both wireless and satellite services, provide the media by which the communications are carried to the End-User premise. The deployment/use of fibre, wireless spectrum and satellite spectrum in different geographical locations is optimised to achieve the following:

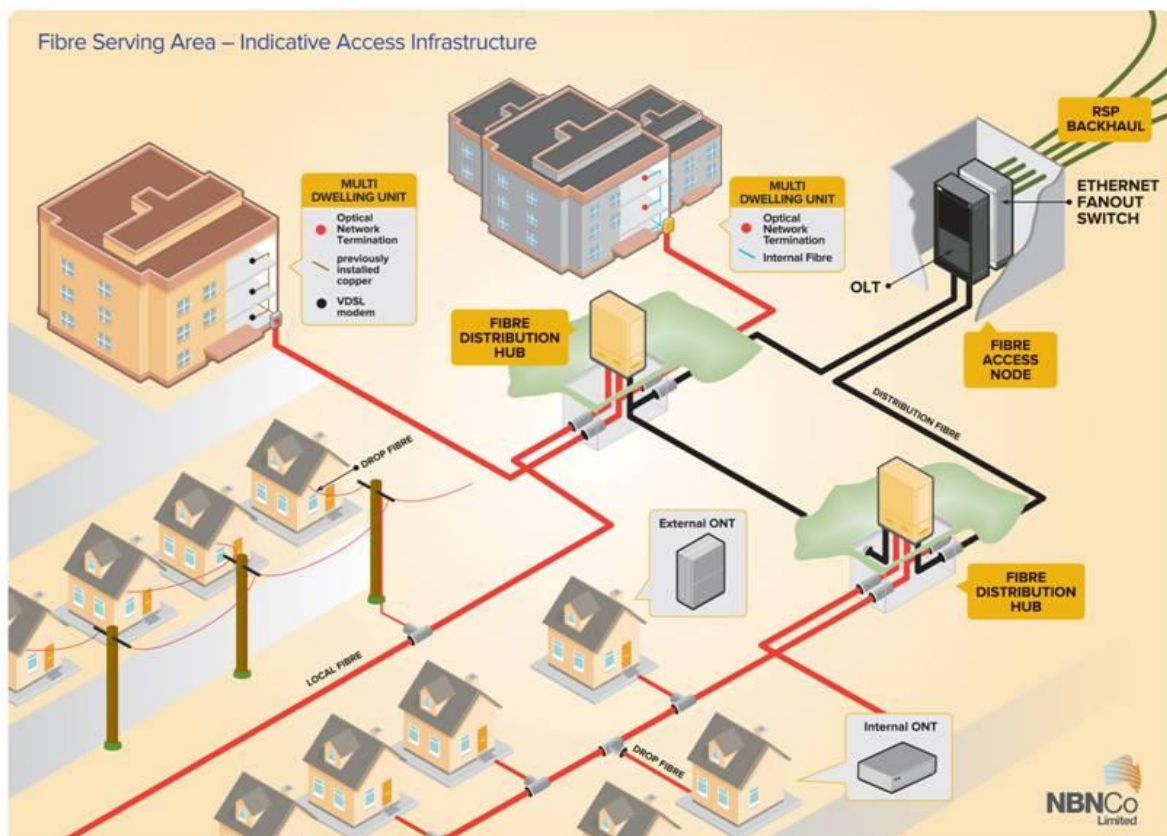
- The lowest overall cost to achieve fibre coverage to support 1Gbps services for 93% of premises; and

- The lowest overall cost to deliver services with a peak download data rate of at least 12Mbps to the remaining 7% of premises. This will be wireless or satellite depending on premise density, cost of backhaul and other geographic factors.

The active access network elements provide the communication signalling that travels over the passive media from End-User premises to the points of interconnect where NBN Co's wholesale Access Seekers (i.e. Retail Service Providers, **RSPs**) connect their networks. The preferred technology to use for the communication signalling is Ethernet which is a widely deployed/scalable technology for providing digital communications at what is commonly referred to as 'Layer 2' in the Open System Interconnection (**OSI**) Reference Model.

Gigabit Passive Optical Network (**GPON**) will be used to support Ethernet communications on fibre networks. Technologies for wireless (e.g. LTE or WiMax) and satellite are still under investigation along with network architectures with the objective of providing Ethernet communications in a similar manner for fibre networks wherever possible.

Exhibit 5.2: GPON Network Overview



Source: NBN Co

5.1.1 FTTP Coverage

The precise FTTP footprint will only be known when NBN Co completes detailed suburb-by-suburb designs for the network, which will happen progressively during the construction period of the project (i.e. as NBN Co rolls out in each geographic area). However, NBN Co has conducted detailed geospatial analysis to determine a high level FTTP footprint as the basis for its network design. In determining the FTTP footprint the key objective has been to achieve NBN Co's FTTP coverage target of 93% of premises at the minimum cost. In determining FTTP costs, NBN Co has also taken into account the costs of building transit backhaul to connect more remote areas of the FTTP network to the main competitive backhaul network.

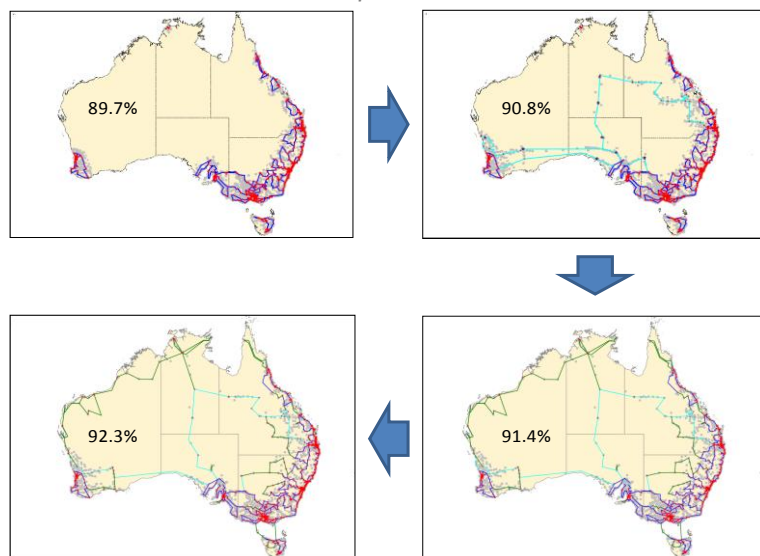
The proposed FTTP footprint is shown in Exhibit 5.3. It should be noted that this footprint actually extends to 92.3% of premises as of June 2010 but covers 93% of premises at the end of the roll-out. The FTTP footprint has been determined as follows:

- i. All communities with greater than 1,000 premises (determined by G-NAF data) were mapped, and then remote communities (i.e. those requiring extensive transit backhaul) were backed out, to provide the minimum FTTP coverage of 90%;
- ii. Transit backhaul routes required to service this FTTP footprint and 8 satellite earth stations were then plotted, and any communities with greater than 1,000 premises excluded under i. along these routes were added back in, resulting in 90.8% FTTP coverage;
- iii. All additional communities with over 1,000 premises were then added back in, together with the additional transit backhaul needed to serve these communities, resulting in 91.4% FTTP coverage; and
- iv. All communities with greater than 500 premises that are passed by the transit backhaul routes resulting from i-iii were added in, resulting in 92.3% FTTP coverage.¹⁸

This approach results in an optimised coverage plan, trading off the additional expense of adding incremental FTTP premises and the associated transit backhaul against the improved service that fibre will offer compared with wireless or satellite. NBN Co would consider proposals to provide FTTP coverage to particular locations when external sources of funding were provided to offset the incremental costs involved (eg state or local government funding).

¹⁸ FTTP coverage to 93% of premises by the end of the roll-out period. This is due to the growth in premises served by FTTP during the roll-out period, hence the 93% coverage at the end of the roll-out period equates to 92.3% at the beginning of the roll-out period.

Exhibit 5.3: NBN Co FTTP Footprint Scenarios



Source: NBN Co

NBN Co has proceeded with its network and system design on the basis that it would provide a layer 2 bitstream service only, using predominantly a GPON architecture, but allowing for some Point-to-Point development.

As directed by Government, NBN Co will undertake a Point-to-Point (or 'Home Run') architecture design, and more detailed desktop cost study in respect of a Greenfields site, which can be followed by a field trial, if directed by Government, once the design and further cost analysis is available. This desktop cost study and its required field testing will be aimed at facilitating proper consideration of the pros and cons of a Point-to-Point architecture without unduly losing momentum in the first three years.

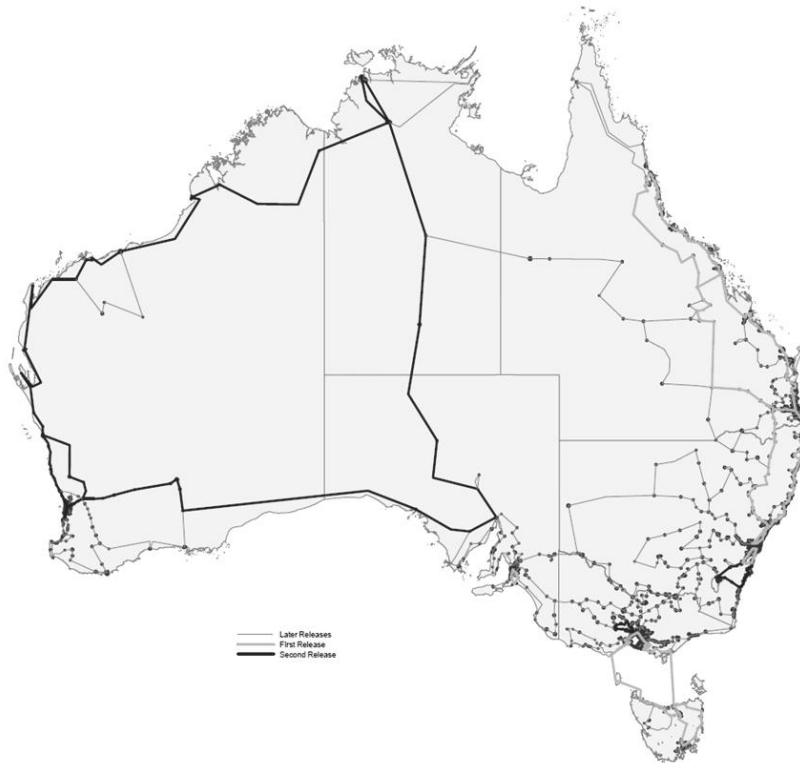
5.1.2 Transit Backhaul

The active transport network is used to provide long distance communication where it is needed in the network to deliver communications to points of interconnect that cannot be directly serviced by the active access network elements. This long distance communication is referred to as 'transit backhaul'. It is required predominantly in rural and remote regions to enable aggregation of communication traffic to a scale required to provide effective and efficient points of interconnect (**PoIs**) for NBN Co's wholesale Access Seekers. This network will be a common network used for all three network technologies (fibre, wireless and satellite) and NBN Co's own needs for managing the network.

In determining the requirement for transit backhaul, NBN Co has considered the routes currently being constructed as part of the Government's Regional Backhaul Blackspots Program. Where these routes overlap with NBN Co's transit backhaul requirements, the costs of NBN Co acquiring the routes in the future have been factored in to NBN Co's capital expenditure forecasts.

The diagram below shows an illustration of the envisaged long-term Transit Backhaul rings, with the dots showing the location of FSAs.

Exhibit 5.4: Transit Backhaul Rings (Proposed Only*)



Source: NBN Co

Note: *Subject to changes based on the semi-distributed PoI model.

5.2 Major Support Systems and Facilities

Before NBN Co can start acquiring End-Users on a significant scale there are a number of support systems and facilities that must be in place, including:

Support Systems	Support Facilities
OSS / BSS Enterprise Resource Planning	Network and Services Operations Centre (NSOC) Data Centre(s) Network Test Facility (NTF)

NBN Co’s systems requirements revolve around three major domains:

- Operational Support Systems (**OSS**) - providing the capabilities needed to provision, configure, manage, and operate the network;
- Business Support Systems (**BSS**) - providing the capabilities needed to manage Access Seekers, take orders, process bills and collect payments; and
- Enterprise Resource Planning (**ERP**) - providing the capabilities for managing enterprise functions such as finance, fixed assets, HR, project management, supply chain management, and contract management.

5.2.1 OSS / BSS

The detailed planning for OSS/BSS and other essential systems will ensure that capability and systems are progressively delivered to align with the requirements of the First Release and Release 2 Sites and commencement of volume roll-out.

The OSS/BSS will provide critical capabilities to ensure that NBN Co is able to build, operate and maintain its national network and activate, assure and bill for services provided on this network. The objective is to enable NBN Co and its wholesale Access Seekers to be able to perform these tasks in the most efficient and effective way possible with the maximum use of automation and self-serve processes being made available to wholesale Access Seekers.

In particular, in order to reduce operational costs for both NBN Co and its wholesale Access Seekers, retail and wholesale service providers must be able to access NBN Co's network, to deploy services, as if it was their own network. This "virtualised" network concept is vital in ensuring NBN Co's wholesale Access Seekers are able to transact with NBN Co in a way that optimises their End-User's experience. This must be achieved whilst meeting NBN Co's non-discrimination obligations.

Therefore NBN Co will be offering its Access Seekers the opportunity to connect via business-to-business (**B2B**) operational interfaces for ordering, provisioning and fault management purposes. This will involve the connection of our telecommunications Access Seekers' business support systems with NBN Co's operational support systems using open, transparent and robust interfaces for performing the many transactions required at different stages of the End-User lifecycle (ordering, provisioning, service management, billing, deactivation etc).

The capabilities to be delivered using the OSS/BSS are:

- Product Catalogue;
- Ordering and Activation;
- Service Assurance;
- Billing and Collections;
- Inventory Management; and
- Network Planning and Geospatial tools.

NBN Co has indicated to industry (Access Seekers and suppliers) its intention to use a standards-based approach wherever possible for transacting with third parties. In particular existing standards from the International Telecommunications Union (**ITU**) and the TeleManagement Forum (**TMF**) are being used and extended to enable this capability.

Three goals are driving the NBN Co systems delivery approach:

- Deploy off the shelf products for most capabilities, and customize only where absolutely necessary to meet regulatory, legal, or critical operational requirements;
- Select “best of suite” solutions, to minimize integration cost, rather than selecting the very best product for each specific capability; and
- For a select few systems (notably internet and intranet portals and B2B gateways) NBN Co will consider in-house development to ensure maximum flexibility and speed to market.

5.2.2 Vendor Selection Process

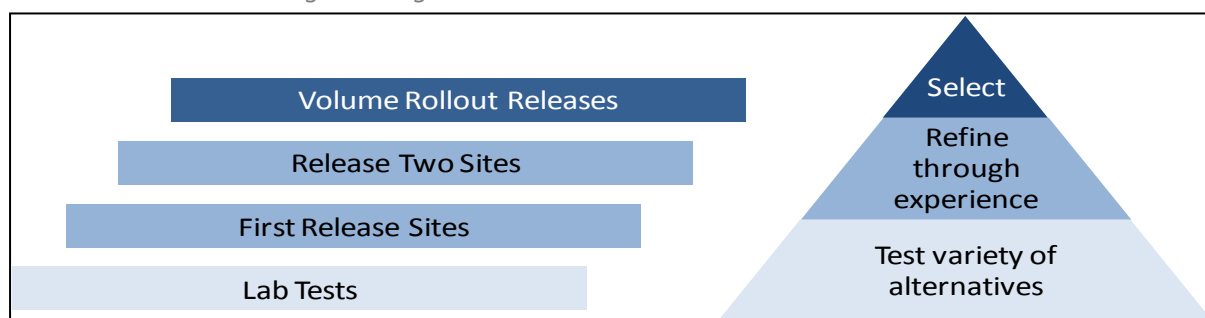
NBN Co has selected the Oracle e-Business Suite as the system solution for ERP. Accenture has been selected as the System Integrator (**SI**). A Request for Capability Statement (**RCS**) and Request for Proposal (**RFP**) process has been followed to identify the key system components and suppliers for the BSS and OSS systems, as well as to reduce the list of possible SIs. Five BSS/OSS domains have been identified for awarding of SI contracts, namely:

- Integration and Core Flow;
- Planning, Constructions, Network Inventory and Asset Management;
- Assurance;
- Access Seeker Care and Billing; and
- Fulfilment.

5.3 Network Design Testing

NBN Co has developed a strategy to progressively test and refine its Network design ahead of full scale national roll-out. This approach allows NBN Co to test its design and construction methodologies in a variety of scenarios before committing to large scale deployment.

Exhibit 5.5: Network Design Testing



Source: NBN Co

Testing for the NBN network design will begin with a lab-based proof of concept for the technology and then proceed to end-to-end field trials of the technology and design in conjunction with Construction, Operations, OSS/BSS systems and RSPs. This approach will not only validate design but also ensure that the national construction roll-out can scale successfully.

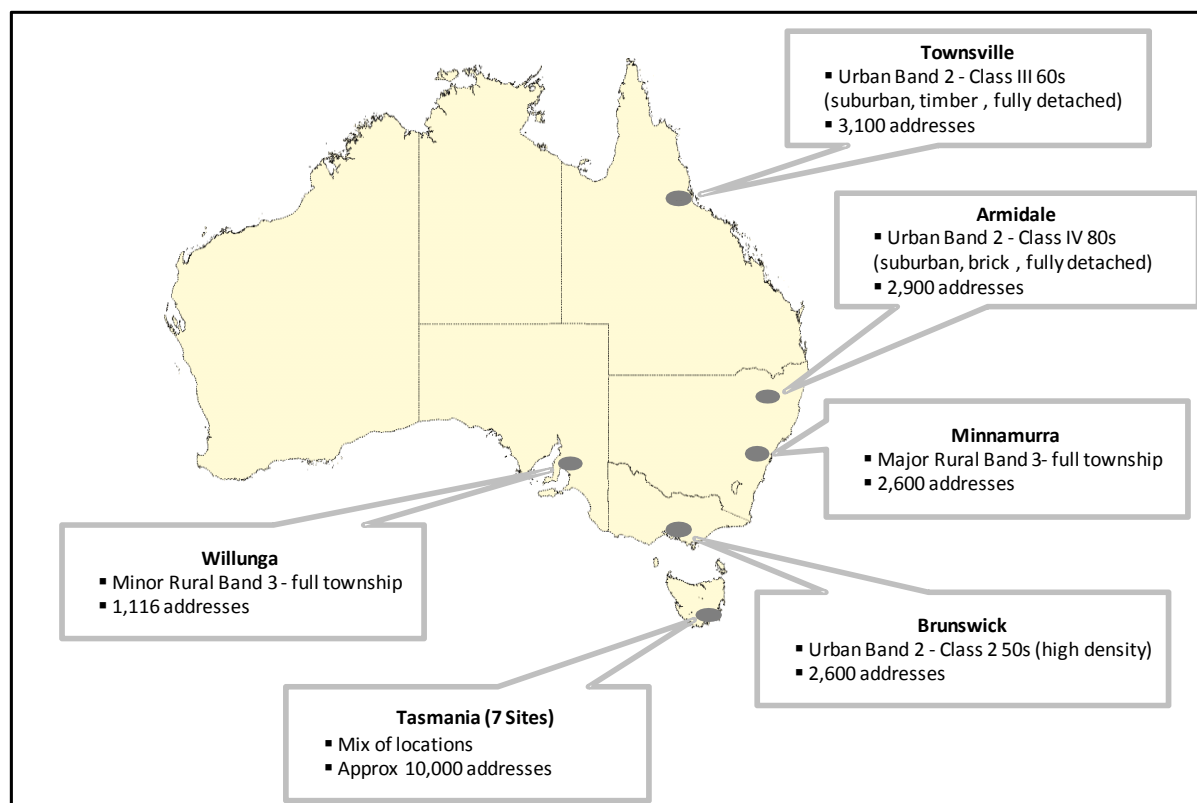
Twelve 'First Release Sites' (five on the mainland and seven in Tasmania) have been selected to test the validity and robustness of NBN Co's network design as well as construction techniques across a variety of different geographies. These are discussed in more detail in Section 5.4, *First Release Sites*. Prior to completion of the First Release Sites, NBN Co has commenced work on a more extensive Release 2 Site programme, aimed at validation of passive network technology construction methodologies including those required to install optical fibre in Telstra ducts (e.g. ribbon fibre).

This approach also enables NBN Co to put in place the vital support systems and facilities – such as OSS/BSS, ERP and NSOC – that are needed to support full scale roll-out at the same time as testing its design and construction methodologies.

5.4 First Release Sites

The First Release Sites have been selected as part of NBN Co's live trial of its network design and construction methods. These First Release Sites represent the diversity of situations NBN Co will encounter across Australia in the network roll-out, so sites have been selected that allow the company to test different design and construction techniques.

Exhibit 5.6: First Release Sites



Source: NBN Co

The objectives of the First Release Sites include the validation of the initial passive design, and testing the cost assumptions against actual costs. In addition, other important outcomes from this stage will be obtaining early input into organisational processes and to test/challenge current thinking; demonstrating NBN Co's readiness and responsiveness to industry and government; establishing relationships with councils, utility companies and suppliers; and providing an opportunity for the whole organisation to engage in delivering a single outcome.

NBN Co will deploy the Alcatel-Lucent active network equipment (i.e. OLT and Ethernet Aggregation Equipment) in the Fibre Access Nodes.

5.5 NBN Tasmania

On 25 July 2009 the Prime Minister announced that the communities of Smithton, Scottsdale and Midway Point would be the first to receive optical fibre broadband connections in the roll-out of NBN's network in Tasmania. The roll-out to these communities, covering approximately 4,000 premises, has been supported by the building of backbone optic fibre transmission links along five routes.

The Tasmanian project (Pre Release Sites) has been conducted in order to better understand the challenges of rollout, allow refinement of NBN Co's operational and procurement approach, and to provide input to the national architecture design, whilst at the same time delivering long-term value to the communities.

With the completion of the Pre Release Sites, all future activity in Tasmania will form part of, and be managed in an identical manner as the First Release, Second Release and subsequent Network Release programs.

5.5.1 Pre-Release Sites

The first test End-User was connected on 1 July and the network was launched on 12 August by the Prime Minister, Shareholder Minister and Premier of Tasmania. The pre-release network covers 4,000 premises, of which 50% provided consent for a free optic fibre connection by the closing date on 31 May.

Following the launch, there are now five participating RSPs that have logged a total of 580 service orders serving 470 premises, of which 440 premises are in live operation.

Media coverage and the election campaign generated significant email enquiries through the NBN Tasmania website mainly concerning future coverage and timing of the roll-out. The website contains answers to frequently asked questions, geospatial coverage maps, speed comparison tools and external links to the RSP products, plans and pricing. Feedback from connected End-Users has been very positive.

5.6 Last 7%

NBN Co has been set the objective of providing broadband access to premises in the final 7% of the country at speeds of at least 12Mbps. At the same time, the network must be cost effective and ensure a level playing field for all Access Seekers and End-Users. Realising these objectives is particularly challenging in Australia for a number of reasons:

- **Low population density.** The final 7 percent has very low population density making it both difficult and expensive to build infrastructure to these premises. While the first 80% of the

population has a density of 77.2 people per square kilometre, this drops to less than 1 person per square km for the final 6.5% of the country.¹⁹

- **Fragmented population pockets.** Premises outside the FTTP footprint covering the first 93% of premises are not generally in discrete areas. They tend to be located in small, fragmented pockets at the fringe of fibre serving areas or in isolated locations, separate from other settlements. This eliminates some of the economies of scale for wireless or fixed-line networks.
- **Hard to define ahead of the FTTP build.** In many cases, NBN Co will not know exactly which premises will be beyond the 93% fibre footprint. This will not be known until field surveys have been conducted on a site by site basis at the time of roll-out. Consequently, any modelling of the costs of serving the Last 7% should be considered preliminary at this stage and NBN Co will have to retain flexibility to adjust plans as the network is rolled out.

NBN Co's key design objective has been to optimise the FTTP / Wireless / Satellite network boundaries in order to deliver the maximum consumer experience within reasonable capital and operating expenditure constraints.

Within these parameters, NBN Co geospatial modelling suggests that the optimal network design, from a cost-to-serve perspective, would involve:

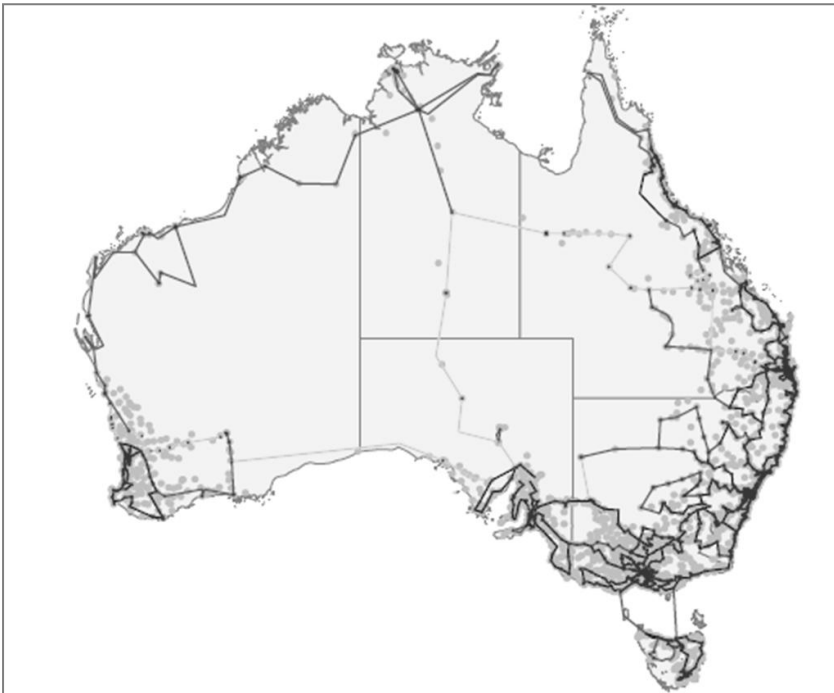
- FTTP initially to 92.3% of premises (based on existing premises numbers, 93% by end of the deployment when taking into account new real estate developments);
- Wireless from 92.3% to 97%; and
- Satellite for the remainder.

In order to optimise the wireless footprint, NBN Co has extended the edge of the FTTP footprint by a maximum of 75km (this being the propagation edge for a wireless base station served by 4 microwave hops back to the fibre boundary). NBN Co has conducted detailed geospatial analysis within this footprint to determine the optimal boundary for the wireless network, where the incremental cost of expanding the wireless footprint exceeds the incremental benefit of wireless services over satellite services.

This analysis results in a maximum wireless coverage of an additional 4.7% of premises, bringing the total wireless and fibre footprint to 97%. The balance of premises will be served by satellite.

¹⁹ Hugo G, *Changing patterns of population distribution in Australia*, Journal of Population Research and NZ Population Review, September 2002.

Exhibit 5.7: NBN Co Wireless Footprint and Satellite Earth Stations (Proposed Only*)



Source: NBN Co

Note: *Subject to changes based on the semi-distributed PoI model.

Deployment strategy for the Fixed Wireless solution

NBN Co's fixed wireless deployment has been accelerated with the Ready for First Commercial Service date targeted for May 2012 (due to availability of PoIs). A select process is in progress to procure a managed service for build, operate, maintain and transfer.

Deployment strategy for the Satellite First Release solution

The Satellite First Release solution will offer users a 6Mbps peak download speed, with an Average Busy Hour Throughput (**ABHT**) of up to 30Kbps. This is a substantial improvement on the current ABG services, albeit inferior to NBN Co's long term Satellite Access Service solution.

Deployment for commercial services is expected from 1 July 2011.

Procurement strategy for the long term Satellite Access Service solution

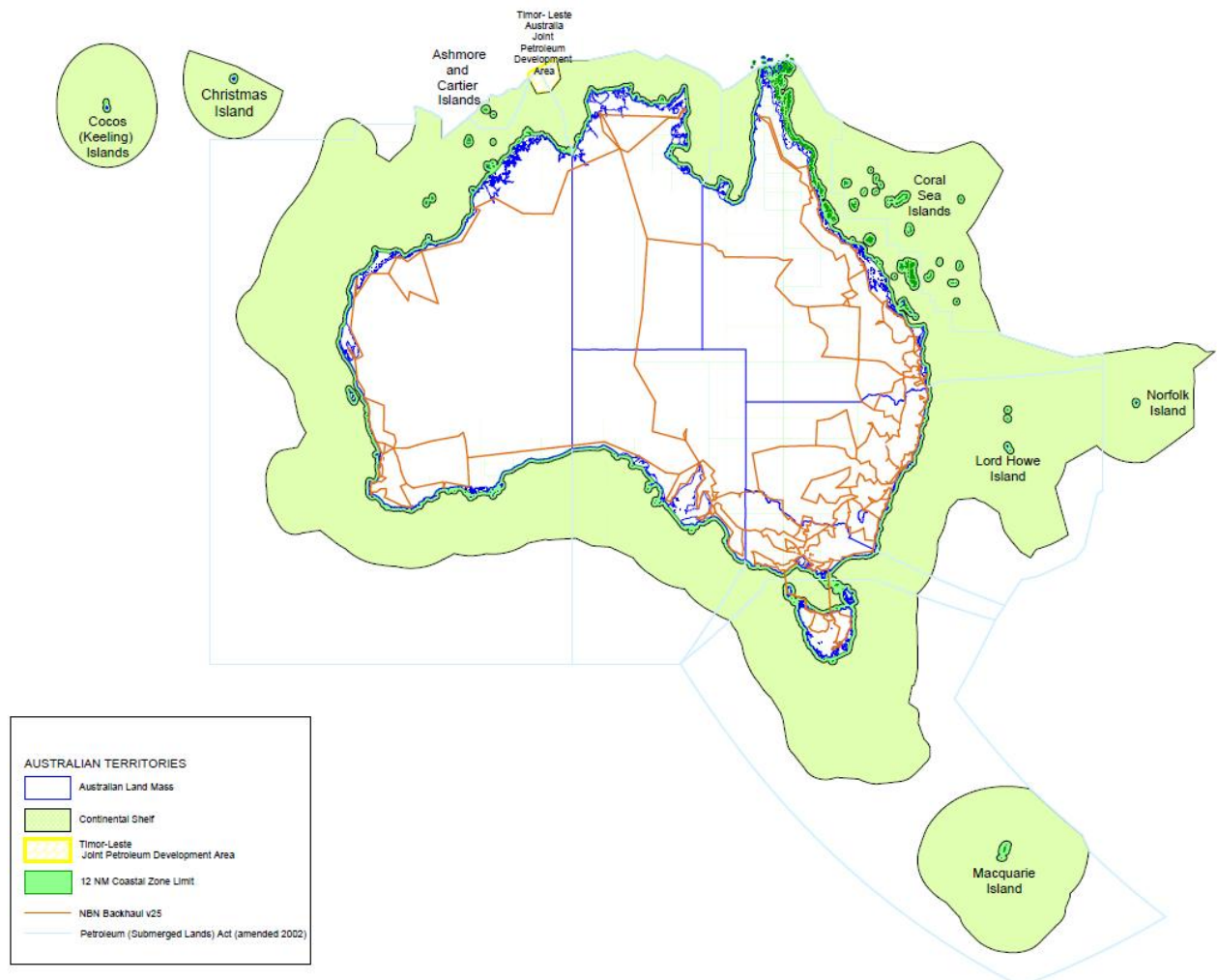
The Long term Satellite Access Service solution, also known as the NBN Co Satellite Access Service (**NSAS**), is a Layer 2 wholesale Ethernet access product suite, using third generation satellite technology. The NSAS will deliver at least 12Mbps peak download speed, and an ABHT of 300Kbps, for up to 200,000 users. To meet this requirement, NBN Co will need to launch two 80Gbps Ka-Band (60Gbps forward path and 20Gbps return path) satellites, supported by a network of 10 – 15 transmitting and receiving stations known as Gateways.

It should be noted that the NSAS will not be required to deliver basic voice services; this requirement will be met by USO Co.

The Procurement Strategy for the Long term Satellite Access Service solution has identified two supply segments: the Space segment; and the Gateway segment. Through the RFP process, NBN Co is intending to select either a single Turnkey supplier for both segments or two separate Segment suppliers.

Deployment of NBN Co's satellite network is expected to occur in FY2014/15, given the long lead time (3+ years) for satellite construction and reservation of launch slots. The indicative satellite beam coverage is shown in Exhibit 5.8.

Exhibit 5.8: NBN Co Satellite Coverage



Source: NBN Co

5.7 Type 2 Passive Network Design

NBN Co has commenced an extensive RFP process with suppliers of passive optical network components (e.g. cable, connectors, enclosures, fibre distribution hubs, optical distribution frames) to be used for the volume roll-out phase of the network construction. As part of this process the passive network design has been further optimised compared with the design used for the First Release Sites (see Section 5.4, *First Release Sites*).

One significant aspect of the new design will be the introduction of ribbon fibre (previous Australian deployments have used single fibres in a loose tube configuration) which is expected to significantly

reduce the labour required to perform the optical fibre splicing through the network. This technology has been widely deployed in Japan and South Korea in FTTP deployments.

The new “Type 2” passive design will be trialled in the next set of sites to be built after the First Release Sites and will be provided under the long-term supply contracts for the passive optical network.

5.8 Battery Backup

In order to comply with the Government’s objectives, NBN Co will provide a Battery Backup solution so as to temporarily power Network Termination Units (**NTUs**) installed at the Fibre End-User’s premise in the event of a mains power failure.

Standard NTU installation will include installation of a Battery Backup Unit together with the initial battery. Going forward, battery replacement, charging, and maintenance will not be NBN Co’s responsibility. Any battery-related alarms will be passed to the RSPs for appropriate action.

Lifeline Functionality during Power Outages

Telstra’s PSTN / copper network features the delivery of line power to the End-User premise. This current is sufficient to support a standard telephone handset and ensures that, assuming the copper line is intact, calls can be made during mains power failures, provided a cordless phone is not being used. During power outages this current is sourced from batteries in the local exchange.

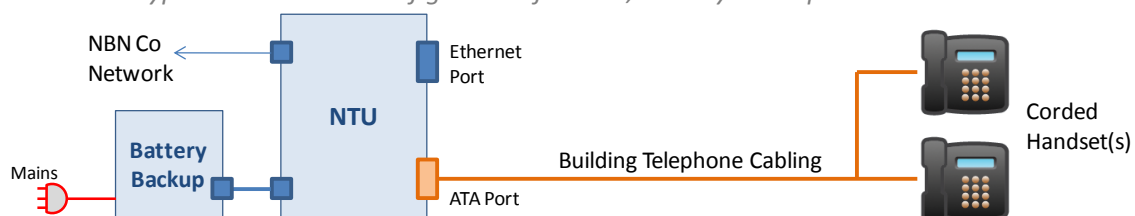
As fibre cables are electrically inert, powering both the NTU and End-User handset during mains power failures must be supported via an onsite battery.

Although many fixed lines now have cordless handsets (and thus require supplementary mains power) and the ownership of mobile phones is almost universal, NBN Co recognises for safety reasons the need for an uninterrupted fixed line services is still needed during times of emergency. Beyond calling, remote monitoring services and alarm systems will also be able to continue to function during mains failures.

Description

The Battery Backup solution will deliver power to the Analogue Telephone Adapter (**ATA**) port within the NBN Co Network Termination Unit (**NTU**) as shown in the diagram below.

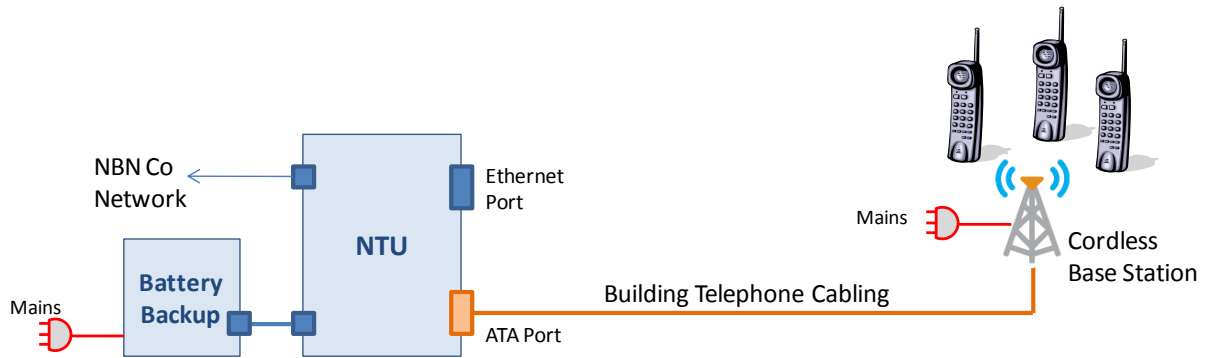
Exhibit 5.9: Typical Connection Configuration for NTU, Battery Backup and Corded Handsets



Source: NBN Co

It should be noted that telephone CPE requiring a local power source (such as cordless telephones) typically do not have a battery backup capability. Even though the NTU will remain powered through a mains outage, the cordless phone base-station will not, rendering communications inoperable.

Exhibit 5.10: Typical Connection Configuration for NTU, Battery Backup and Cordless Handsets



Source: NBN Co

The NTU's Ethernet (Data) interfaces will also not be powered during a mains failure. This is closely aligned to FTTP roll-outs in other countries. Provision of battery backup power to the Ethernet ports is a "custom" feature that is not currently available from equipment vendors.²⁰

Non-voice End-User equipment such as alarm panels and medical alert systems often contain their own battery backup capability. Coupled with the NTU battery backup, these devices will, for a limited time, continue to operate during an outage and will allow emergency usage if the End-User is in distress.

In terms of OSS/BSS, NBN Co does not intend to store any additional End-User information to support the Battery Backup solution. RSPs receiving battery alarms will be able to correlate the alarm to an End-User account and retrieve details from their own OSS/BSS platforms. RSPs could also supply this information to third party battery maintenance companies who perform this kind of service today.

Assumption for Corporate Plan

NBN Co has assumed that a Power Supply Unit (PSU) including a suitable battery at End-User premises at the time of NTU installation; this will allow power to be provided to the NTU for a limited time to provide telephone service in the event of a power outage.

Indeed, during a mains power failure, the Battery Backup solution will allow the End-User to receive NTU based telephony services for up to 5 hours.²¹

For the purposes of the Corporate Plan, NBN Co assumes that 0% of Fibre subscribers will opt-out of the Battery Backup solution. The battery will have a life of approximately 3 years. Maintenance of the battery, including replacement, is deemed to be the responsibility of the End-user or RSP.

NBN Co has not factored in the replacement of the Battery Backup solution due to faults or damage.

The Government has indicated it will consult with stakeholders including emergency services on the provision of battery backup services for those who need them. The Plan has not assumed any savings from the outcome of this process.

²⁰ NTU Battery Backup, Options Paper dated 28 September 2010.

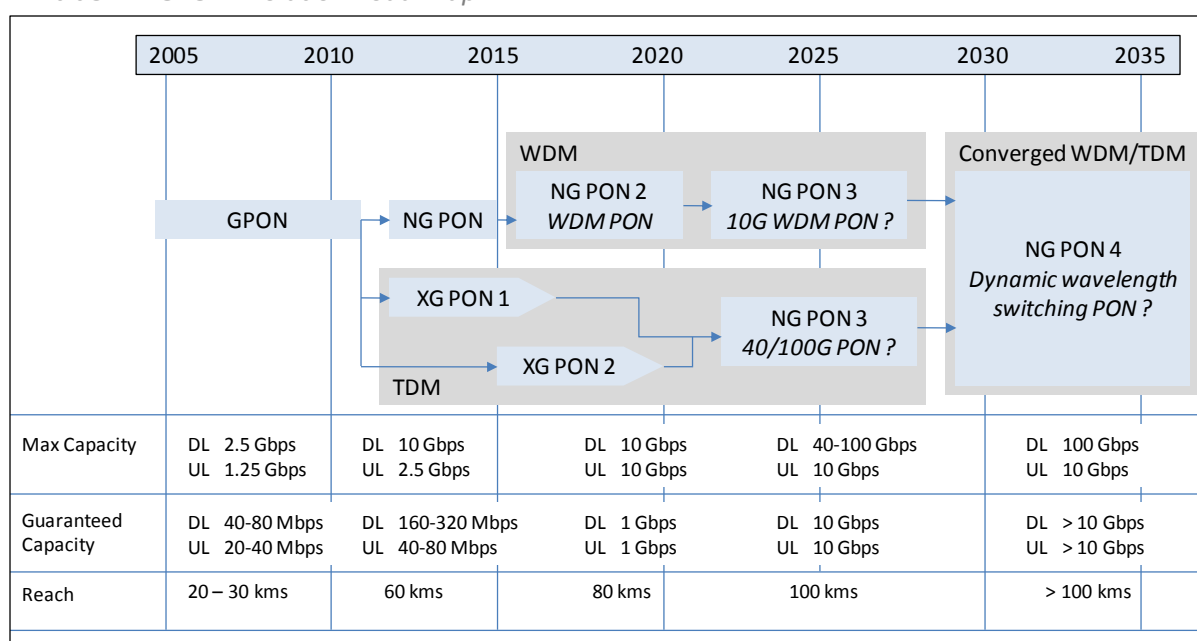
²¹ Assumes a 7.2Ah battery in new condition with a typical telephone usage pattern.

5.9 Future Proofing the NBN

The initial GPON technology selected by NBN Co is capable of delivering download speeds of up to 1,000Mbps.

PON technology already has a well defined road map to deliver 10Gbps, based on international standards and global development programs (see Exhibit 5.11). Beyond 10Gbps PON, there are already blueprints for Next Generation PON 3 (**NG PON 3**) and NG PON 4, with projected speeds of 100Gbps available by 2030-35. These future developments cover both Wavelength Division Multiplexing (**WDM**) and Time Division Multiplexing (**TDM**) PON networks.

Exhibit 5.11: GPON Evolution Road Map



Source: NBN Co, Ofcom, Analysys Mason

At layer 1, NBN Co is specifying and deploying ITU-T (International Telecommunications Union) rated optical fibres that will assure compatibility with future FTTP technologies. NBN Co is dimensioning cables with sufficient fibre count to ensure that the Company can support both i) any future subdivision of premises within the FTTP footprint and ii) the adoption of alternate FTTP architectures as these emerge. The fibre and the fibre count deployed by NBN Co is the ultimate future-proofing, as NBN Co is working to ensure that any technology that runs on fibre can be run on the NBN.

NBN Co’s contracts with the GPON suppliers also embody very strong commitments on future proofing and technical development. NBN Co also requires seamless interworking between equipment from different vendors, giving the Company maximum control over product change and the evolution of NBN Co’s network and services.

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6 NETWORK CONSTRUCTION



6.1 Construction – Key Objectives

The Corporate Plan covers the first three years of a nine year deployment schedule. The work in the next three years will help to:

- Establish NBN Co’s capability to achieve its objective of fully deploying the transit, distribution and local networks to pass 12.2 million premises in the FTTP footprint (approximately 93% of addressable market) by June 2021; and
- Serve the remaining 7% of premises (1 million) by next generation wireless and satellite technologies, including developing a Satellite First Release solution.

The deployment schedule intends to achieve full deployment within 9.5 years of completing the First Release mainland sites (by June 2011).

Exhibit 6.1: Deployment Schedule to FY2021

Deployment Schedule to FY2021											
June YE (Premises)	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021
Fibre Premises Passed ('000s)	58	316	1,268	2,711	4,173	5,647	7,116	8,564	9,989	11,403	12,202
Fibre Premises Passed Daily Run Rate (250 Working Days / Year)	0	1	4	6	6	6	6	6	6	6	3
Fibre Premises Connected ('000s)	35	137	511	1,589	2,616	3,679	4,712	5,708	6,672	7,623	8,320
Fibre Premises Connected Daily Run Rate (250 Working Days / Year)	0	0	1	4	4	4	4	4	4	4	3
Wireless & Satellite Premises Covered ('000s)	165	179	447	545	770	813	858	904	950	962	974
Wireless & Satellite Premises Connected ('000s)	0	13	55	102	151	165	181	198	215	222	229
Total Premises Connected - All Platforms	35	150	566	1,691	2,767	3,845	4,893	5,905	6,887	7,845	8,549

Source: NBN Co

The construction targets include:

- Full-scale construction of NBN Co’s FTTP network which is due to commence in Q3, 2011;
- Transit backhaul built in four years;
- Premises covered by fixed wireless; and
- Premises covered by Satellite First Release.²²

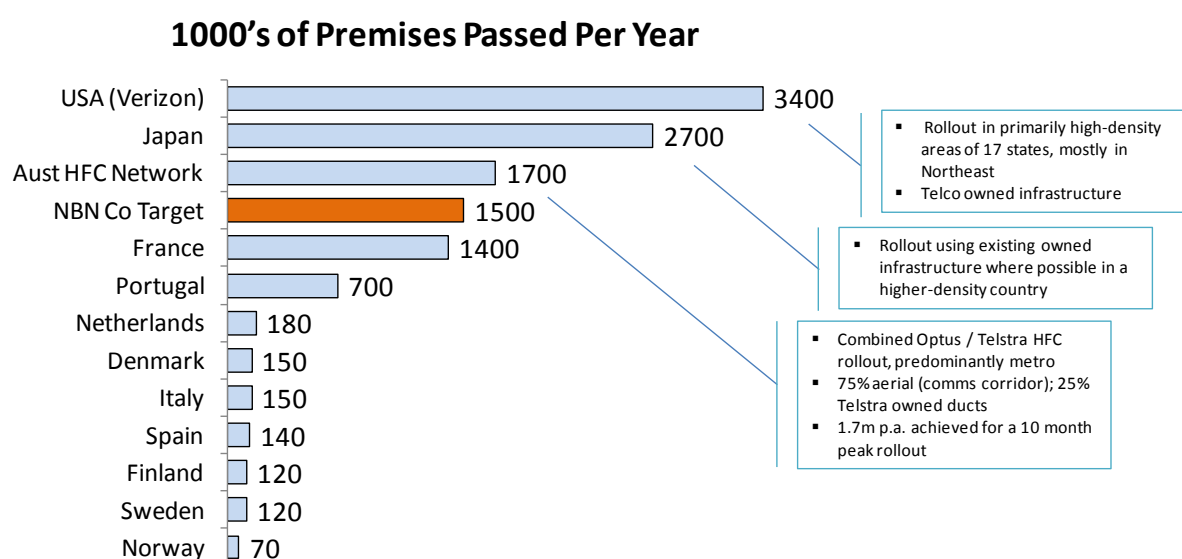
The phased release approach highlighted above will allow NBN Co to fine tune its construction model ahead of committing to large scale roll-out, thus reducing the risks of ‘false starts’ in the main network construction program.

²² Number subject to further assessment with Satellite service providers.

6.2 Achievability of Key Objectives

Over the period covered by the Corporate Plan, NBN Co will ramp up its construction capacity to a daily run rate of 5,200 premises passed per day by March 2013 (total of Build plus BOT premises) in order to reach 1.27 million premises passed by Fibre at the end of FY2013. Afterwards, the daily run rate will increase to 5,900 premises passed per day (total of Build plus BOT premises) during peak construction (assuming a 9.5-year roll-out and 250 working days per year). A comparison with roll-outs in other countries as shown in Exhibit 6.2 indicates that the NBN Co target run rate of 1.5 million premises passed per year is achievable.

Exhibit 6.2: Annual Roll-out Comparison with Other Countries



Source: IDATE, *FTTH European Panorama*, December 2008. RVA LLC, *Fibre to the Home: North American Market Update for the FTTH Council*, April 2009. Japanese Ministry of Internal Affairs and Communications, *Japan Monthly Statistics Information and Communication Service Subscribers and Contracts*, 2009. Analysys Mason, *Fixed Broadband: connections and penetration*, October 2009. Company reports.

Note: NBN Co Target: based on rounding the deployment target to 6,000 premises per day (versus forecast daily run rate of 5,900 premises passed per day).

NBN Co is currently assessing the resource requirements in order to achieve the premises passed rate of 5,900 per day at peak rate.

6.3 Main Assumptions of the Deployment Schedule

Critically, the deployment schedule is predicated on the availability to NBN of existing infrastructure. It specifically assumes that:

- Existing Telstra infrastructure will be available for use by NBN Co in accordance with the terms of the current Financial Heads of Agreement. NBN Co will deploy underground as much as possible when a fit-for-purpose infrastructure exists or infrastructure can be remediated; and
- Aerial infrastructure will be available for 25% of premises.

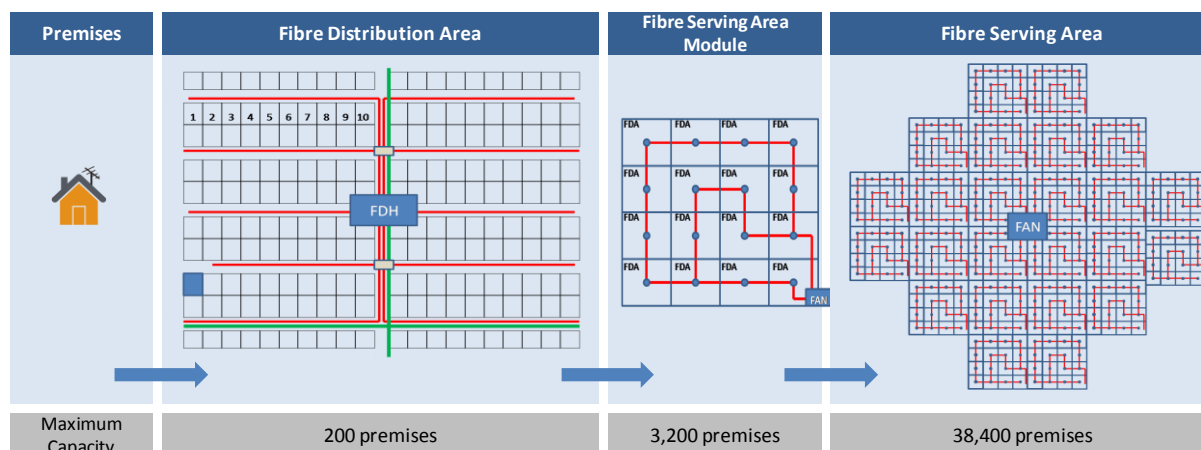
Planning will be continuously validated and confirmed incorporating experience accumulated from First Release sites to be completed in June 2011 and from Release 2 sites to be completed through 2011 and 2012.

One key consideration that will impact the roll-out speed over the full deployment period will be the mix of region density and construction type (aerial, underground – new duct, underground – existing duct).

6.4 Modular Deployment

The FTTP network architecture adopted by NBN Co comprises a large number of replicating modules that combine to make up the overall network.

Exhibit 6.3: FTTP Network Dimensions – Replicating Model



Over the 9.5-year construction period NBN Co will build or lease approximately 120 Semi-Distributed Poles, and 980 Fibre Serving Areas.

6.5 Geographic Coverage Principles

NBN Co has sub-divided the FTTP network into 16 Roll-out Regions. Deployment of the network is planned to take place concurrently across all Roll-out Regions in order to optimise workforce utilisation and avoid large peaks and troughs in labour requirements both nationally and regionally.

The 16 regions have been further sub-divided for the purposes of awarding 31 nominal work packages (known as Regional Contractor Packages (**RCPs**)) to contractors. The RCPs do not necessarily align with a specific geographic boundary within the region but provide NBN Co with the flexibility to allocate any Fibre Serving Area Module (**FSAM**) within a region to a contractor who has been successfully contracted within that region, thereby fostering a competitive framework.

The Government has asked the company to take into account the Government's commitment that fibre will be built in regional areas as a priority. The government has also encouraged NBN Co to explore mechanism by which community inputs and advice on regional priorities – in order to overcome the digital divide and improve the efficiency of the rollout – can be considered by NBN Co including through existing coordination structures like Regional Development Australia committees.

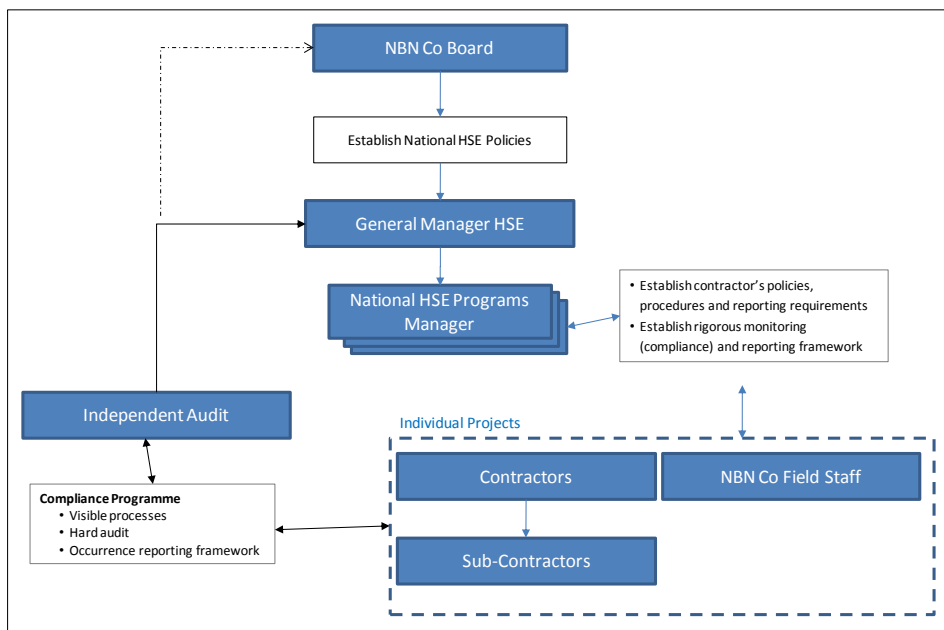
6.6 Construction Policies

6.6.1 Health, Safety and Environment (HSE)

The nature of construction activities exposes NBN Co to a variety of risks, particularly across the key power and communications corridors for aerial deployment. Safety is the number one priority for the Construction Group within NBN Co with appropriate mitigation plans and framework developed to ensure achievement of HSE KPIs. NBN Co will work collaboratively with utility companies and construction partners to ensure that best practice HSE policies are implemented, monitored and enforced throughout all aspects of the construction process.

A Manager, Construction HSE has been appointed with responsibility for establishing the HSE framework for Construction by defining standards and benchmarks for internal and external HSE performance. The Manager, Construction HSE is also responsible to establish the HSE team that will influence and drive a positive risk management culture within Construction. The Construction framework will be fully aligned with relevant legal and regulatory requirements as well as NBN Co enterprise-wide policies, procedures and performance objectives. Defined HSE criteria have been established to guide the HSE team in the evaluation and selection of external suppliers, ensuring their proposed processes and systems are consistent with HSE performance expectations and accreditation requirements. HSE Team typically interacts across several functions including Procurement, Government Relations and External Affairs, Chief Technical Officer, Network Operations and Construction Contractors. Construction HSE is involved in the development and design of NBN Co Group HSE systems to ensure that Construction's requirements are considered and incorporated into the NBN Co group wide framework.

Exhibit 6.4: NBN Co HSE Framework



Source: NBN Co

Construction HSE will continue to expand on its supplier/employees framework so that risks are mitigated as internal and external resources and works increase. The following principles summarise the HSE approach:

- HSE criteria will be given a high priority in the assessment and selection of relevant contractors;
- A skilled and qualified HSE Team will be built to support process compliance and risk mitigation;

- Engage specialist resources to input into the 'safety in design' process so that safety requirements are factored into product definition;
- Develop, refine and maintain the HSE framework and standards;
- Monitor 10 HSE Gates prior to site construct activities being undertaken;
- Coordinate HSE training and certification of NBN Co staff and contractors;
- Conduct regular safety / environmental audits;
- Establish an escalation process for HSE incidents;
- Risk assessments and safety audits of construction activity;
- Analysis and reporting for HSE performance;
- Coordinate the supply and deployment of Personal Protection Equipment (PPE) to NBN Co staff; and
- Benchmarking and best practice assessment for HSE.

The key outputs being the creation of a safe working environment for all NBN Co construction staff and contractors with the goal of 'no blame'.

6.7 Quality Control and Continuous Improvement

NBN Co has implemented a quality management framework to integrate product quality activities, process quality activities and quality improvement across the Company. This framework forms the basis of ensuring acceptable quality for the full scale national roll-out of all elements of the NBN.

NBN Co has implemented Australian and international standards for quality control and quality assurance so that required processes are being followed and results are consistently compliant with agreed standards.

A range of specific activities have been undertaken, including:

- Establishment of an enterprise quality management framework;
- Identification and use of state, federal and international standards across the various jurisdictions in which NBN Co will be operating;
- Appointment of quality assurance managers to assist design, construction and operations teams;
- Development of key performance indicators for network construction and network operations, to enable systematic monitoring and tracking of network quality and to benchmark against industry best practices;
- Development of product quality requirements for network component procurement and installation, to be incorporated into all relevant contracts; and

- Product assurance activities to control the quality of delivered products and services e.g. passive network installation quality, active equipment reliability.

NBN Co has implemented quality assessment (measurement and statistical analysis) and monitoring procedures enabling the Company to identify key lessons from projects and incorporate process and quality improvements for subsequent projects.

The rollout of the NBN involves a large number of nearly identical projects spread out over several years. This presents a significant opportunity for NBN Co to leverage learnings and refine processes as the rollout progresses. Continuous improvement will enable NBN Co to realise quality, cost and operational efficiencies within a safe workplace environment.

The continuous review and refinement of the construction process will ensure construction methods and processes are of the highest quality and evolve over time to reflect best practice.

6.8 Construction Partner Selection Process

A critical aspect of the Construction Plan is the identification of capable construction partners and the development of suitable structures to align interests and incentivise performance.

An RCS and RFP selection process was undertaken to appoint suitable contractors for the construction of the First Release Sites. A subsequent process is underway to award up to 10 contracts for the design and construction of the Release 2 Sites and construction volume roll-out. NBN Co intends to formally select construction partners for the Release 2 Sites and volume roll-out.

6.9 Supply Chain Management

A great deal of progress has been made by NBN Co in this space since June 2010.

The active equipment sourcing process has been completed and the major suppliers chosen. Alcatel-Lucent is now integrated into the organisation and complex network planning, engineering and laboratory testing has commenced.

The passive equipment sourcing is virtually complete with a range of suppliers in each of the key categories such as fibre optic cable now confirmed and contract award recommendations about to be made.

Civil construction companies have been sourced for the five First Release sites across the eastern states. The main Design and Construction RFP is still in progress with 21 firms and consortia proposing to respond.

Planning has been completed for the structure of the supply chain between equipment suppliers, contractors and NBN Co.

It is now clear that construction and installation companies will order directly from the NBN Co negotiated supply contracts with the equipment suppliers.

An over-arching information system will schedule and monitor the timely delivery of materials through the entire supply chain.

A comprehensive contract management process has been designed to ensure that NBN Co retains the necessary rights to intervene across the supply chain should supply failures or other emergencies occur.

The overall supply chain is expected to be robust with multiple options for inbound shipment and local logistics across Australia. All key items will be manufactured either locally or offshore by multiple suppliers. There is sufficient geographic dispersion across the supply base to minimise the risk of localised disruptions to manufacturing or transportation of the equipment.

6.10 Workforce Planning – Skills and Assurance

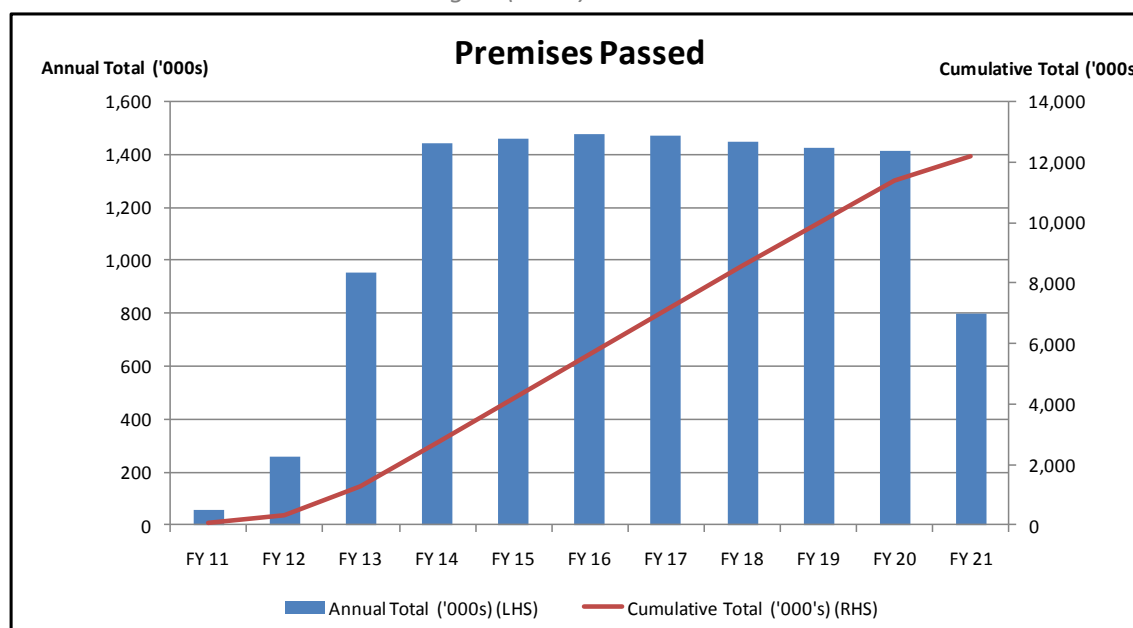
The success of the construction programme is dependent upon the development and implementation of a workforce development strategy. The strategy must identify potential skills shortages, determine the appropriate training programs as well as consider funding opportunities and establishment of a nationally consistent skills assurance process.

A workforce development strategy is being prepared that comprises three major elements:

- The identification of the national supply of appropriate skilled resources versus the demand for these resources, and therefore what potential gaps will require intervention;
- Determination of the relevant training programs and qualifications, providers and funding sources to support the development of skills; and
- Implementation of an approach to provide assurance that the workforce engaged on the NBN has the required skills and qualifications.

6.11 Summary Objectives for Construction

Exhibit 6.5: Fibre Premises Passed Targets ('000s)



Source: NBN Co

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7 COMMERCIAL OPERATIONS



7.1 Access Seeker and End-User Acquisition

The Financial Heads of Agreement sets out high level terms and conditions for the timing of the decommissioning of Telstra's copper and HFC networks (subject to certain exclusions). However, even in a situation where Definitive Agreements are entered into with Telstra, NBN Co will face competition from competing platforms (notably wireless). NBN Co has identified a number of key initiatives to facilitate take-up, which are applicable irrespective of whether Definitive Agreements are entered into with Telstra.

7.1.1 Promotion of Fibre-Based Services

Consumers base their decisions primarily on the applications and services.

Development of applications and layer 3 services is outside NBN Co's remit of activities; however, these will be major drivers for Access Seeker up-selling and the future usage of the NBN.

In order to ensure fibre offers services beyond the current user experience NBN Co will focus on four areas:

- **Enable IPTV over the NBN.** Video is likely to be one of the major applications requiring truly high speed internet in the next 2-5 years. NBN Co therefore regards securing an attractive wholesale IPTV application as a short-term priority. To this end NBN Co is planning to support IPTV product offering and, will continue extensive industry consultation and enable emerging IPTV wholesalers.
- **Enable other unique content and applications.** Other applications which will increase demand for fibre in the medium term are likely to include advanced telecommunications (e.g. teleconferencing), home security and management, e-health, e-learning and e-government services. NBN Co will work with RSPs to ensure product designs and network architectures support emerging or novel applications (e.g. similar to initiatives such as NTT DOCOMO and Apple's App Store).
- **Support improved access to offshore content.** A significant constraint on Australian internet usage is the expense of accessing offshore content and the related use of restrictive download caps. NBN Co will monitor international backhaul bottlenecks and review options for local caching of content to remove existing constraints.
- **Encourage new RSPs.** New RSPs will have a strong motivation to attract End-Users to the National Broadband Network. NBN Co will work to facilitate the emergence of new RSPs with innovative applications and services.

7.1.2 Create End-User 'Pull' to Fibre

Whilst NBN Co will not market directly to End-Users, there is an important role to play in promoting the benefits of fibre to consumers. NBN Co will support campaigns that promote the advantages of super-fast broadband and will work with RSPs to promote grassroots awareness of fibre and its benefits.

7.1.3 Create 'Push' from RSPs

To complement the consumer 'pull' initiatives outlined above, NBN Co needs to ensure that RSPs have a strong business model for fibre and have the capacity to migrate End-Users as easily as possible.

- **Reduce barriers for RSPs to transition to NBN Co.** In order to facilitate the migration of RSPs to the new network, NBN Co will work co-operatively with RSPs to ensure:
 - OSS/BSS interfaces are open, compatible and simple;
 - Technology risks are managed by test-bedding and integration of systems before going live;
 - Complexity and interconnect costs at each PoI are reduced; and
 - Rapid solutions for customer fault rectification.
- **Establish strong RSP Business Model for the National Broadband Network.** NBN Co will work alongside RSPs to ensure that the economics of migrating End-Users are clearly understood.

7.1.4 Ensure smooth migration

NBN Co is working to establish a smooth and standardised transition process from an existing copper service to fibre, with a number of actions identified:

- **Minimise repeat visits to End-User Premises to complete the migration process.** NBN Co is working with the industry to establish migration operating procedures which will be tested across a variety of products to minimise repeat visits to complete the migration process.
- **Ensure adequate training and monitoring of installation teams.** All installation resources will be required to have appropriate regulated and NBN Co specific verified accreditation to perform the specific installation functions required of them. NBN Co will support accreditation of staff and contractors by arranging training programmes.
- **Establish comprehensive problem resolution system.** Efficient resolution of problems will be key to maintaining migration momentum. NBN Co will specify a variety of options, including on-line real-time support systems for RSPs; remote fault rectification procedures; establishing standardised procedures for all anticipated fault scenarios; and efficient fault escalation procedures.

7.2 Network Operations and Maintenance

Operational interactions with RSPs will be primarily channelled through the Service Desk collocated within the Network and Services Operations Centre (**NSOC**). This function will have the technical capabilities to be a first point of management of Access Seeker service activation and assurance issues. The Service Desk will also monitor and report on conformity to contracted service levels.

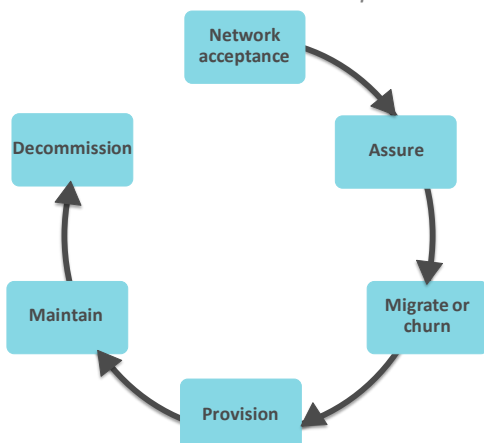
Service Activation Centres will be established in Sydney and Melbourne. One Service Activation Centre will be co-located with the NSOC in Melbourne to ensure effective coordination between activation and assurance staff. The workforce will be spread across both centres and load sharing will be implemented to spread the jobs into work queues. These centres will manage all exceptions which arise in the work queues and will be responsive in real time to staff and contractors engaged in provisioning and activating services for NBN Access Seekers. Additionally, specialist teams will support design and activation of non-standard services for businesses and Multi-Dwelling Units. A separate specialist team will support RSPs migrating services from legacy access networks to the NBN.

State Operations teams will be established in depots in each state and territory. NBN Co staff will cover safety, quality assurance, local contractor management, migration and non-standard services. The bulk of routine field requirements in support of assurance and activation activities will be provided by contracted resources.

Operational Functions

The primary operational functions within NBN Co, and the interdependencies between these, are illustrated in Exhibit 7.1. Each of these functions will have automated processes where practical to ensure interactions with partners and RSPs are cost effective and customer focussed.

Exhibit 7.1: NBN Co Network Operations Functions



Source: NBN Co

7.2.1 Network Acceptance

The Operations group will ensure that the built network is delivered to meet operational quality and timing requirements. Acceptance processes will ensure that all data required to effectively operate the network is captured and processed.

7.2.2 Assurance

Once the network is accepted into service, Operations will manage the operational interface to Access Seekers, monitor the network and respond to network and service faults using a mix of NBN Co staff and contractors. The network will be managed from a primary Network & Service Operations Centre located in Melbourne, with backup secondary facilities available in other locations to be used if required.

7.2.3 Customer Migration and Transfer

As soon as the network is accepted into service, the opportunity is created for RSPs to migrate existing End-Users from their existing copper or HFC access to the NBN. Similarly End-Users will be able to transfer from one RSP to another.

NBN Co is investigating options for coordinating the NBN Co and RSP activities to minimise impact on the End-User. NBN Co is also working with Communications Alliance and potential RSPs to assist in facilitating the development of RSP to RSP aspects of transfer in a NBN context.

7.2.4 Provision

Regardless of whether the End-User is migrating, transferring or establishing a new service a provisioning activity will be required. The standard products will typically be delivered using a highly automated, system supported process. More complex products for business and Multiple Dwelling Unit scenarios will also be required and these will be processed with higher levels of manual intervention.

7.2.5 Maintain

Maintenance of the network will be controlled through the Network & Service Operations Centre which will respond to a range of engineering and systems requirements for planned and unplanned maintenance routines. A separate function has been established to ensure that routine and emergency maintenance activities are appropriately tested before being applied in the live network and that business continuity plans are developed and maintained.

7.2.6 Decommission

Some active elements in the network may have a limited life-span due to the potential increase in demand for additional capacity. Consequently it is likely that, even during the build phase of the network, some infrastructure elements will require replacement by elements with improved functionality. Operations will be primarily responsible for executing changes in the operational network. When required, specific programmes will be established to ensure that any significant changes in the network have minimal impact on End-Users

7.3 Operational Readiness

The operational focus for FY2011 and FY2012 will be largely influenced by the preparations for launch and the subsequent transition from manual activities during the Trial phase to increasing levels of automation through to mid 2012. The significant activities include:

- Development of operational and business processes and progressive refinement.

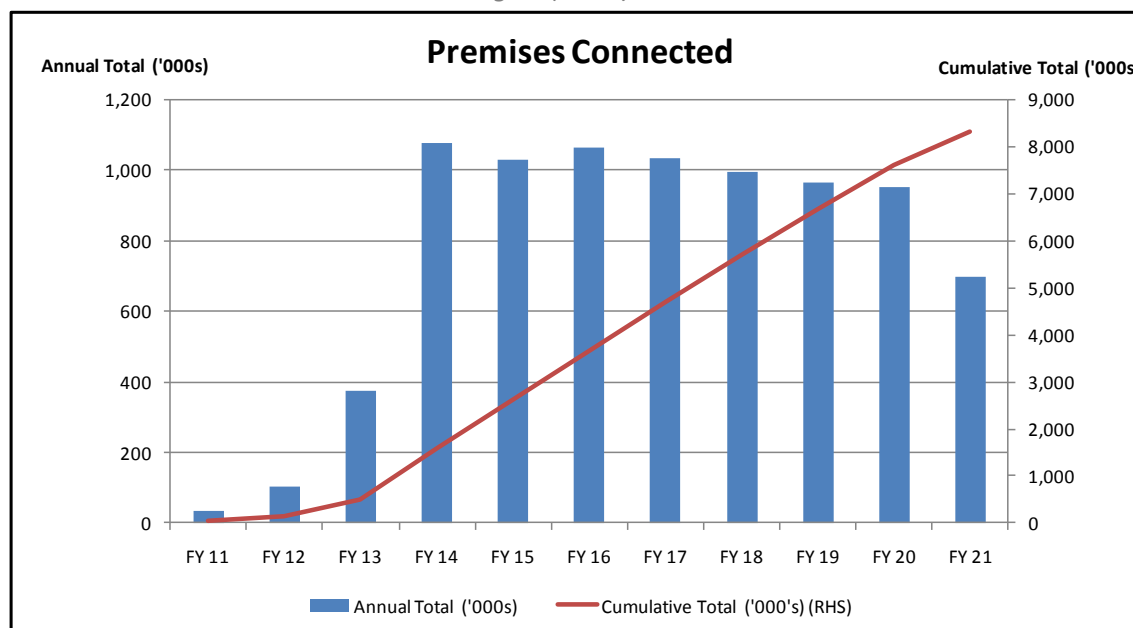
- Ensuring that the NBN Co working environment will be safe and environmentally acceptable.
- Specification of the business requirements to be delivered through Operations and Business Support Systems and user acceptance testing of systems when delivered.
- Establishment, training and accreditation of the large pool of human resources, both internal and contracted, required to operate and maintain the network. Business readiness preparations and testing for each phase of the roll-out for fibre, wireless and satellite services.
- Establishment of effective processes and systems for interworking with third parties including RSPs, contractors, vendors, utilities and other suppliers of services.

Critical to the success of the business readiness preparations is the progressive delivery of the systems capabilities necessary to support First Release and Release 2 Sites and, ultimately, the ongoing roll-out commencing early in FY2012.

7.4 Summary Objectives for Commercial Operations

The following chart shows the activation capability on a quarter-by-quarter basis to June 2013. The activation capability is the main driver of the rollout targets presented in Section 7, *Network Construction*.

Exhibit 7.2: Fibre Premises Connected Targets ('000s)



Source: NBN Co

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8 PRODUCT DEFINITION AND PRICING



8.1 Product & Pricing Approach

NBN Co's product definition and pricing constructs have been designed to provide a simple suite of products at competitive entry prices that:

- Assures early migration by service providers as the network is rolled out; and
- Achieves ongoing ARPU growth for NBN Co by facilitating the upgrade of services to higher speeds and increased usage.

The definition of the suite of products to be offered by NBN Co, and the pricing of those products, is central to both the technical design of the NBN and the long-term business model of the Company. NBN Co has developed a rigorous process to ensure an attractive product set is offered to meet market demand, based on the following core concepts:

- A highly structured product development process;
- A strong focus on gathering Access Seeker and End-User requirements;
- Benchmarking of current market wholesale pricing, with the objective of providing value to End-Users that is equal or better than what is currently available in the wholesale market today;
- Fostering early migration through compelling economics for the majority of Access Seekers;
- A deliberate objective to harness observable trends in End-User demand and utilisation;
- Being simple and easy to understand; and
- Provide Uniform Wholesale National Pricing across fibre, wireless, and satellite technologies.

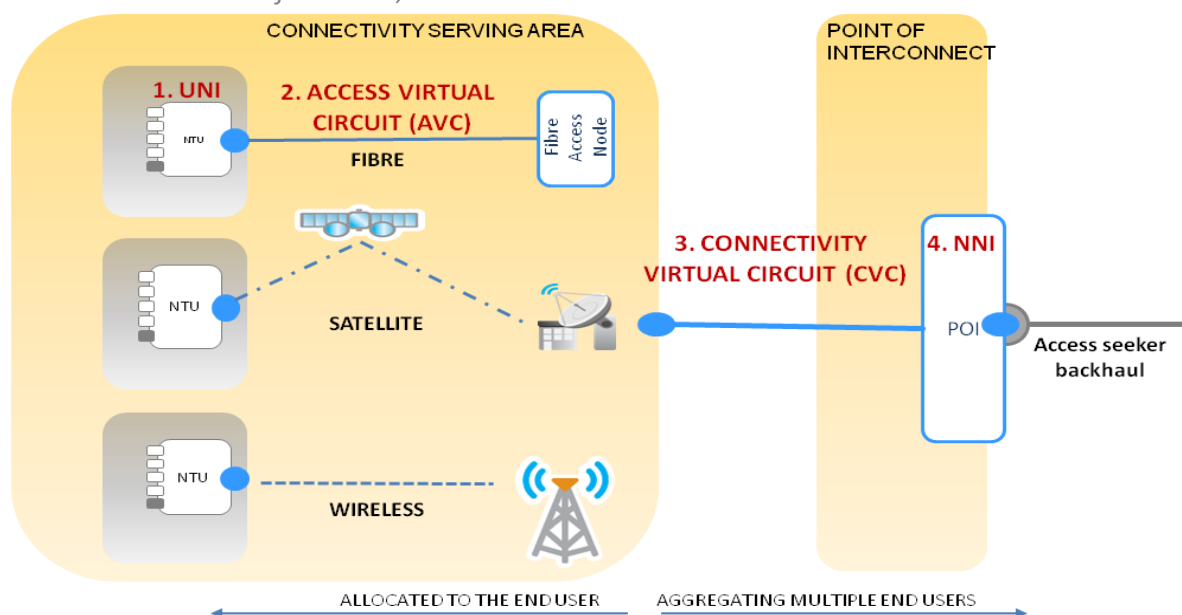
8.2 Product Summary

The NBN Co product set will be offered as follows:

- A uniform product construct across fibre, wireless and satellite. Featuring the same four product components across each access network and based on the technology – agnostic Ethernet bitstream framework;
- A 12 Megabits per second downstream and a 1 Megabits per second upstream entry-level offer across all three access technologies for the same price; and
- A Fibre Access Service with committed speed options of up to 100 Megabits per second and peak speed options of up to 1 Gigabits per second.

Exhibit 8.1 shows the high-level fibre, wireless and satellite product construct:

Exhibit 8.1: Overview of the Fibre, Wireless & Satellite Product Construct



Source: NBN Co

The fibre, wireless & satellite products comprise of four components as follows:

1. **User Network Interface (UNI):** are the ports on the Network Termination Unit at the End-User Premises. The User Network Interface is purchased in conjunction with an Access Virtual Circuit based on the required port type (e.g. User Network Interface –Data port and User Network Interface-Voice port) and connects the End-User’s set-top box, internet gateway or telephone;
2. **Access Virtual Circuit (AVC):** is the bandwidth allocated to an End-User Premises. The Access Virtual Circuit is purchased based on the required bandwidth, e.g. 12 Megabits per second downstream and 1 Megabits per second upstream;
3. **Connectivity Virtual Circuit (CVC):** is the capacity required for each Connectivity Serving Area to aggregate the Access Virtual Circuits to the Point of Interconnect. A Connectivity Serving Area is a logical selection of End-User Premises defined by NBN Co. Each Connectivity Serving Area has approximately the same number of End-User Premises; and
4. **Network-to-Network Interface (NNI):** is the port at NBN Co’s Point of Interconnect where Access Seekers connect their transmission backhaul and connect with the NBN. The Network-to-Network Interface (NNI) is purchased in either 1 Gigabits per second or 10 Gigabits per second interface with various protection options.

Technically, all four components work in conjunction with each other to deliver an Ethernet Bitstream from the NBN Co Point of Interconnect to an End-User Premises.

This component-based product construct gives Access Seekers the flexibility to configure the NBN Co network as if it were their own.

The product construct also allows Access Seekers to build the majority of their volume offerings very simply. Additional features, such as committed information rates, improved service levels, protected infrastructure and specialist video features are able to be selected as additional options.

The starting point for the fibre, wireless and satellite products nationally will be a 12Mbps downstream/1Mbps upstream access product comprising a ‘User Network Interface – Data’ and Access Virtual Circuit capacity of 12Mbps downstream and 1Mbps upstream. The products have been designed to be as similar as the technologies allow, so that Access Seekers are able to offer the same service across all 3 networks.

It should be noted that NBN Co intends to offer an initial version of the satellite product which will be 6Mbps downstream and 1Mbps upstream. This first-release offering is designed to service the market prior to the launch of the long-term 12Mbps downstream satellite product in 2015

8.2.1 Ethernet Bitstream, Peak/Committed Information Rates and Traffic Classes

The NBN Co product set will be an Ethernet Bitstream offering. Ethernet Bitstream is a widely accepted, technology-agnostic framework which will allow Access Seekers to easily overlay their distinct offerings (e.g. video content, voice offerings, and high speed internet).

Additionally, the fibre, wireless and satellite products will operate using up to four traffic classes, to support the variety of applications that will run across the network (e.g. data, voice, video and Internet usage). These four traffic classes are differentiated across a range of performance and availability characteristics, enabling Access Seekers to select and dimension the most appropriate traffic type for each category of application. Exhibit 8.2 describes the 4 traffic classes.

Exhibit 8.2: Overview of the NBN Co Product Traffic Classes

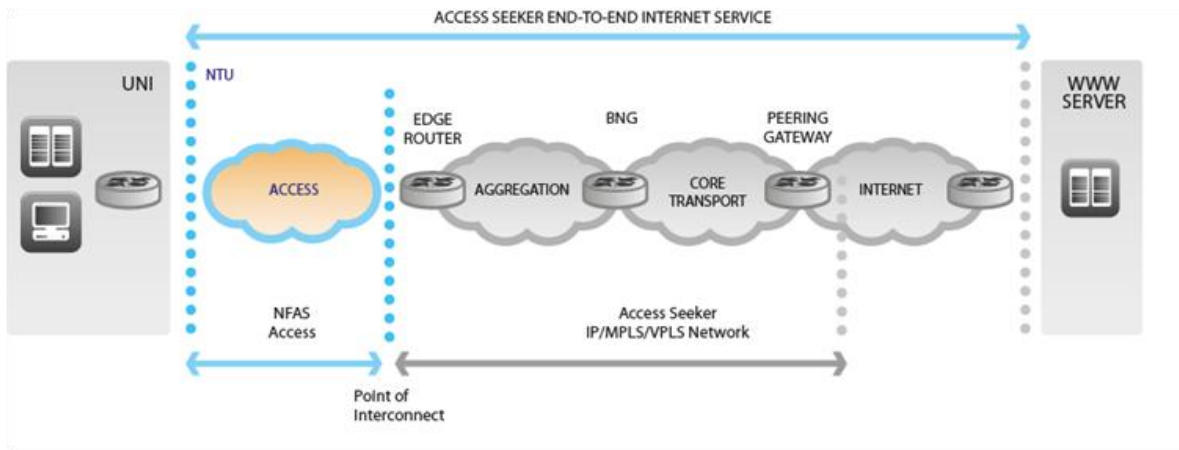
Traffic Class	Application Category	Example Usage
1	Real-Time / Mission-Critical	Voice Control
2	Interactive	Interactive Streaming & Real-Time Video
3	Transactional	Business Virtual Private Network Access
4	Best-Effort	Internet

Source: NBN Co

8.3 Fibre Product

The fibre product is known as the NBN Co Fibre Access Service. As noted in the Section 8.2, *Product Summary*, the fibre product set consists of a number of components which are used by Access Seekers as “building blocks” to provide an end-to-end service. As illustrated in Exhibit 8.3, this represents the “access network” portion of the overall network chain that is used for delivering Retail Service Provider applications and services.

Exhibit 8.3: Illustration of Where the NFAS Product Fits into the Delivery of an End-to-End Internet Service



Source: NBN Co

The NBN Co Fibre Access Service delivers an active wholesale network connection from the NBN Co PoI to the End-User premises which delivers analogue telephony and/or Ethernet interfaces at the End-User premises. Access Seekers can interconnect at designated NBN Co Points of Interconnect (**PoIs**), which serve defined selections of End-User Premises.

The NBN Co Fibre Access Service (**NFAS**) will initially be offered in the following speed combinations.

Exhibit 8.4: PIR Speeds Available on Fibre

Downstream (PIR Mbps)	Upstream (PIR Mbps)
12	1
25	5
25	10
50	20
100	40
250	100
500	200
1,000	400

Source: NBN Co

Exhibit 8.5: Traffic Classes Available on the Fibre Access Circuit

Traffic Class	Symmetrical CIR (Mbps)
1	Initial 150Kbps, then 0.5, 1, 2 and 5Mbps
2	Starting at 5Mbps, then 10, 20 30 and 40 Mbps
3	Starting at 10Mbps, then 20, 40 and 100 Mbps
4	See PIR table to the left

NBN Co will provide Multicast functionality for the provision of Internet Protocol TV (**IPTV**) services over the broadband network. The Multicast service gives the service provider the option of delivering any number of channels to NBN Co at the Point of Interconnect (**PoI**), with NBN Co handling the distribution to the Access Seeker’s End-Users.

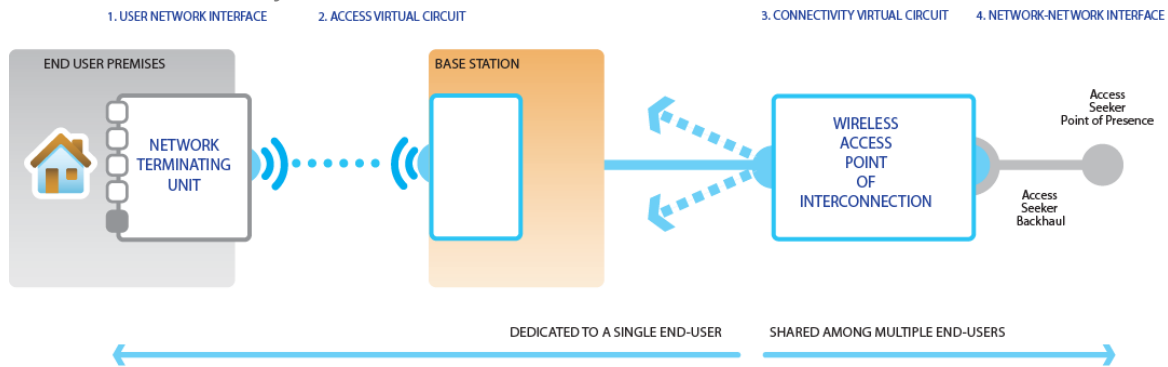
The chargeable items for the Multicast service are the ‘Multicast Access Virtual Circuit’ and the ‘Multicast Domain’. The product design of the Multicast components is designed to compare favourably against other delivery options (e.g. cable or satellite TV).

8.4 Wireless Product

The NBN Co Wireless Access Service product suite consists of a number of components which are used by Access Seekers as “building blocks” to provide an end-to-end service.

The NBN Co Wireless Access Service represents the “access” portion of the overall network chain and provides a conduit for delivering the Access Seeker’s applications and services over a wireless broadband connection.

Exhibit 8.6: Overview of the NBN Co Wireless Product



Source: NBN Co

The NBN Co Wireless Access Service delivers a wholesale network connection via one or more Ethernet Virtual Circuits from the NBN Co Point of Interconnect to the End-User premises. It delivers the services via Ethernet interfaces at the End-User premises.

Access Seekers can interconnect at designated NBN Co Points of Interconnect, which serve defined areas. NBN Co Wireless Access Service Point of Interconnect locations and Network to Network Interface interconnections are used for accessing NBN Co Wireless Access Services.

The initial product in the wireless product suite comprises an Ethernet Bitstream service, and some enhanced features for business users.

The NBN Co Wireless Access Service (**NWAS**) will be offered in the following speed combinations:

<p><i>Exhibit 8.7: Traffic Class 4 Peak Information Rate Speeds Available on Wireless</i></p> <table border="1" data-bbox="188 1637 775 1709"> <tr> <th>Downstream (PIR Mbps)</th> <th>Upstream (PIR Mbps)</th> </tr> <tr> <td>12*</td> <td>1*</td> </tr> </table>	Downstream (PIR Mbps)	Upstream (PIR Mbps)	12*	1*	<p><i>Exhibit 8.8: Traffic Classes Available on the Wireless Access Circuit</i></p> <table border="1" data-bbox="820 1637 1334 1854"> <tr> <th>Traffic Class</th> <th>Upstream and/or Downstream CIR (Mbps)</th> </tr> <tr> <td>1</td> <td>Limited to 150kbps</td> </tr> <tr> <td>4</td> <td>See PIR table to the left</td> </tr> </table>	Traffic Class	Upstream and/or Downstream CIR (Mbps)	1	Limited to 150kbps	4	See PIR table to the left
Downstream (PIR Mbps)	Upstream (PIR Mbps)										
12*	1*										
Traffic Class	Upstream and/or Downstream CIR (Mbps)										
1	Limited to 150kbps										
4	See PIR table to the left										

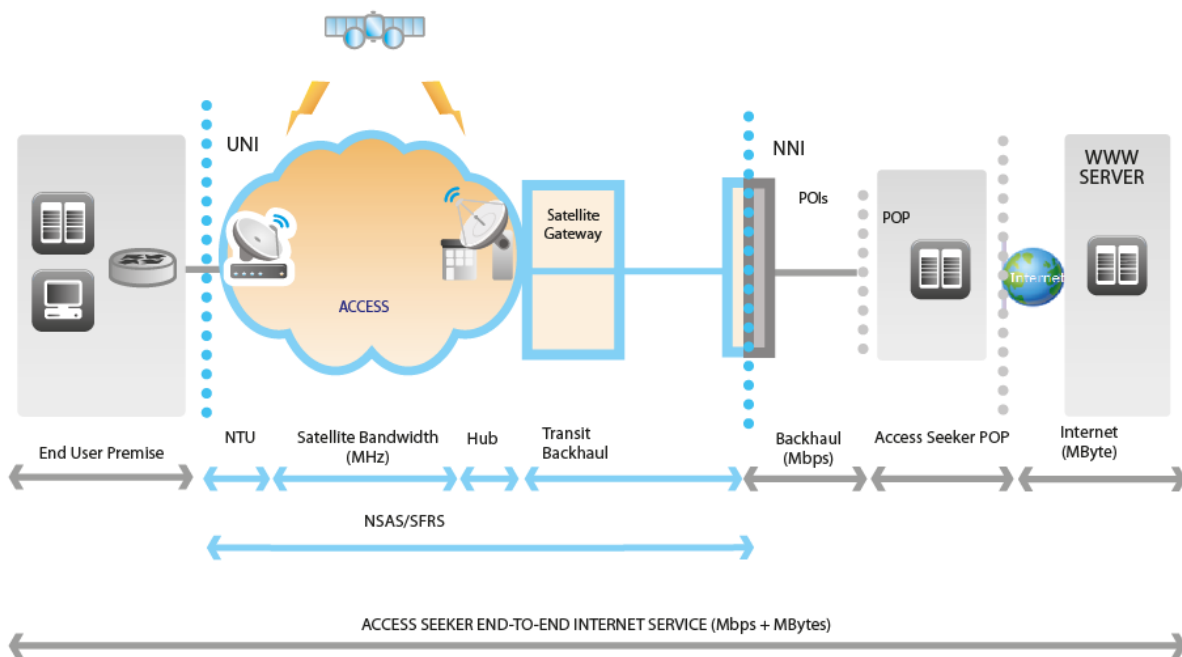
Source: NBN Co

*Note: Additional speeds may be available in future releases of the product.

8.5 Satellite Product

As per the Fibre and Wireless products, the NBN Co Satellite Access Service product consists of a number of components which are used by Access Seekers as “building blocks”, to provide an end-to-end service. The NBN Co Satellite Access Service represents the “access network” portion of the overall network chain and is used as a conduit for delivering the Access Seeker’s applications and services, as illustrated in the Access Seeker’s application environment, Exhibit 8.9 below.

Exhibit 8.9: Illustration of Where the NSAS Product Fits into the Delivery of an End-to-End Internet Service



Source: NBN Co

NBN Co Satellite Access Service delivers an active Ethernet connection via the space interface from the NBN Co Point of Interconnect to the End-User premises within the NBN Co Satellite footprint. Access Seekers can interconnect at designated NBN Co Points of Interconnect, which serve defined areas.

The NSAS will initially be offered in the following speed combinations:

<i>Exhibit 8.10: Traffic Class 4 Available on Satellite and Associated Access Circuit Pricing</i>		<i>Exhibit 8.11: Traffic Classes Available on the Satellite Access Circuit²³</i>	
Downstream (PIR Mbps)	Upstream (PIR Mbps)	Traffic Class	Upstream and/or Downstream CIR (Mbps)
12	1	1	Up to 150 Kbps to support Voice
		4	See PIR table to the left

Source: NBN Co

*Note: NBN Co intend to have a first release offer of the satellite product which will be 6Mbps downstream and 1Mbps upstream. This first release version of the product is designed to service the market prior to launch of the long-term satellite product. The Long Term Solution will include higher upload speeds of up to 2 Megabits per second with a future roadmap including 4 Megabits per second upload speed.

The NBN Co Satellite Access Service will initially be offered with traffic classes 1 and 4 only. Over time, the product will evolve to include all four traffic classes as per the fibre product.

8.6 Product Development and Product Roadmap

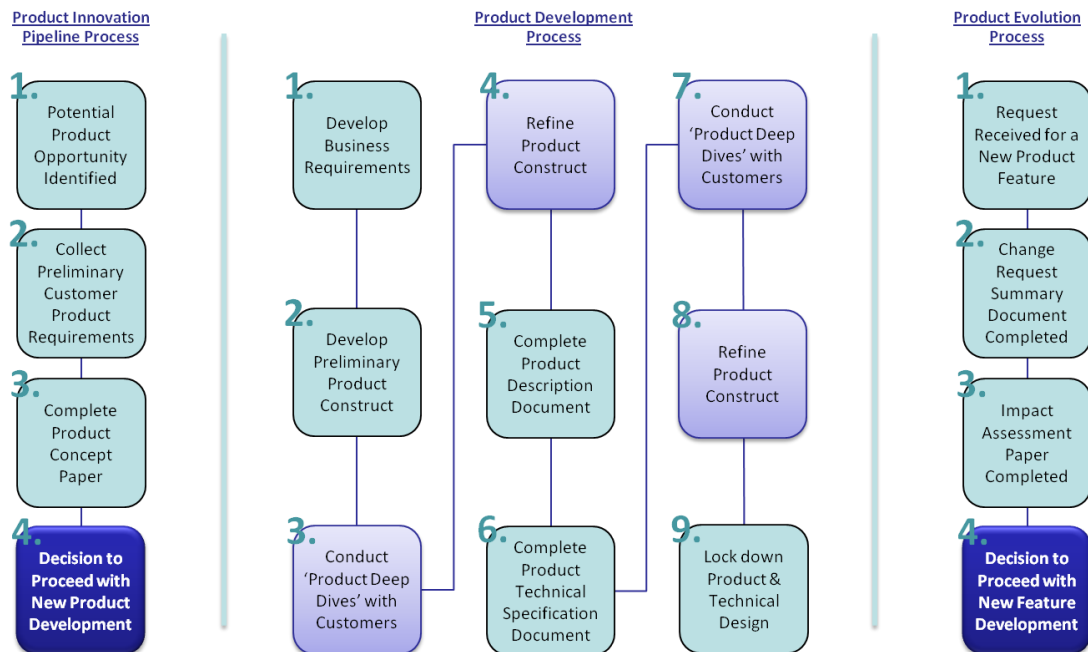
The NBN Co product development process is based around three principles, which together combine elements of world's best practice product development. These three principles are:

1. **Customer-Driven Product Design:** The current NBN Co product construct has been created after several rounds of consultation with prospective Access Seekers (over two hundred hours of consultation with more than twenty five Access Seekers).
2. **Traditional Technology Product Design Methodologies:** The NBN Co product development process incorporates key activities from technology product development processes, e.g. requirements gathering, solution definition, and change requests. Access Seeker requirements and product value propositions developed and identified during the product development phase feed into the technology build processes.
3. **Product Innovation Pipeline:** The product development process accommodates the wide variety of innovative future ways in which the NBN network may be used (e.g. health, education, security, utilities and entertainment) – it ensures that potential product requirements can be quickly gathered and summarised in 'Product Concept Papers', to allow NBN Co to make decisions around future product offerings or refinements.

²³ Symmetrical speed up to 2Mbps will be offered for the business market.

The following diagram is an overview of the key NBN Co product processes:

Exhibit 8.12: NBN Co Product Development Phases



Source: NBN Co

NBN Co is very conscious that the building and delivery of this unique network will have benefits across many different sectors of industry, organisations and society. As such we are undertaking a piece of work to identify which sectors and which application and service areas will derive the greatest benefit from the facility that a superfast national broadband network will deliver. This work will be carried out by an independent third party and will identify what new and improved applications and services can be expected in areas such as health, education, transport, power supply, social infrastructure, community services, government services, research and development and entertainment among others.

The results of this study will guide NBN's product development and enhancement roadmap for the future and will form the fourth principle of the product development process. Where significant benefits are identified in a given sector from the availability of specific features or new products, NBN Co will use those to prioritise enhancements and development. The prioritisation of those enhancements will be based on the level of benefit derived by the sector or the country as a whole, rather than on the potential for NBN Co to derive greater financial benefits.

The process of product development in regards to wider NBN benefits will be ongoing through the life of NBN Co as the benefits and applications of technology change over time.

8.6.1 Criteria for Developing the Product Roadmap

The following criteria have been used to develop the NBN Co product roadmap, which sets out the order in which offerings will be brought to market:

1. **Value Proposition:** The product roadmap has been selected to leverage the key differentiators of the NBN Co network, namely higher speeds, guaranteed bandwidth, and delivery of services in both metropolitan and regional Australia.
2. **Take-up:** Initial products selected are those which drive maximum take-up of NBN Co offerings by Access Seekers and End-Users.
3. **Demonstrating Innovation:** Offerings selected encompass the key product features, i.e. Ethernet bitstream for Internet services, voice telephony, and multicast for Internet Protocol TV.
4. **Customer Experience:** Product prioritisation is based on Access Seeker and End-User experience - including product migration tools and analogue voice emulation ports on the network termination units.
5. **Feature Availability:** Product roadmap has also been driven by the availability of various product features (e.g. analogue emulation voice ports, traffic classes, etc.).

8.6.2 Product Roadmap & Release Schedule

The Product Release roadmap commences in April 2011, building on the core capability and value proposition of the NBN, with the introduction of the high speed broadband and telephony capabilities. The product set then evolves with 4 additional feature and functionality 'releases' creating a strong value proposition for Access Seekers to address consumer through to high-end business markets.

Product Release One: High Speed Broadband & Telephony

Product Release one delivers a core set of NBN Co Fibre Access Service features to the market. It is intended to enable Access Seekers to "On-Board" and commence interoperability testing of NBN Co services. The Access Seeker will be able to offer high-speed internet packages with access speeds of up to 100 Megabits per second and telephony capability. This will enable a range of migration scenarios from existing broadband and telephony plans.

Product Release Two: Emerging Entertainment Capability

Product Release two enables Access Seekers to build a triple play offering, by adding the capability to distribute their content (e.g. television channels) simultaneously to two or more end-users as a single stream. This feature will greatly enhance an Access Seeker's ability to deliver internet protocol television offerings. This multicast technique can achieve significant bandwidth savings when delivering the same content to many end users. NBN Co expects to see retail market innovation based on these features, particularly around the delivery of a "triple play" offering, e.g. high speed internet, telephony and television channels for real time viewing.

Product Release Three: High Speed Business Services

Product Release three provides incremental functionality to support innovation in the small-to-medium-business market. These additional features are specifically designed to connect multiple business locations, so that they interact seamlessly and provide secure, high-speed and reliable access to various business applications, including video collaboration and video conferencing.

Product Release Four: High Speed Enterprise Services

Product Release four delivers very high speed (i.e. up to 1 Gigabit per second) services for high-end enterprise products. It will also provide incremental business-oriented functionality including point to point links and transparent VLAN services. Enhanced respond and repair service levels, in support of mission critical applications, are targeted for this release.

Product Release Five: Enhanced Reliability for Mission Critical Sites

Product Release five delivers the final features to complete the initial NBN Co Fibre Access Service offering. It includes access diversity for end-users. This feature enables mission-critical sites, such as hospitals, to achieve higher network availability and reduce their risk of outages. Additional operational capabilities will allow Access Seekers to provide greater reliability to their business End-Users.

8.7 Pricing

The goals of NBN Co pricing can be summarised as:

- Providing value that is equal or better than what is available in the wholesale market today;
- Fostering early migration through compelling Access Seeker economics;
- Being simple and easy to understand; and
- Providing uniform national wholesale pricing across all three delivery technologies.

The NBN Co Access product has two physical components, the User Network Interface (**UNI**) and the Network to Network Interface (**NNI**) as well as two logical components, the Access Virtual Circuit (**AVC**) and the Connectivity Virtual Circuit (**CVC**). These four components deliver a simple yet flexible construct to address both consumer and business needs via a set of speed tiers and support differentiation by Access Seekers at several points in the end to end path.

8.7.1 Access Virtual Circuit (AVC) Pricing

All NBN Access Seekers will be required to select an AVC based on a Peak Information Rate (**PIR**) speed. The initial AVC price scale is set out in Exhibit 8.13. Early lead pricing has been designed to ensure migration of existing broadband and voice End-Users, with the aim of allowing NBN Co to amortise the largely fixed network costs across a large base of End-Users. A key driver to NBN Co's pricing philosophy has been to maintain low price increments between the different access speed tiers in order to encourage End-Users to migrate up the speed curve. This will in turn drive higher usage, allowing NBN to amortise largely fixed network costs across a broader base, in turn keeping prices low.

Exhibit 8.13: Traffic Class 4 AVC PIR Charges (including UNI) (\$/month per service) (excluding GST)

Downstream / (PIR Mbps)	Upstream / (PIR Mbps)	Fibre	Wireless	Satellite
12	1	\$24*	\$24	\$24
25	5	\$27	-	-
25	10	\$30	-	-
50	20	\$34	-	-
100	40	\$38	-	-
250	100	\$70	-	-
500	200	\$100	-	-
1000	400	\$150	-	-

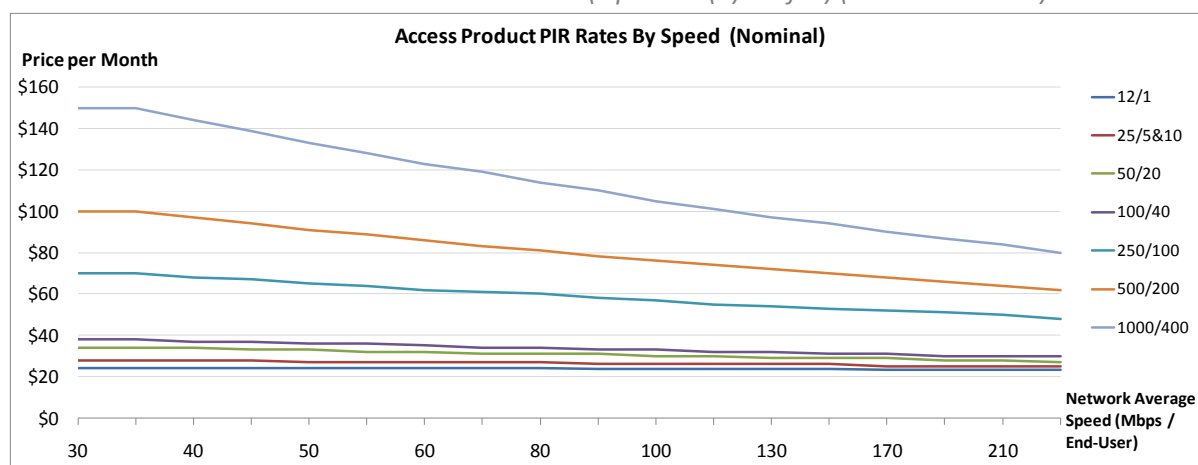
Source: NBN Co

*Note: AVC Pricing for Fibre at \$24 per month from FY2012 to FY2019, steadily decreasing to \$23 per month by FY2040.

Note: Wireless and Satellite roadmap of 12/2Mbps and 12/4Mbps pricing under review.

Over time, NBN also expects the cost of higher speed tiers to be reduced in nominal dollars terms, as illustrated in Exhibit 8.14, as the speed in Mbps, averaged across all network users increases.

Exhibit 8.14: Access Product PIR Rates Over Time (Option A (1) Profile) (Nominal Dollars)



Source: NBN Co

In addition, with every Traffic Class_4 PIR Access Virtual Circuit speed combination, Access Seekers have the option on Fibre Access Service of acquiring additional capacity at Traffic Class_1, Traffic Class_2 and Traffic Class_3. The aggregate capacity of the classes may only be purchased up to the of the Access Traffic Class_4 PIR capacity of the Access Virtual Circuit. This applies in both the downstream and upstream directions. This is expected to be used predominantly by business End-Users. The initial CIR price scale is set out in Exhibit 8.15.

Exhibit 8.15: AVC CIR Charges - Traffic Class 1 & 2 & 3 (\$/month) (Excluding GST)

Traffic Class_1– Committed Information Rates	
Symmetrical Speeds (Mbps)	Monthly Recurring Charge
0.15	\$10
0.5	\$34
1.0	\$66
2.0	\$134
5.0	\$334
Traffic Class_2 Committed Information Rate	
Symmetrical Speed (Mbps)	Monthly Recurring Charges
5	\$32
10	\$64
20	\$128
30	\$192
40	\$256
Traffic Class_3 Committed Information Rate	
Symmetrical Speed (Mbps)	Monthly Recurring Charges*
10	\$48
20	\$96
40	\$192
100	\$380

Source: NBN Co

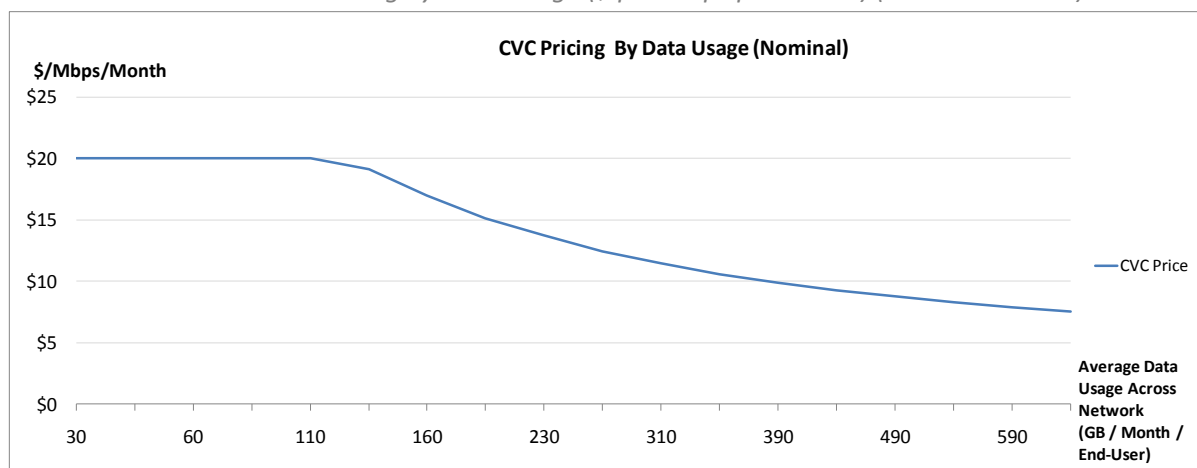
Downstream and upstream capacity increments from 100Mbps to 1,000Mbps are only offered as symmetrical speed combinations and are targeted at businesses requiring Wide Area Network (**WAN**) or point-to-point, high-capacity links. Further details will be released during 2011.

8.7.2 Connectivity Virtual Circuit (CVC) Pricing

The Connectivity Virtual Circuit (**CVC**) in the product construct is an aggregation point where the Access Seekers can choose to contend their traffic to create differentiation. CVCs can be used as proxies for usage charging. The CVC is purchased based on the bandwidth required to service the total amount of End-Users being aggregated across this link.

The CVC is priced initially at \$20 per Mbps, adding approximately less than \$1 per average end user for a 12/1 megabit per second service with current average data usage. It is currently envisaged that CVC capacity will be sold in fixed-sized blocks of capacity, with an expectation that the price will decline to \$8.75 representing a CAGR of -6.2% p.a. (FY2012 to FY2025) (pricing option A, refer Section 9, *Revenue Forecasts*, below). This price decline is based on expectations of increased usage and will be adjusted on a yearly basis to reflect take up rates, average speed increases and usage increases.

Exhibit 8.16: Forecast CVC Pricing by Data Usage (\$ per Mbps per month) (Nominal Dollars)



Source: NBN Co

The balance between AVC and CVC pricing has been designed to enable NBN Co to drive – and benefit from - substantial increased usage in the future. This has been achieved by keeping the AVC as low as possible in order to encourage consumers up the speed tiers, and relying on CVC revenues to drive ARPU growth.

8.7.3 Network-to-Network Interface (NNI) Pricing

The NNI is purchased in either, 1Gbps or 10Gbps port size increments. The two specification types are “Long Haul” and “Short Haul” with the Long Haul port allowing for longer distances between the point of interconnection and the Access Seeker’s point of presence.

NNI Port charging is shown in Exhibit 8.17 below.

Exhibit 8.17: NNI Port Charges (Excluding GST)

	Speed	Range	Non Recurring Charge	Monthly Recurring Charge
Short Haul	1Gbps	1000BaseLX – 10 Km range	\$1,000	\$200
	10Gbps	10GBaseLR – 10 Km range	\$7,000	\$500
Long Haul	1Gbps	1000BaseZX – 40 Km range	\$5,000	\$400
	10Gbps	10GBaseER – 40 Km range	\$35,000	\$1,000

Source: NBN Co

8.7.4 Multicast Pricing

The chargeable items for the multicast service are the Multicast Access VC and the Multicast Domain.

- The Multicast AVC charge is \$5 per End-User per month; and
- The Multicast Domain charge is \$2.50 per 1Mbps per month.

A number of alternate options remain under consideration.

8.8 Comparison with Existing Australian Wholesale Market Pricing

In comparison with wholesale broadband products currently in the market, NBN Co's product set provides higher speeds, in both downstream and upstream directions, more consistently. ADSL2+ technology can provide download speeds of up to 24Mbps, but is highly dependent on the distance between the End-User and the exchange; as a result, only few End-Users experience this speed. The average range of performance for ADSL2+ speed is estimated to be 3 to 8Mbps according to Speedtest.net (Ookla), public statements from Telstra²⁴ and NBN Co estimates.

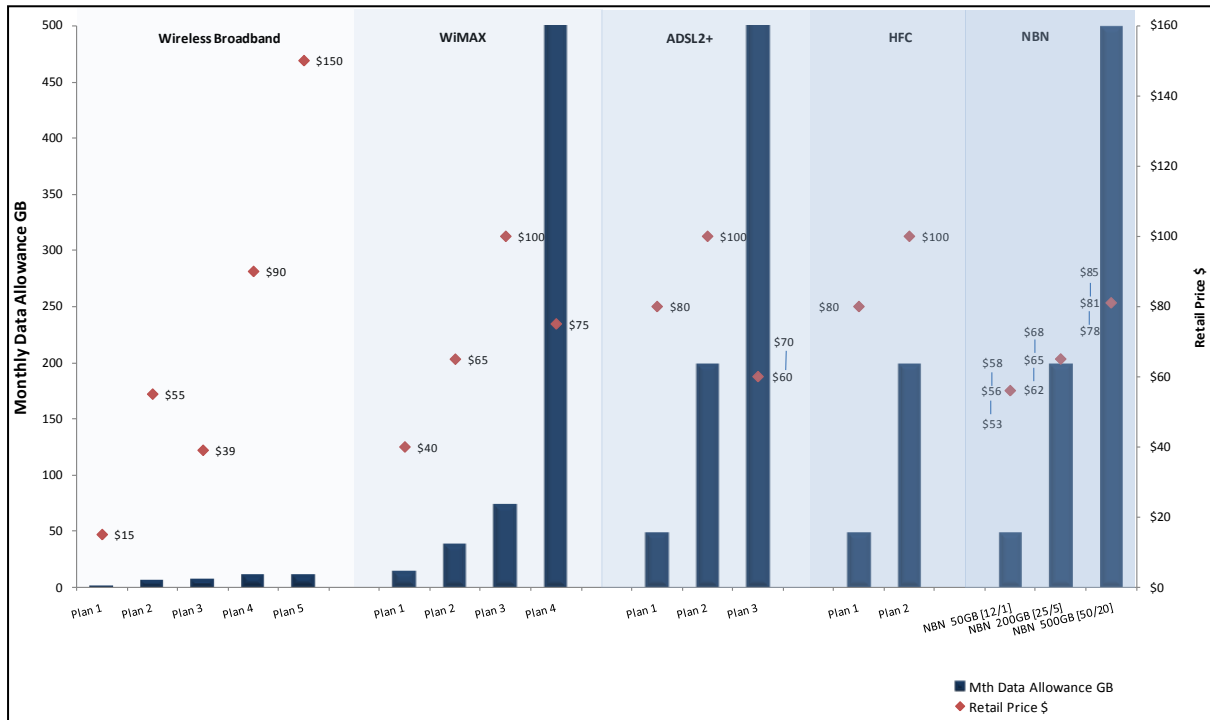
Hybrid Fibre Coaxial (**HFC**) networks can provide download speeds of up to 80Mbps. The technology is, however, strongly dependent on network loading so that on average 20Mbps is more realistic. HFC geographic coverage is limited to selected areas in capital cities, limiting the availability to approximately 2.5 million homes.

A similar picture emerges for Telstra's NextG wireless network. While it offers a peak rate of 42Mbps, at the recent launch of Telstra's network upgrade the company acknowledged that the network will deliver from 1.1Mbps to 20Mbps actual data rates, but currently only within a 5km radius from the CBDs of around 100 regional centres and to a select group of End-Users. Outside this radius the speeds would be in the range of 550kbps to 3Mbps.

In comparison, NBN Co's product suite offers a range of speeds from the entry-level of 12Mbps, up to 1Gbps on the fibre platform. Another strong differentiator of the NBN Co product is the upload speed. While upload speeds for all currently available products are limited to below 2Mbps, NBN Co's offerings start from 1Mbps for the entry level product up to 400Mbps at the top of the fibre range.

²⁴ Telstra advises customer buying its broadband services that average speeds will be lower than advertised maximum speeds: "About 70% of customers on the 8Mbps plan can access speeds around 6Mbps or more. About 50% of customers on the 20Mbps plan can access speeds around 10Mbps or more." <http://go.bigpond.com/broadband/19-plan/>
Optus also advises customers as follows: "About 70% of Optus Direct customers on the DSLD network can typically access average speeds of over 5Mbps and 76% of Optus Cable customers can access average speeds of over 8Mbps."
http://personal.optus.com.au/web/ocaportal.portal?_nfpb=true&_pageLabel=Template_worHS&FP=/personal/bundles/broadbandhome phone&site=personal

Exhibit 8.18: Estimated Retail Pricing and Data Download Distribution by Technology (Including GST)

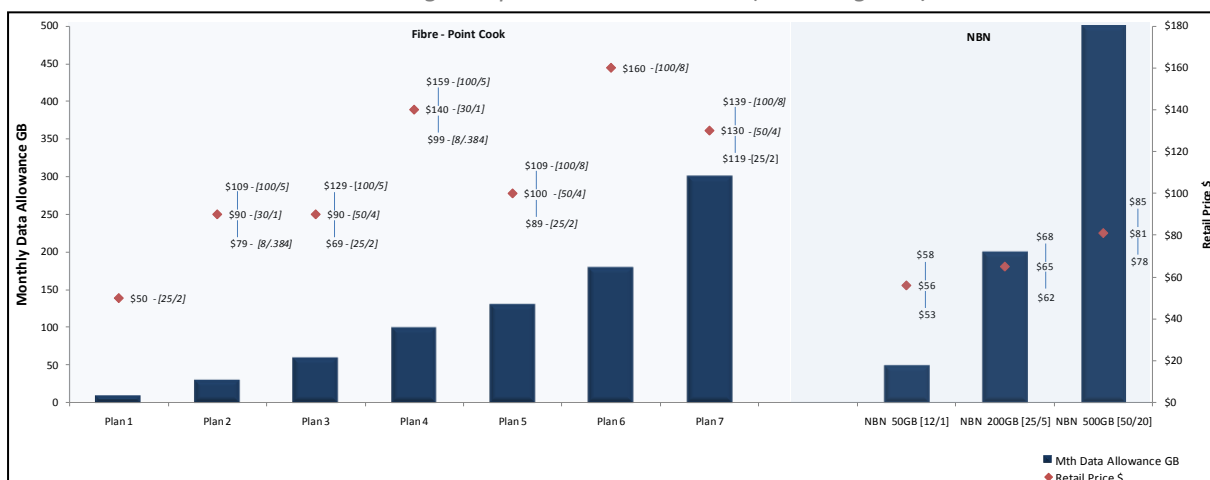


Source: Company Pricing Web Pages – As at December 2010, NBN Co Pricing Estimates

As shown in Exhibit 8.18, NBN Co plans (on the right of the graphic) show that Access Seekers moving to NBN Co fibre could offer lower prices than are currently in the market for similar speed and download products. This is based on an assumed EBITDA margin ranging from 10% to 20% (the red dots being set at the notional 15% mid-point retail margin).

The first bar of NBN plans, represents ‘low use’ End-Users based on a 12/1Mbps 50GB plan with an assumed average download of 18GB. The second bar represents ‘medium use’ End-Users based on a 25/5Mbps 200GB plan with an assumed average download of 40GB. The third bar represents ‘high use’ End-Users on a 50/20Mbps 500GB plan with an assumed average download of 75GB.

Exhibit 8.19: Point Cook Fibre Pricing Comparison with NBN Co (Including GST)



Source: Company Pricing Web Pages – As at December 2010, NBN Co Pricing Estimates

A comparison with existing fibre plans indicates that most of them are priced considerably higher than projected retail pricing for broadly comparable product sets.

8.9 Comparison with International Pricing Constructs

In the development of pricing, NBN Co made use of international experience from Singapore (Nucleus) and the UK (OpenReach). While these countries are very different in terms of geography, regulation, and market structure, many of the product and pricing constructs are applicable to the Australian market.

A direct comparison between Nucleus, OpenReach and NBN Co pricing has to take into account a wide range of differences in services. Our analysis suggests, however, that NBN Co projected access product pricing is in line with current overseas pricing.

8.10 Special Access Undertaking with the ACCC

NBN Co is proposing to lodge a Special Access Undertaking (**SAU**) with the Australian Competition & Consumer Commission (**ACCC**) under Part XIC of the *Trade Practices Act 1974* (TPA). An SAU is intended to provide regulatory certainty to an investor in relation to the issues covered by the SAU and for the term of the SAU. The SAU will also provide certainty to the market about the way NBN Co will engage and operate for the term of the SAU.

It is proposed that NBN Co's SAU will cover key price and product aspects of access to NBN Co's fibre, wireless and satellite networks, as well as a limited range of non-price terms and conditions. NBN Co proposes to address the following product aspects in the SAU:

- Descriptions of the wholesale Layer 2 services and products that NBN Co intends to supply;
- Initial fibre, wireless and satellite wholesale product sets and some conditions of supply;
- NBN Co's product development, variation and withdrawal processes.
- NBN Co proposes to include the following price aspects in the SAU:
 - Pricing principles and methodology;
 - Initial pricing for key wholesale products;
 - Ongoing price regulation for certain wholesale products.
- Detailed long-term constraints on total revenue able to be earned by NBN Co, using a Regulatory Asset Base methodology;
- Cost prudence commitments in relation to the Regulatory Asset Base;
- NBN Co's non-discrimination commitments; and
- Reporting procedures.

NBN Co is also developing a Wholesale Broadband Agreement (**WBA**) which will set out the complete set of terms and conditions of access to all of NBN Co's services and products being

provided over NBN Co's fibre, wireless and satellite networks. The SAU and the WBA will operate in a complementary way. For example, NBN Co's commitments in the SAU will determine how NBN Co exercises certain rights under the WBA (e.g. to change prices).

The WBA published on NBN Co's website will constitute NBN Co's standard form of access agreement (**SFAA**) for the purposes of proposed changes to Part XIC of the TPA, effectively declaring all of NBN Co's products and services.

The finalisation of the SAU for lodgement with the ACCC has required decisions on key policy matters such as the number and location of Pols and the required approach to uniform national wholesale pricing. Further, while SAUs are accommodated under the existing provisions of the TPA, NBN Co considers that it would be preferable if lodgement of the SAU awaited commencement of the Telecommunications Legislation Amendment (Competition and Consumer Safeguards) Bill 2010, the National Broadband Network Companies Bill 2010 and the Telecommunications Legislation Amendment (National Broadband Network Measures – Access Arrangements) Bill 2010. Each of these Bills contain amendments to Part XIC and other provisions which affect the regulation of NBN Co, including in relation to NBN Co's wholesale only status and the non-discrimination obligations to be imposed on NBN Co.

When the SAU is lodged with the ACCC, the ACCC is required to assess the SAU against a series of statutory criteria (known as the 'reasonableness' criteria). These criteria include the promotion of competition, encouraging economically efficient investment in and use of infrastructure, the legitimate business interests of access providers, the interests of access seekers and direct costs. The ACCC is subject to a statutory timeframe of 6 months to accept or reject the SAU, subject to extensions of time and stop-clocks.

8.11 Summary Objectives for Product Development Roadmap

Exhibit 8.20: Key Objectives for Product Development Roadmap

Product Roadmap & Release Schedule – Key Objectives	FTTP Capability
Product Release One	High Speed Broadband and Telephony
Product Release Two	Emerging Entertainment Capability
Product Release Three	High Speed Business Services
Product Release Four	High Speed Enterprise Services
Product Release Five	Enhanced Reliability for Enterprise

Source: NBN Co

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9 REVENUE FORECASTS



9.1 Summary Outcomes

This section summarises the overall revenues and key assumptions behind two options generated by NBN Co:

- Option A (1): Balanced revenues from access and usage, forming the upper boundary of the scenario range for this Plan; and
- Option A (2): Balanced revenues from access and usage, with lower usage and speed growth, forming the lower boundary of the scenario range.

Option A (1) & Option A(2) Common Major Assumptions:

In formulating the Revenue Plan a number of key assumptions have been made:

Exhibit 9.1: Option A (1) and Option A (2) Major Assumptions

Variable	Assumption ²⁵
Opening Premises (FY2010)	Business 1.3 million. Residential 9.6 million.
Premises Growth	1.6% p.a. (average FY2010 to FY2025). 1.4% p.a. (average (FY2010 to FY2040).
Premises Covered by Fibre	93% at end of NBN roll-out
Vacant/ Unconnected Premises	12.4% (at FY2025).
Existing Third Party Networks	4.6% (at FY2025).
Residential Wireless-Only Homes	13% currently increasing to 16.3% by FY2025 and 16.4% by FY2040. (Equivalent to Wireless-only premises at 13% ²⁶ of total premises (residential and business) by FY2025).
Existing Copper Network	Progressively decommissioned during NBN roll-out (refer Telstra Financial Heads of Agreement).
Telstra HFC Network	Progressively deactivated during NBN rollout for IP-based services, voice services, broadband services or services

²⁵ To FY2025 unless otherwise stated.

²⁶ Calculated as 16.3% of Residential Wireless-only Households times 88% (to factor in unoccupied premises) times 88% (to factor in business) = 13% of total premises in FY2025.

Variable	Assumption ²⁵
	requiring a return path transmission from the End-User (refer Telstra Financial Heads of Agreement).
Uniform Wholesale National Pricing	Uniform wholesale access pricing irrespective of the delivery platforms and across geographies for the entry level offering. ²⁷ No charge for transit backhaul (from the premise to the Point of Interconnect (Pol)).
Points of Interconnect	120 semi-distributed Pols.

Source: NBN Co

9.1.1 Option A (1)

Option A (1) Summary Results

Exhibit 9.2: Option A (1) Revenue Plan - Summary Results

Revenue	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2023	FY2025	FY2028	FY2040
June YE															
Premises Passed or Covered ('000s)															
FTTP	58	316	1,268	2,711	4,173	5,647	7,116	8,564	9,989	11,403	12,202	12,568	12,931	13,467	15,435
Wireless and Satellite	165	179	447	545	770	813	858	904	950	962	974	998	1,021	1,055	1,181
Total Premises Passed ('000s)	223	495	1,715	3,256	4,942	6,460	7,974	9,467	10,939	12,365	13,176	13,566	13,951	14,522	16,616
Premises Connected ('000s)															
FTTP	35	137	511	1,589	2,616	3,679	4,712	5,708	6,672	7,623	8,320	8,780	9,052	9,454	10,930
Wireless and Satellite	0	13	55	102	151	165	181	198	215	222	229	244	259	283	373
Total Premises Connected ('000s)	35	150	566	1,691	2,767	3,845	4,893	5,905	6,887	7,845	8,549	9,024	9,311	9,736	11,303
Gross Revenue (\$M)	3	42	160	509	1,075	1,706	2,388	3,130	3,972	4,914	5,760	6,788	7,571	8,769	14,002

Source: NBN Co

In Option A(1), by the end of the 3-year Corporate Plan, it is forecast that NBN Co will have \$160 million in annual revenues (in FY2013), with 566,000 connections across all platforms and a restated blended Average Revenue Per User (**ARPU**) of \$34.²⁸

Option A (1) Revenue Breakdown

AVC (PIR) and CVC products are expected to contribute approximately 50% and 30% of revenue respectively by FY2025, 41% and 36% respectively in FY2040. This reflects a policy to balance NBN Co revenues between speed (**AVC**) and usage (**CVC**). The construct of charging for CVC capacity is the principal mechanism by which NBN Co can benefit from the expected future growth in broadband data usage.

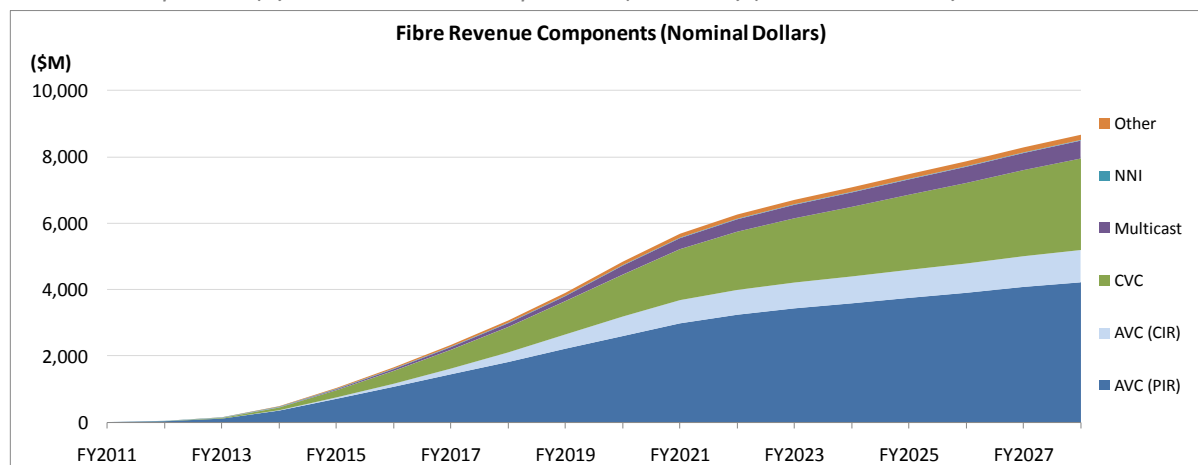
CVC revenues will be heavily dependent upon competition through quality of service, which will act as a catalyst for Access Seekers to purchase sufficient CVC capacity to enable End-Users to experience maximum actual speeds over the NBN.

Exhibit 9.3 shows the breakdown of projected revenues across the main FTTP product components.

²⁷ The Plan assumes that access seekers will face the same total wholesale cost from any premises to a designated Point of Interconnect (**Pol**) from NBN. This means that the total cost of access to NBN Co's network should not depend on customer location or technology used to deliver that service. This definition of Uniform National Wholesale Pricing (**UNWP**) specifically does not cover any backhaul from the Point of Interconnect (**Pol**), any inter-capital transmission or international capacity required, as the price of these facilities is not within the scope of NBN Co's network.

²⁸ Throughout this Section 'Restated ARPU' refers to restated ongoing ARPU, excluding costs not directly driven by customer numbers such as NNI and Multicast domain, which distort the ARPU figures in the early years due to the limited number of customers.

Exhibit 9.3: Option A (1) Fibre Revenue Components (\$ Million) (Nominal Dollars)



Source: NBN Co

Option A (1) ARPU

The main driver of NBN Co's Revenue Model is the assumed Average Revenue per User (**ARPU**). ARPU reflects a combination of inter-related factors, including:

- Initial prices;
- Average speed per user over time (which drives AVC revenues);
- Average data usage per user over time (which drives CVC revenues); and
- Decline in prices over time (nominal price decreases year-on-year as a function of demand growth).

9.1.2 Option A (2)

Option A (2) Summary Results

Exhibit 9.4: Option A (2) Revenue Plan - Summary Results

Revenue	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2023	FY2025	FY2028	FY2040
June YE															
Premises Passed or Covered ('000s)															
FTTP	58	316	1,268	2,711	4,173	5,647	7,116	8,564	9,989	11,403	12,202	12,568	12,931	13,467	15,435
Wireless and Satellite	165	179	447	545	770	813	858	904	950	962	974	998	1,021	1,055	1,181
Total Premises Passed ('000s)	223	495	1,715	3,256	4,942	6,460	7,974	9,467	10,939	12,365	13,176	13,566	13,951	14,522	16,616
Premises Connected ('000s)															
FTTP	35	137	511	1,589	2,616	3,679	4,712	5,708	6,672	7,623	8,320	8,780	9,052	9,454	10,930
Wireless and Satellite	0	13	55	102	151	165	181	198	215	222	229	244	259	283	373
Total Premises Connected ('000s)	35	150	566	1,691	2,767	3,845	4,893	5,905	6,887	7,845	8,549	9,024	9,311	9,736	11,303
Gross Revenue (\$M)	3	42	154	484	1,008	1,598	2,276	3,054	3,927	4,988	5,951	7,333	8,160	9,041	13,447

Source: NBN Co

In Option A(2), by the end of the 3-year Corporate Plan, it is forecast that NBN Co will have \$154 million in annual revenues (in FY2013), with 566,000 connections across all platforms and a restated blended Average Revenue Per User (**ARPU**) of \$33.²⁹

²⁹ Throughout this Section 'Restated ARPU' refers to restated ongoing ARPU, excluding costs not directly driven by customer numbers such as NNI and Multicast domain, which distort the ARPU figures in the early years due to the limited number of customers.

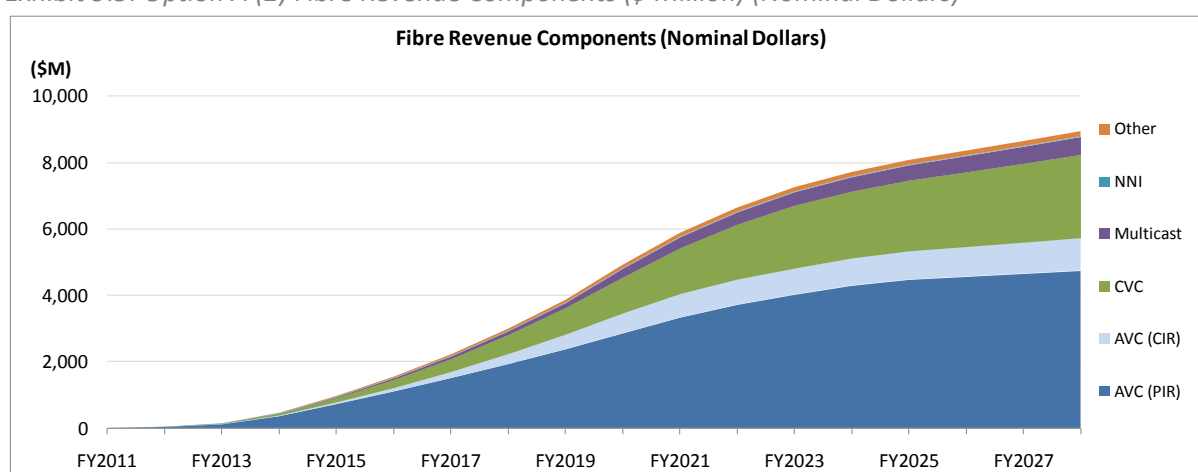
Option A (2) Revenue Breakdown

AVC (PIR) and CVC products are expected to contribute approximately 55% and 26% of revenue respectively by FY2025, 43% and 33% respectively in FY2040. This reflects a policy to balance NBN Co revenues between speed (**AVC**) and usage (**CVC**). The construct of charging for CVC capacity is the principal mechanism by which NBN Co can benefit from the expected future growth in broadband data usage.

CVC revenues will be heavily dependent upon competition through quality of service, which will act as a catalyst for Access Seekers to purchase sufficient CVC capacity to enable End-Users to experience maximum actual speeds over the NBN.

Exhibit 9.5 shows the breakdown of projected revenues across the main FTTP product components.

Exhibit 9.5: Option A (2) Fibre Revenue Components (\$ Million) (Nominal Dollars)



Source: NBN Co

Option A (2) ARPU

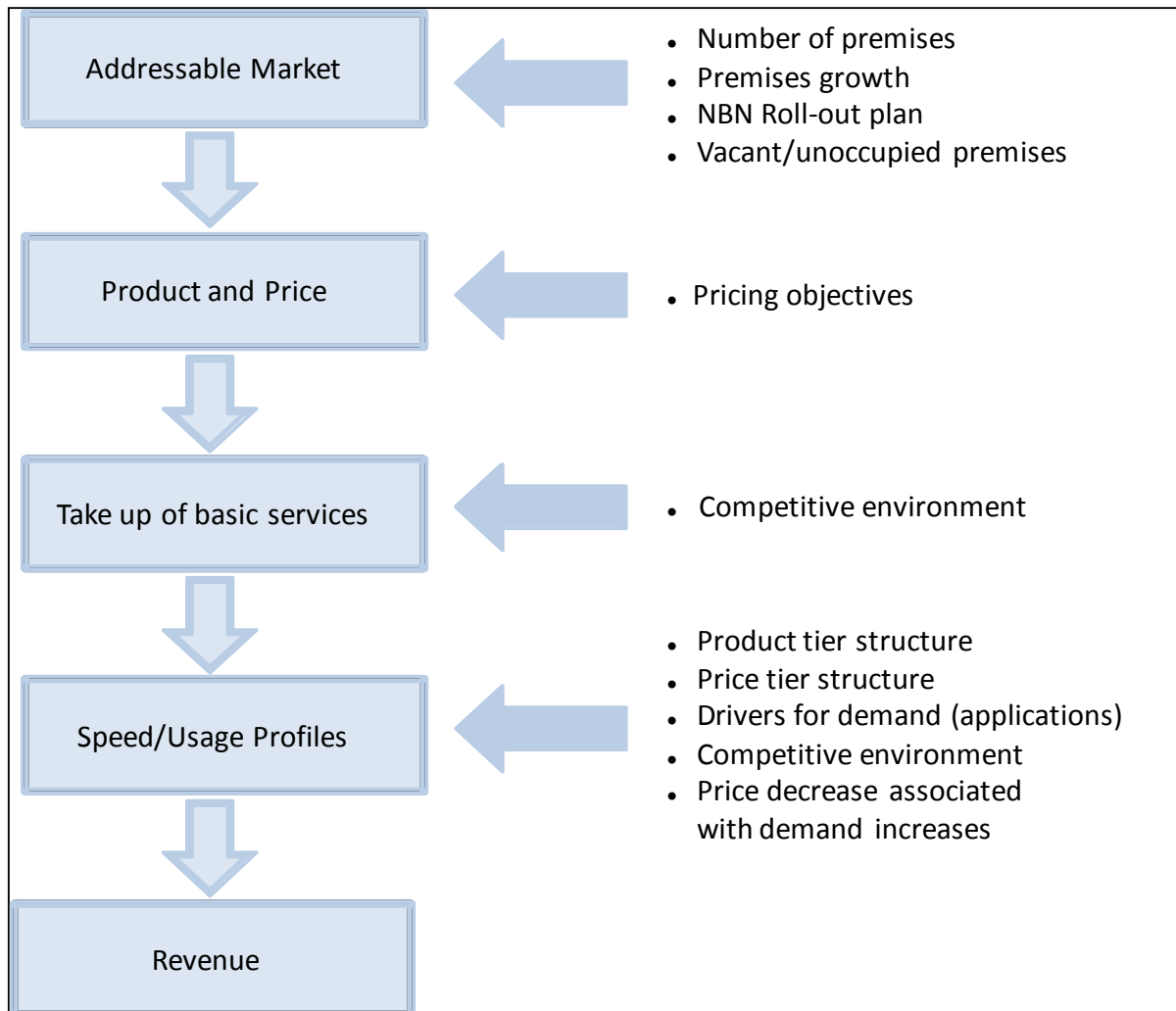
The main driver of NBN Co's Revenue Model is the assumed Average Revenue per User (**ARPU**). ARPU reflects a combination of inter-related factors, including:

- Initial prices;
- Average speed per user over time (which drives AVC revenues);
- Average data usage per user over time (which drives CVC revenues); and
- Decline in prices over time (nominal price decreases year-on-year as a function of demand growth).

9.2 Foundations of NBN Co's Revenue Model

The Revenue Plan is built from the ground up, based on the key inputs set out in Exhibit 9.6.

Exhibit 9.6: Revenue Plan Modelling Approach



Source: NBN Co

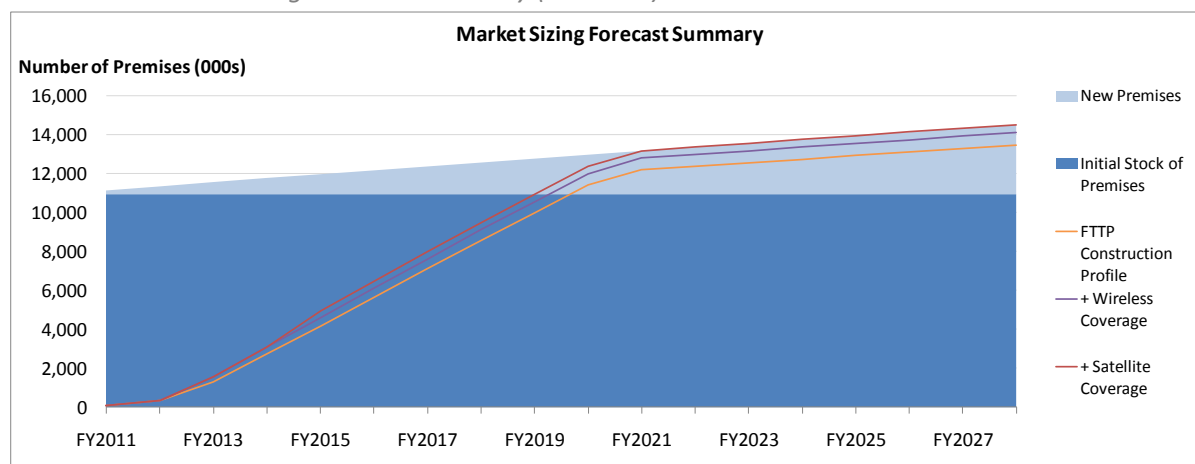
Each of these elements is discussed in the subsequent Sections.

9.3 Addressable Market

9.3.1 Overview

The objective of the NBN is to provide 100% coverage to all Australian premises through a combination of fibre, wireless and satellite services. NBN Co's addressable market is therefore the total of all residential and business premises in Australia. This is determined by looking at the opening stock of premises, the expected growth in that stock, and layering NBN Co's roll-out profile on top.

Exhibit 9.7: Market Sizing Forecast Summary (Premises)



Source: NBN Co

9.3.2 Initial Stock of Premises

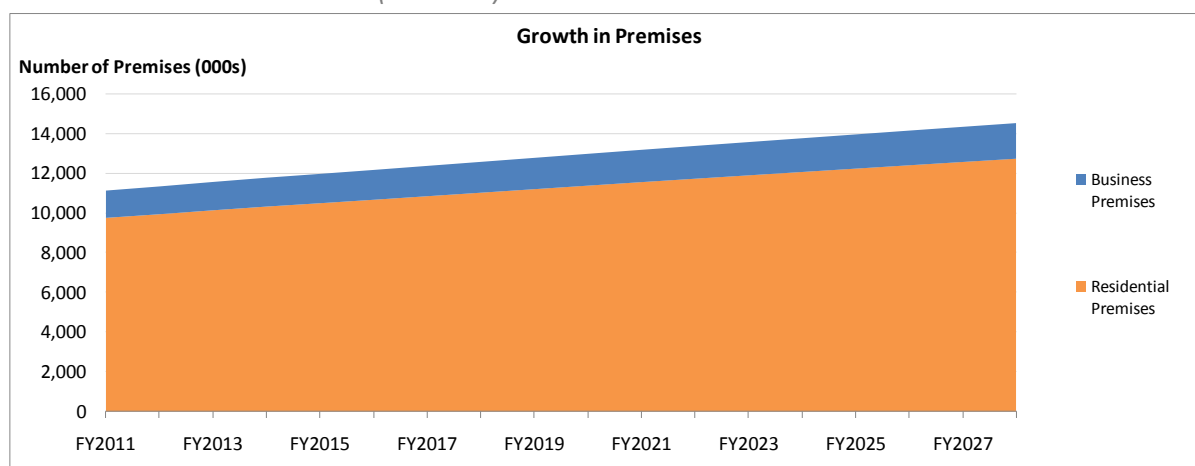
Total premise sizing has been based on Geocoded National Address File (**GNAF**) national address index, which uses multiple address sources including Government land records, Australia Post and the Australian Electoral Commission. In conjunction with work carried out by DBCDE, NBN Co has assumed a starting national premise count of 10.9 million at FY10, comprising 9.6 million residential premises and 1.3 million business premises.

9.3.3 New Premises

The forecast for premise growth has been based on forecasts of new 'Greenfield' (undeveloped/raw broadacre land) and 'Redevelopment / In-fill (net of demolitions / replacement stock) dwelling households and business premises. This is based on the BIS Shrapnel report 'Overview of the Australian Residential Market' dated August 2010; National Housing Supply Council (**NHSC**) 2009 report, ABS data and internal estimates. NBN's long-term forecasts have been referenced to residential household growth rates, assuming a compound annual growth rate (**CAGR**) of 1.6% p.a., from ABS forecasts.

As can be seen from Exhibit 9.8, premises growth is driven primarily by the expected growth in residential households, resulting in an average growth of approximately 177,000 new premises each year during the forecast period (FY2010 to FY2025), or average growth of approximately 166,000 from FY2010 to FY2040.

Exhibit 9.8: Growth in Premises (Premises)



Source: NBN Co

9.3.4 NBN Deployment Schedule

The addressable market has been adjusted to recognise the progressive roll-out of the NBN during the 9.5-year construction profile. Exhibit 9.9 shows the assumed deployment schedule for the FTTP network build (93%).

Exhibit 9.9: Brownfields FTTP Deployment Coverage Schedule

June YE	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021
Brownfields Premises Passed (%)	0%	1%	9%	21%	34%	46%	58%	70%	82%	94%	100%

Source: NBN Co

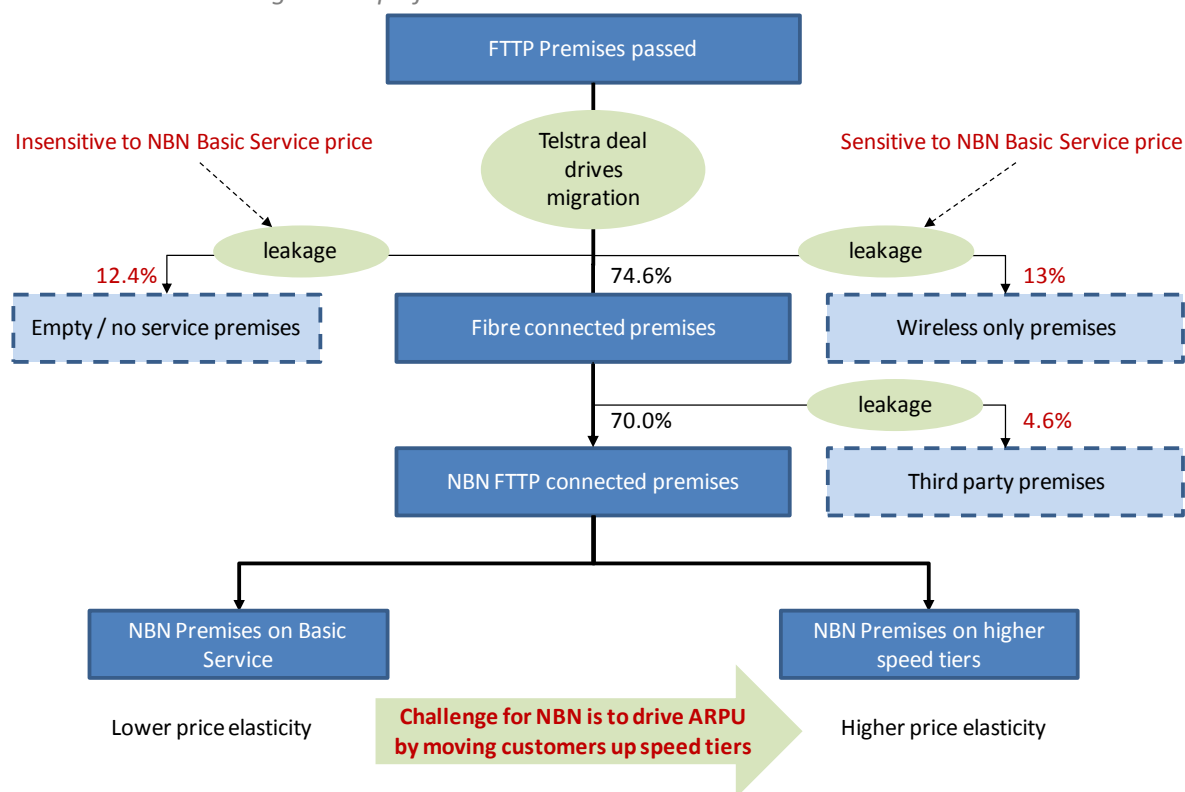
The overall roll-out profile, including wireless and satellite is shown in Section 6, *Network Construction*.

9.4 Take Up of Basic Services

The take-up of NBN's basic service is primarily driven by the disconnection deal / migration scenarios entered into with Telstra. It is therefore expected that the vast majority of premises currently served by copper and/or HFC will migrate to at least the basic NBN fibre offering. The only 'leakage' is expected to be from:

- Vacant premises / premises that take no telecommunications services;
- Premises that opt for 'wireless-only'; and
- Premises served by third party networks.

Exhibit 9.10: Calculating Take-Up of Basic Services at FY2025



Source: NBN Co

Note: Wireless-only premises percentage is based on total premises (homes, businesses, unoccupied premises).

9.4.1 Empty / No Service Homes

The number of occupied residential and business premises used in the Revenue Plan is based on ABS statistics. When reconciling to total Geocoded National Address File (GNAF) premises, this implies a vacancy rate of approximately 12.4% for both residential and business premises.

The majority of empty/no service premises are structural in nature, as such it is not likely that price would be a significant factor in whether or not they elect to take a broadband service.

9.4.2 Wireless-Only Homes (Residential Market)

Wireless-only homes is a relatively recent trend in the residential market; NBN Co estimates that the business market has and will remain immune to complete wireless-only substitution, given the importance especially of fixed line voice communications for a business End-User.

Wireless is the fastest growing segment of the residential broadband market in Australia, driven by a combination of technical upgrades and strong price competition pulling consumers.

According to Roy Morgan data, 13% of households (residential market, excluding business market) were wireless-only premises as at FY2010 (12% in FY2009), which NBN forecasts to grow to 15% of residential homes by FY2015, 16.3% by FY2025 and 16.4% by FY2040, based on a slowing growth rate, but still supported by wireless data speed increases and price reductions.

International data suggest a range of up to 15% Wireless-only homes on comparable terms (residential market). In addition to international benchmarks, NBN Co has commissioned Ovum to

prepare a detailed comparison of international and Australian market trends in order to support the revenue assumptions.

Outcomes from this survey suggest that:

- Current numbers of wireless-only homes appear to include 4% of households (residential market) not subscribing to fixed voice services, but keeping a fixed broadband service on their fixed line ('naked' broadband); and
- In a most likely scenario, wireless-only homes would trend to 15.6% in 2020 (residential market).³⁰

The Revenue Plan assumes wireless-only homes increase to 16.3% by FY2025 and 16.4% by FY2040 of the residential market (equivalent to approximately 13% of total premises, including businesses³¹ in FY2025 and FY2040).

9.4.3 Third Party Fibre Premises

The building of the NBN will not prevent third parties from building or upgrading their own fibre networks.

Given the economies of scale that will be achieved by the NBN, and the likelihood of overbuild, it is considered unlikely that existing or new competitors will deploy alternative significant fibre networks on a broad scale. The Base Case assumes approximately 4.6% of premises (0.6 million) will be served by non-NBN networks at FY2025.

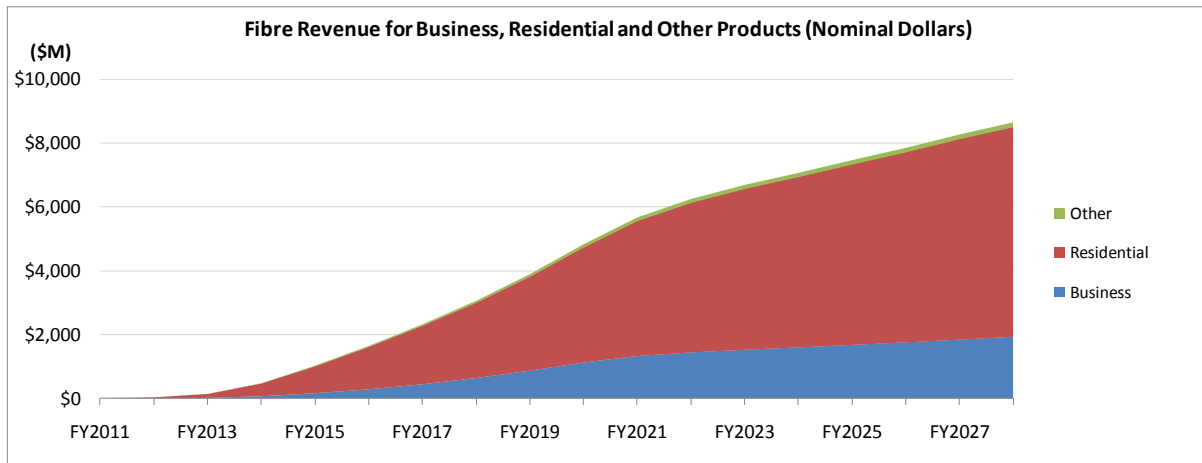
³⁰ Ovum, Wireless-Only Homes Report, October 2010.

³¹ Businesses defined as any business excluding Small Offices Home Offices (SOHOs) operating from a residential premise.

9.5 Residential and Business Markets

Because of their different requirements and price points, the residential and business sectors are dealt with separately. This section provides indicative splits between residential and business market revenues and the associated ARPU breakdowns. As illustrated by Exhibit 9.11 the residential market is by far the larger, with residential GPON revenue contributing 76% of FTTP revenues in FY2025.

Exhibit 9.11: Fibre Revenue for Business, Residential and Other Products (\$ Million) (Nominal Dollars)



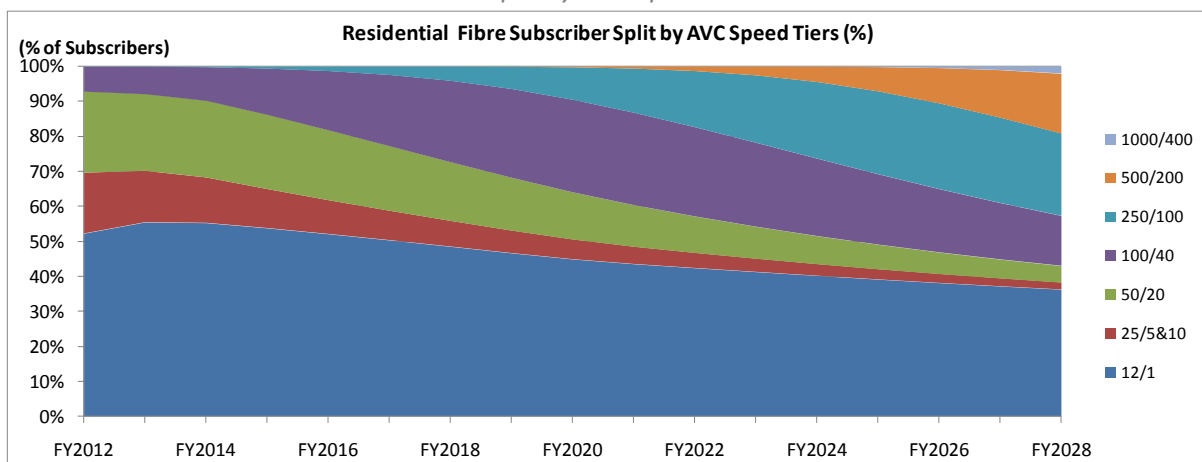
Source: NBN Co

9.5.1 Residential Market

The residential market will be dominated in the early years by a mass of basic service users, with 52% of residential End-Users expected to be on the 12/1Mbps service in FY2012.

Despite the movement of residential consumers up the speed curve shown in Exhibit 9.12, the growth in AVC (PIR) ARPU is relatively modest. This reflects the small price differential between AVC tiers, and the decline in prices for the higher tiers. However, the consequence of more End-Users moving to higher speed tiers is reflected in the significant rise in the contribution of the CVC to overall ARPU, as increased speed drives increased usage.

Exhibit 9.12: Residential Fibre Subscriber Split by AVC Speed Tiers



Source: NBN Co

The Revenue Plan assumes no AVC (CIR) revenues in the residential market. However, there is an expected increase in the uptake of IPTV that will lead to a modest increase in Multicast revenues over time.

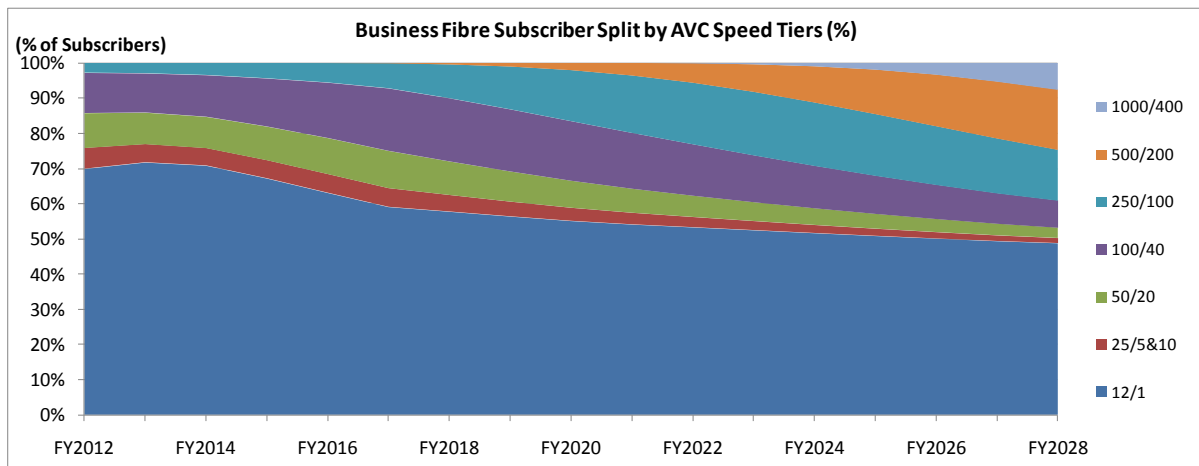
The contribution of NNI charges to overall revenues is negligible.

9.5.2 Business Market

The Business segment is expected to be the primary user of the AVC (CIR) products, as businesses require the guaranteed performance and quality of service that are only provided through committed information rates. By FY2025 CIR products are expected to account for 51% of Business restated fibre GPON ARPU (59% by FY2040), this is a good reflection of the value of the network to End-Users and ensures NBN Co is charging appropriately for the part of the network which is likely to be the scarcest resource.

Conversely, as shown in Exhibit 9.13, the bulk of business users are expected to be less concerned with PIR rates, and therefore the growth in AVC (PIR) ARPU is less than for residential consumers.

Exhibit 9.13: Business Fibre Subscriber Split by AVC Speed Tiers



Source: NBN Co

The contributions of Multicast and NNI to ARPU are both very small for business users.

9.6 Benchmarking Speed and Usage Growth

9.6.1 Usage and Speed Statistics

The purpose of this section is to document a number of domestic and international statistics outlining the historical and forecast data download usage and speed characteristics of subscribers and the broadband speed requirements for different applications.

The data presented has been published in the public domain by government authorities, public companies or research organisations.

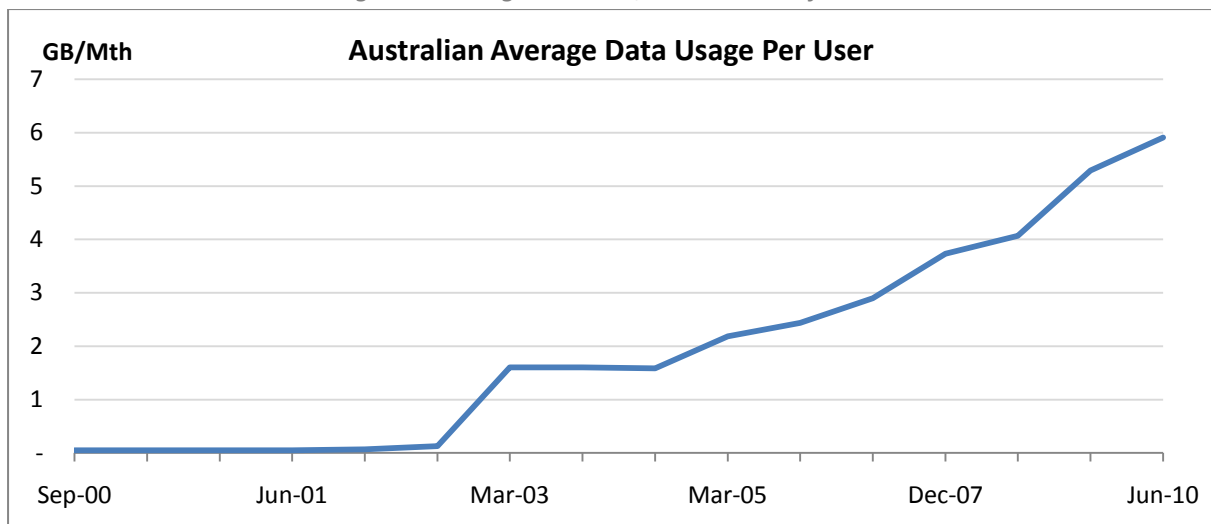
Actual Broadband Data Usage

Australia and Hong Kong are two countries with periodical data usage reporting from the Australian Bureau of Statistics (**ABS**) and the Office of the Telecommunication Authority Hong Kong (**OFTA**), respectively.

Australia Broadband Data Usage

Data for Australian usage was sourced from the ABS report Internet Activity Australia Cat 8153.0, June 2010. Australian data usage (fixed and wireless) has increased steadily overtime, with the latest reported average user GB/mth over the last half year increasing 11.3% from 5.3GB to 5.9GB. Average user data usage increased 30.8% over the last twelve months as illustrated in Exhibit 9.14 and Exhibit 9.15.

Exhibit 9.14: Australian Average Data Usage Per User, Historical Profile



Source: ABS, 8153.0 Internet Activity Australia – June 2010

The increase in data usage has been supported by a continuing increase in available higher speeds as End-Users increasingly upgrade to ADSL2+ services, which became available in 2006.

The ABS has only recently commenced reporting separate statistics of Wireless and Fixed Subscribers Usage, with data only available for the quarters of December 2009 and June 2010 as shown on Exhibit 9.15.

Exhibit 9.15: Australian Data Usage June 2010³²

	Sep-06	Dec-07	Dec-08	Dec-09	Jun-10
Fixed Broadband Subscribers				5,007	5,167
Wireless Broadband Subscribers				3,052	3,601
Total Subscribers (000')	3,900	5,024	6,667	8,059	8,768
Fixed Broadband Download				37,803	47,391
Wireless Broadband Download				4,750	4,443
Download /month (TB)	11,310	18,764	27,117	42,554	51,834
Per User Average					
Fixed Download GB/mth				7.6	9.2
Wireless Download GB/mth				1.6	1.2
Total Download GB/mth	2.9	3.7	4.1	5.3	5.9

Source: ABS Internet Activity Australia – June 2010

Due to data quality errors, the ABS in its June 2010 results, restated the December 2009 wireless numbers. Consequently, when comparing usage data at a Fixed and Wireless level, Wireless download data per user showed a decrease from 1.6GB/mth to 1.2GB/mth between the December 2009 and June 2010 period.

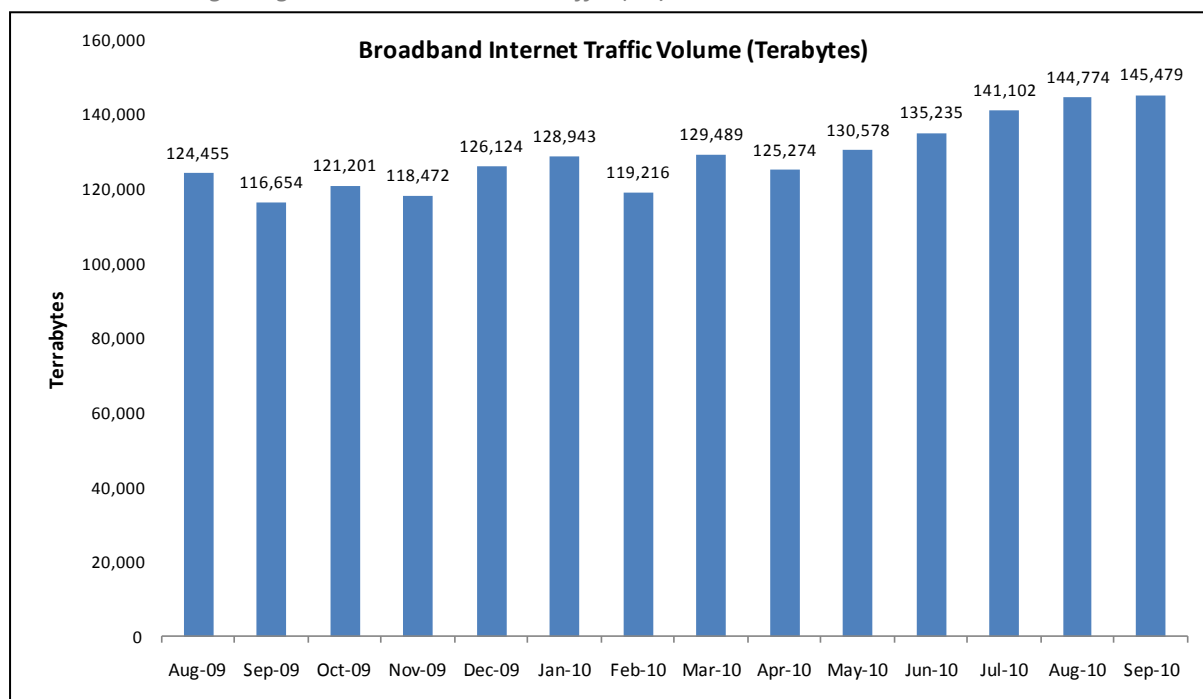
Fixed Broadband usage per user over the same period increased 21.4% from 7.6GB/mth to 9.2GB/mth, an annualised rate of 43%.

Hong Kong Data Usage

Data for Hong Kong usage was sourced from OFTA. OFTA publishes separate reports for broadband data usage and for the total number of broadband subscribers. NBN Co has used both these reports to calculate an estimated GB/mth.

OFTA defines Broadband as the “capacity to transmit data at the rate of 1.5Mbps or above using family of Digital Subscriber Line (xDSL), Local Multipoint Distribution Services (**LMDS**), Fibre-To-The-Building (**FTTB**), cable modem or other technologies”, as illustrated in Exhibit 9.16.

³² Internet Activity, Australia, Jun 2010 <http://www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0/>

Exhibit 9.16: Hong Kong Broadband Internet Traffic (TB)³³

Source: OFTA – Office of the Telecommunication Authority Hong Kong

Yearly broadband usage growth in Hong Kong has matured to circa 5% over the last two years, compared to the explosive growth in early years of circa 165%, as fibre and IPTV services were launched into the market.

Exhibit 9.17: Hong Kong Broadband Internet Traffic – Historical Profile³⁴

Month	January	February	March	April	May	June	July	August	September	October	November	December
2010	128,943	119,216	129,489	125,274	130,578	135,235	141,102	144,774	145,479	-	-	-
2009	117,763	106,559	116,798	116,824	121,778	122,666	126,397	124,455	116,654	121,201	118,472	126,124
2008	105,900	97,171	107,869	104,490	108,974	109,021	111,514	110,961	103,544	107,682	108,786	113,168
2007	90,344	87,196	97,515	98,397	101,310	102,909	105,923	110,801	99,246	102,632	97,253	103,075
2006	74,966	67,244	75,790	76,824	79,950	82,179	87,844	88,589	82,480	84,945	85,349	88,094
2005	41,901	41,822	51,758	52,077	50,915	54,519	58,300	62,568	62,143	65,914	63,217	68,903
2004	19,130	18,841	22,782	25,932	28,639	29,422	30,343	34,101	35,080	39,147	40,321	44,970
2003	3,893	3,547	4,782	6,438	7,702	8,725	10,708	11,918	12,536	14,369	14,953	17,145
2002	1,422	1,399	1,588	1,698	1,873	1,936	2,190	2,465	2,627	3,010	3,213	3,492
2001	198	346	459	539	543	760	866	969	1,017	1,068	1,119	1,318
2000	-	-	-	-	-	-	-	-	-	-	203	161

Source: OFTA – Office of the Telecommunication Authority Hong Kong

³³ OFTA, Statistics of Internet Traffic Volume, <http://www.ofta.gov.hk/en/tele-lic/operator-licensees/opr-isp/s2.html>

³⁴ OFTA, Statistics of Internet Traffic Volume, <http://www.ofta.gov.hk/en/tele-lic/operator-licensees/opr-isp/s2.html>

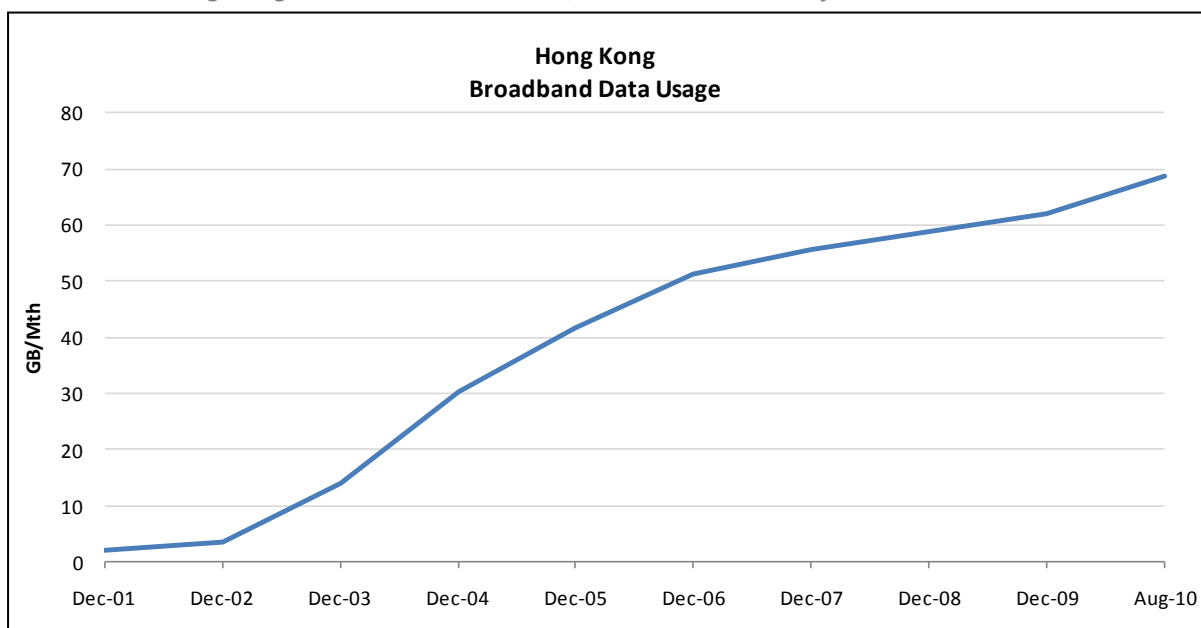
Exhibit 9.18: Hong Kong Broadband Internet GB/User – Historical Profile³⁵

Mth	Subs	TB	GB/Sub	Subs Growth Rate	GB/Mth Growth Rate
Dec-01	623,302	1,318	2.1		
Dec-02	989,115	3,492	3.5	59%	67%
Dec-03	1,230,607	17,145	13.9	24%	295%
Dec-04	1,484,486	44,970	30.3	21%	117%
Dec-05	1,648,409	68,903	41.8	11%	38%
Dec-06	1,717,329	88,094	51.3	4%	23%
Dec-07	1,853,026	103,075	55.6	8%	8%
Dec-08	1,921,258	113,168	58.9	4%	6%
Dec-09	2,033,352	126,124	62.0	6%	5%
Aug-10	2,108,417	144,774	68.7	4%	11%

Source: OFTA – Office of the Telecommunication Authority Hong Kong, NBN Co Calculations.

Note: Subs and GB/Month growth rates are based on YTD to August-10 and not FY10. Estimated annualised FY10 growth rates are circa 5% Subs and 15% GB/Month respectively.

Hong Kong reported a calculated average 68.7GB/mth per user being downloaded as at August 2010.

Exhibit 9.19: Hong Kong Broadband Internet GB/User – Historical Profile³⁶

Source: OFTA – Office of the Telecommunication Authority Hong Kong

While subscriber growth has slowed to 4% for the year to June 2010, data usage continues to grow at 11% for the eight months to August 2010. The latest data usage reported by OFTA is 7 times higher than the Australian data usage reported by the ABS for the period to June 2010.

³⁵ OFTA http://www.ofta.gov.hk/en/datastat/eng_cus_isp.pdf

³⁶ OFTA http://www.ofta.gov.hk/en/datastat/eng_cus_isp.pdf

Usage and Speed Forecasts

Cisco Visual Network Index which is published yearly is the only external source providing data usage forecasts beyond a 12 month period. The published forecast is for a 5-year period to 2014.

Global Usage – Cisco Forecasts

The Cisco® Visual Networking Index (VNI) forecast is an ongoing initiative to track and forecast the impact of visual networking applications. For a more analytical look at the implications of the data presented below, refer to the document titled: "*Hyperconnectivity and the Approaching Zettabyte Era.*"³⁷

Overview of VNI Methodology:

The Cisco Visual Networking Index Forecast methodology rests on a foundation of analyst projections for Internet users, broadband connections, video subscribers, mobile connections, and Internet application adoption. Analyst forecasts come from SNL Kagan, Ovum, Informa Telecoms & Media, Infonetics, IDC, Frost & Sullivan, Gartner, ABI, AMI, Screen Digest, Parks Associates, Yankee Group, Dell'Oro Group, Synergy, comScore, Nielsen, and others. Upon this foundation are layered Cisco's own estimates for application adoption, minutes of use, and kilobytes per minute. The adoption, usage, and bitrate assumptions are tied to fundamental enablers such as broadband speed and computing speed.

Although not GB/user specific, Cisco VNI Usage Forecasts support the overall growth in data traffic being experienced globally.

Cisco noted that the average broadband connection generates 11.4 gigabytes of Internet traffic per month, or 375 megabytes per day.³⁸

Exhibit 9.20 illustrates Cisco's global IP traffic forecasts beyond 2009, which stood at 15 exabytes per month, and more than quadruples by 2014, to approach 64 exabytes per month. Consumer IP traffic will exceed 56 exabytes per month and business IP traffic will approach 8 exabytes per month. More detailed forecasts can be found on the Cisco VNI site.³⁹

³⁷ Hyperconnectivity and the Approaching Zettabyte Era,

http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/VNI_Hyperconnectivity_WP.html

³⁸ Cisco VNI Forecast 2010 http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360_ns827_Networking_Solutions_White_Paper.html

³⁹ Cisco VNI Forecast 2010 http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360_ns827_Networking_Solutions_White_Paper.html

Exhibit 9.20: Global IP Traffic, 2009-2014

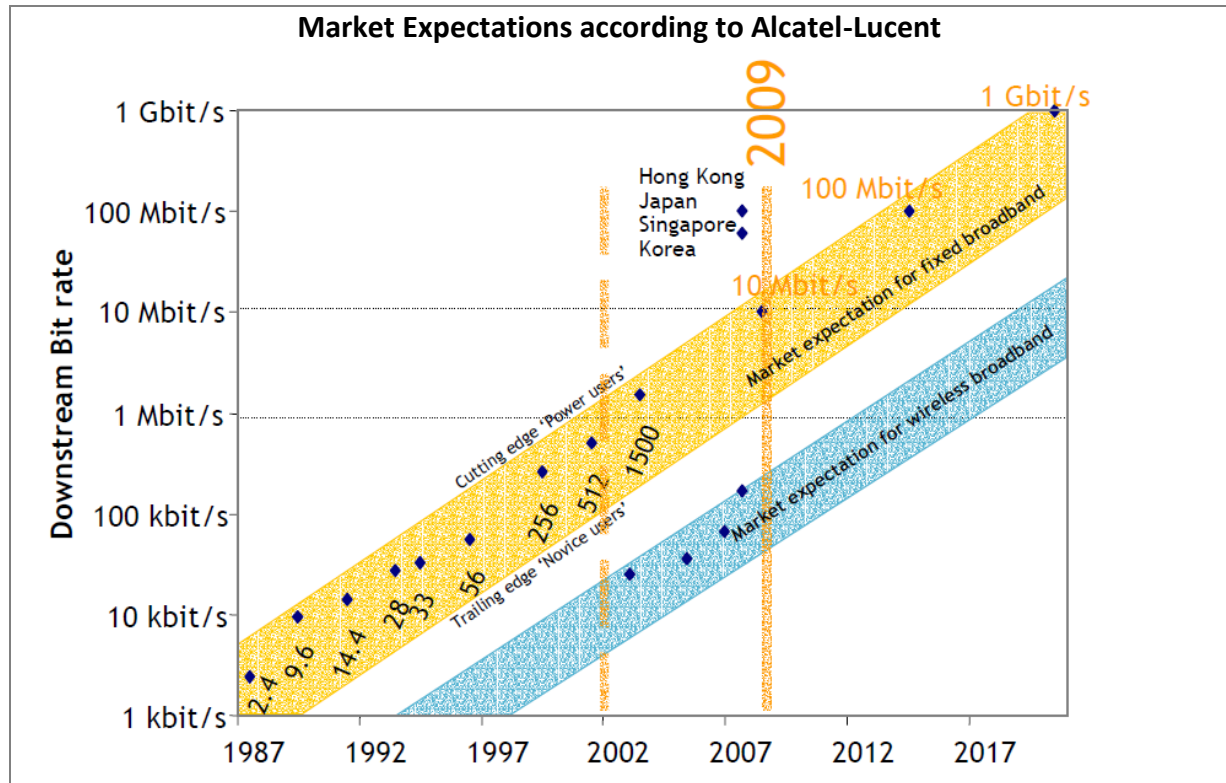
IP Traffic, 2009-2014							
	2009	2010	2011	2012	2013	2014	CAGR 2009-2014
By Type (PB per Month)							
Internet	10,942	15,205	21,181	28,232	36,709	47,176	34%
Managed IP	3,652	4,963	6,771	8,851	11,078	13,199	29%
Mobile Data	91	228	538	1,158	2,132	3,528	108%
By Segment (PB per Month)							
Consumer	11,602	16,534	23,750	32,545	43,117	55,801	37%
Business	3,083	3,862	4,740	5,697	6,801	8,103	21%
By Geography (PB per Month)							
North America	5,115	7,091	10,051	12,988	16,136	19,019	30%
Western Europe	3,495	4,818	6,712	9,261	12,417	16,158	36%
Asia Pacific	3,920	5,367	7,295	9,815	12,985	17,421	35%
Japan	1,068	1,539	2,149	2,855	3,591	4,300	32%
Latin America	438	680	1,026	1,527	2,274	3,479	51%
Central Eastern Europe	493	678	938	1,306	1,815	2,510	38%
Middle East and Africa	157	223	319	490	700	1,018	45%
Total (PB per Month)							
Total IP traffic	14,686	20,396	28,491	38,242	49,919	63,904	34%

Source: Cisco VNI, 2010

Global Speed Forecast – Alcatel Historical Profile and Forecast

NBN Co has been unable to source independent global or Australian speed forecasts but has referenced data released by Alcatel-Lucent which has published market expectations of Downstream bit rates as illustrated in Exhibit 9.21.

Exhibit 9.21: Speed Historical Profile and Market Expectations according to Alcatel-Lucent⁴⁰



Source: Alcatel-Lucent

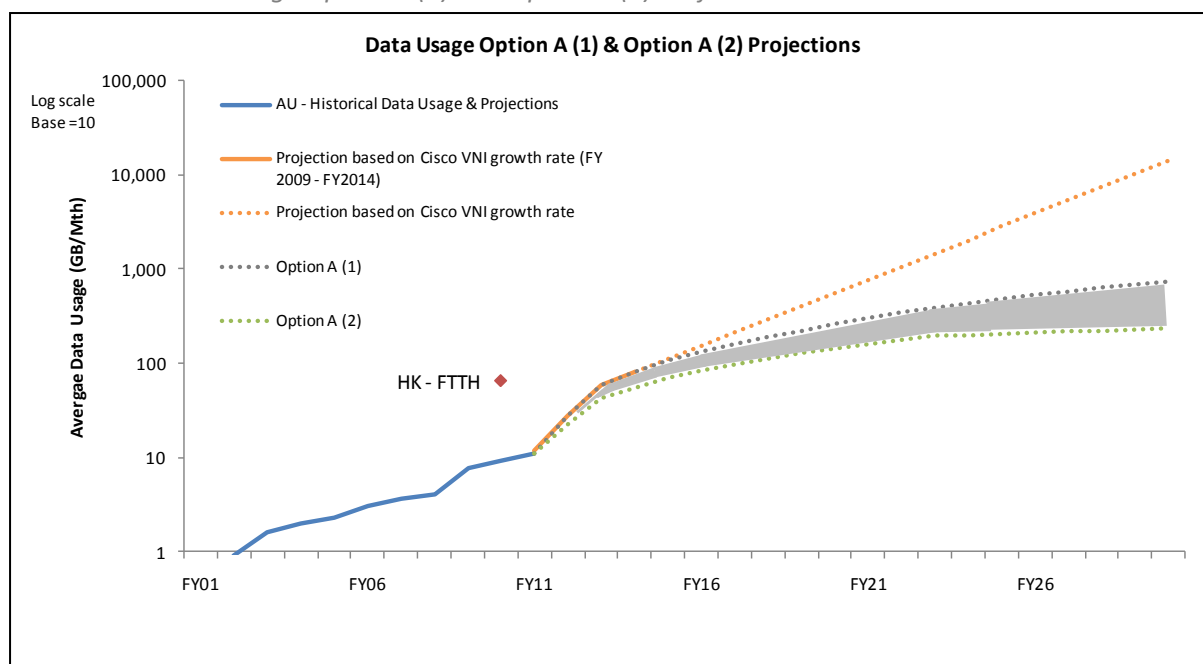
⁴⁰ Alcatel, September 2009, University of NSW Presentation 2009, "The National Broadband Network, It's much more than Fast Internet"

9.6.2 NBN Co Projections

NBN Co Data Usage Projections

Exhibit 9.22 illustrates the projections of average user data usage (GB/mth) during the forecast period. Data usage for Option A1 and Option A2 have been compared to the growth predicted by the latest Cisco VNI index as described in Exhibit 9.20.

Exhibit 9.22: Data Usage Option A (1) and Option A (2) Projections⁴¹



Source: ABS, 8153.0 Internet Activity Australia for period pre – FY10, NBN Co Option A (1) & Option A (2) Projections, Cisco VNI Index 2009-2014, OFTA.

Projections of data usage have been built from the ground up and factor in the relatively strong relationship between increasing access speeds and usage (see Exhibit 9.22). The starting point has been to take the historic average per user usage level as reported by the ABS (9.2GB/mth) in FY2009 allowing for uploads & downloads and the long-term growth trends seen in the Australian and international markets (Cisco VNI forecasts). This underlying growth has been adjusted to reflect the large step change in speeds available to End-Users coming onto NBN fibre, and an adjustment has been factored in over approximately ten years to reflect the gradual development and adoption of applications that can fully utilise the increased bandwidth.

The conservative approach that has been taken with regard to long-term data usage growth, factors in considerations including saturation of usage, slowing growth in online hours and increasing delivery of content on multicast applications. This sees growth fall to ~8% p.a. from FY2030, which is below the baseline increase in access speeds forecast.

NBN Co has also referenced usage CAGR projections against a number of independent sources:

1. Historic ABS data, showing a 36% p.a. CAGR from 2000 – 2010;⁴²

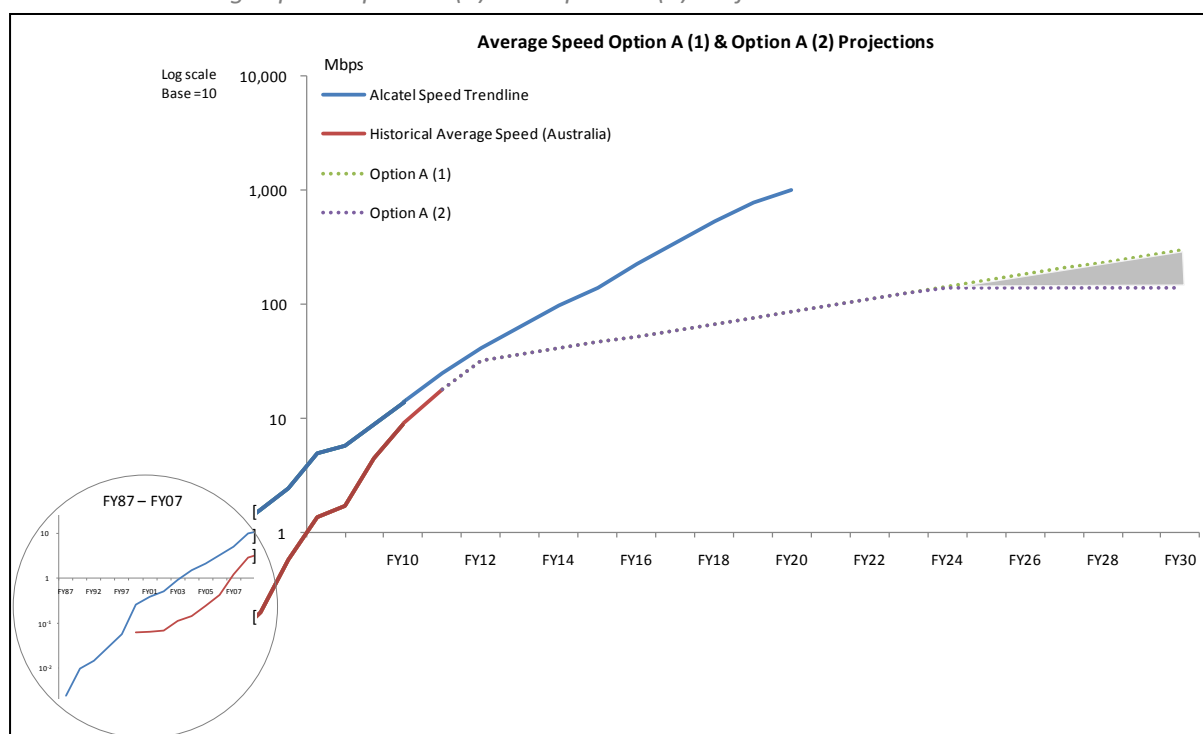
⁴¹ Internet Activity, Australia, Jun 2010 <http://www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0/>

2. Cisco international forecasts for internet traffic to increase at 34% CAGR from 2009 – 2014;⁴³
3. Minnesota Internet Traffic Studies (**MINTS**) reported increases in Internet traffic at CAGR of 40-50%⁴⁴ as at November 2009; and
4. Hong Kong broadband internet traffic growth reported by OFTA of 68% CAGR from 2001 – 2010, or 43% on a per broadband customer basis.⁴⁵

NBN Co Speed Projections

Exhibit 9.23 illustrates the projections of average subscriber speed purchased (Mbps) during the forecast period. The market expectations presented in the previous Alcatel-Lucent diagram (Exhibit 9.21) have been superimposed over NBN Co's Option A1 and A2 projections in Exhibit 9.23. This presentation illustrates NBN's conservative expectation that the growth in demand for speeds will be considerably lower than the extrapolation of increasing speeds implied by the history of internet access technologies.

Exhibit 9.23: Average Speed Option A (1) and Option A (2) Projections⁴⁶



Source: ABS, 8153.0 Internet Activity Australia for period pre – FY10, NBN Co Option A (1) & Option A (2) Projections, Approximation of Alcatel's Market Expectations (per Exhibit 9.21)

As illustrated above, increasing average speeds are significant for driving up usage, ARPU and therefore revenue. Exhibit 9.24 shows the expected mix of speed tiers over time, with the average

⁴² Internet Activity, Australia, Jun 2010 <http://www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0/>

⁴³ Hyperconnectivity and the Approaching Zettabyte Era, http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/VNI_Hyperconnectivity_WP.html
Cisco VNI Forecast 2010 http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360_ns827_Networking_Solutions_White_Paper.html

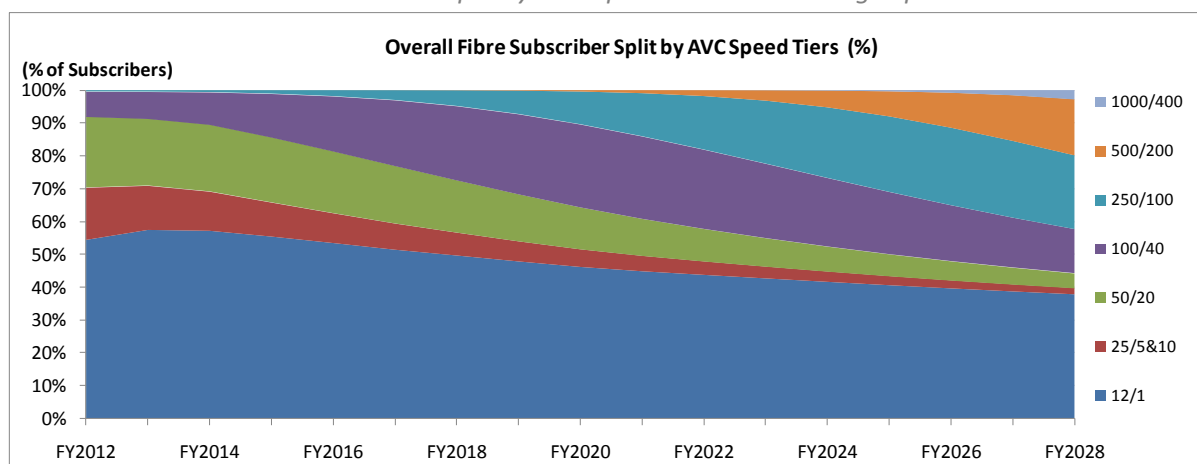
⁴⁴ Minnesota Internet Traffic Studies <http://www.dtc.umn.edu/mints/references.html>

⁴⁵ OFTA, Statistics of Internet Traffic Volume, <http://www.ofa.gov.hk/en/tele-lic/operator-licensees/opr-isp/s2.html>

⁴⁶ Internet Activity, Australia, Jun 2010 <http://www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0/>

speed per user growing from approximately 32Mbps in FY2012 to approximately 162Mbps by FY2025.

Exhibit 9.24: Overall Fibre Subscriber Split by AVC Speed Tiers and Average Speed



Source: NBN Co

9.6.3 Broadband Speed Requirements - Use Cases & Applications

NBN Co Broadband Use Cases

Development of applications and layer 3 services that will encourage the need for speed and a higher usage of the Internet by End-Users is outside NBN Co's remit of activities; however, these will be major drivers for End-User up-selling and the future usage of the NBN.

NBN Co has adapted 4 broadband-use cases initially developed by the FCC⁴⁷ and comScore.⁴⁸

The broadband-use cases identified are based on usage characteristics and speed demands:

- Utility
 - Consumption of basic Internet news, email communications and basic entertainment
- Social Media
 - Consumption of video and communicate via social media and access news and entertainment in rich format
- Full Media
 - Heavy consumption of high quality voice, video, data and graphics but not in the most cutting edge forms
- Advanced
 - Cutting edge use of voice, data, video and graphics using the latest equipment available in the marketplace

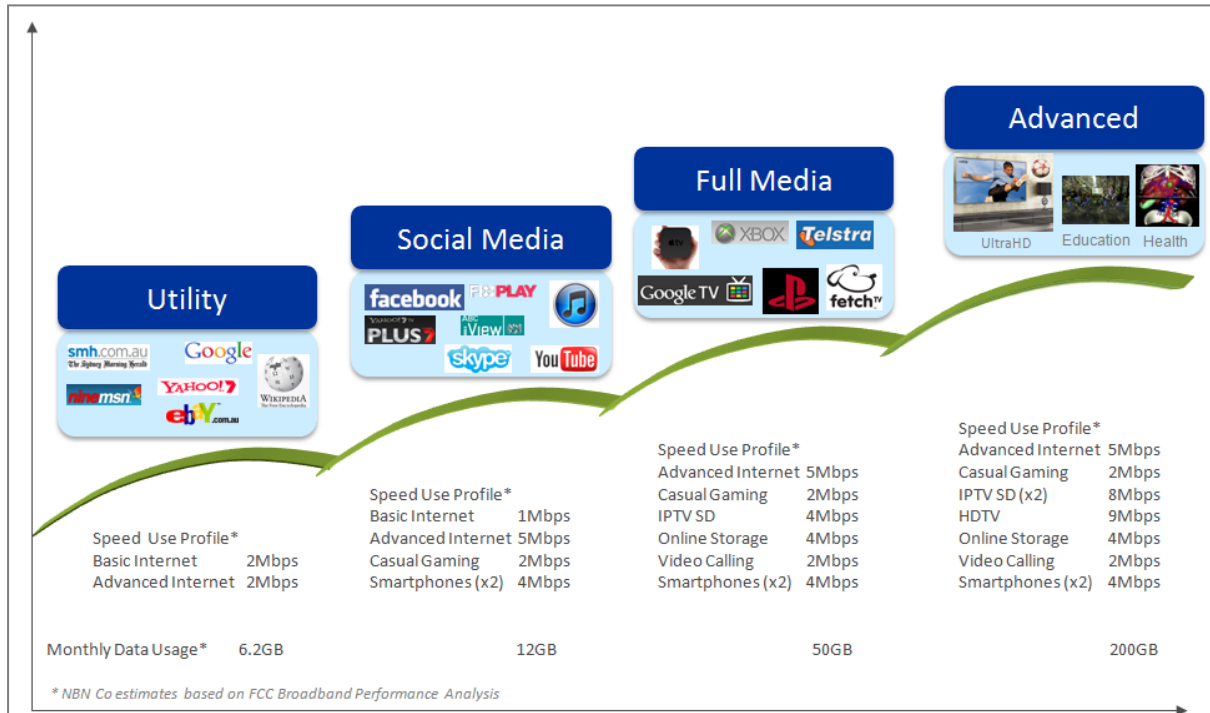
⁴⁷ FCC, Broadband Performance, http://www.fcc.gov/Daily_Releases/Daily_Business/2010/db0813/DOC-300902A1.pdf

⁴⁸ comScore is a market research tracking Internet usage and behaviour, <http://comscore.com>

Members of each profiles access different mix of applications, each with different speed requirements.

The **concurrent** use of multiple applications make-up the future speed estimates and demand in forthcoming years as illustrated in Exhibit 9.25.

Exhibit 9.25: Broadband Use Cases⁴⁹

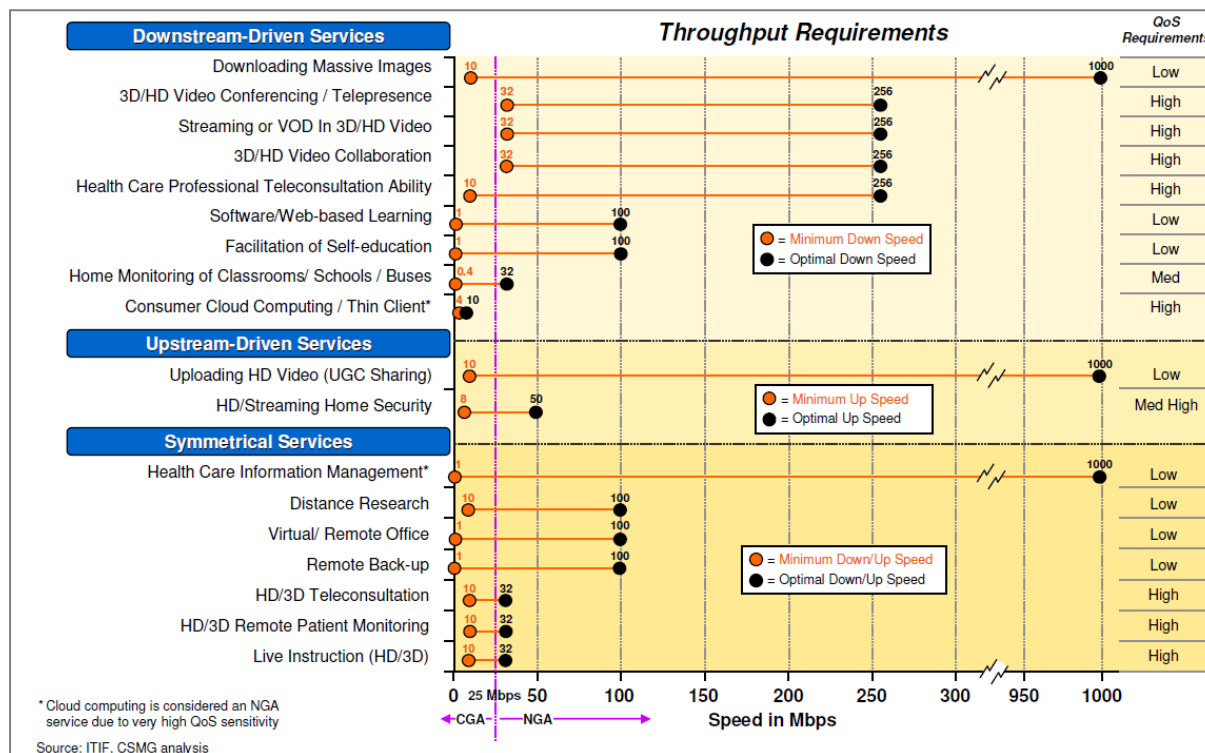


Source: NBN Co adapted from FCC, OBI Technical Paper No4 and September Meeting Commission 2009, ITIF, CSMG

The US Fibre-To-The-Home (**FTTH**) council commissioned a study performed by the telecommunications strategy consulting firm CSMG, on future applications that all-fibre networks will make possible and their value. The study was submitted to the Federal Communications Commission by the Council as it considers a National Broadband Plan.

Applications requiring very high-speed broadband are emerging today. Exhibit 9.26 illustrates the range of speeds that will be required for applications over time as reported by CSMG.

⁴⁹ FCC, Broadband Performance, http://www.fcc.gov/Daily_Releases/Daily_Business/2010/db0813/DOC-300902A1.pdf; FCC September Commission Meeting 2009, <http://reboot.fcc.gov/open-meetings/2009/september>; Information Technology & Innovation Foundation, ITIF, <http://www.itif.org/files/2009-needforspeed.pdf>

Exhibit 9.26: Broadband Speed Requirements Vary for Different Applications⁵⁰

Source: Cambridge Strategic Management Group (CSMG) commissioned by US FTTH Council, Information Technology & Innovation Foundation ITIF

9.7 Wireless and Satellite Revenues

The uptake levels for Wireless and Satellite services were forecast in parallel with the evaluation of the footprint boundaries of wireless and satellite deployment in the 'Last 7%'. The modelling of satellite and wireless take-up has been carried out from a top-down perspective, with analysis undertaken for each incremental percentage (1%) of coverage. The steps involved were as follows:

- 1. Estimation of broadband penetration for Wireless and Satellite:** The national fixed broadband penetration rate was 62% in June 2009. The lag in penetration rates in regional Australia is attributed to the lack of infrastructure and lack of competition. Based on the number of satellite services in the market and the reach of Telstra's NextG network, NBN Co has estimated a penetration rate of less than 40% in the 'Last 7%' of the market. The Revenue Plan assumes there will be convergence with national rates over time as the availability of quality, 'real' broadband services is improved.
- 2. Evaluation of relative competitiveness of available products.** NBN Co's wireless and satellite services will be competing with other infrastructures (e.g. Telstra's NextG and other wireless and copper services). NBN has evaluated the competitive landscape in each percentile of the 'Last 7%' to determine likely take-up of NBN wireless and satellite services.

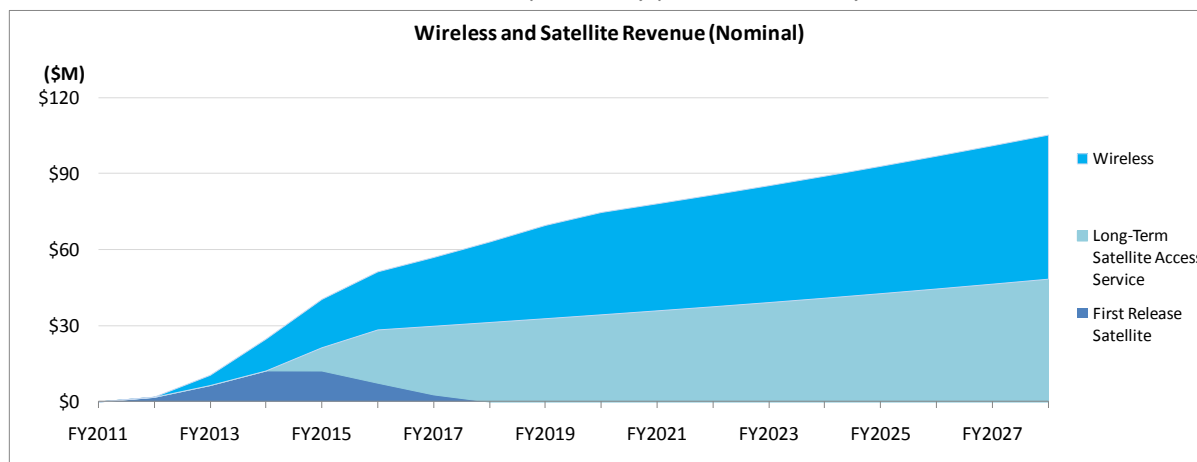
Based on the above evaluation, take up of wireless services is expected to grow to 139,000 premises by FY2025, and of satellite services to 120,000 by FY2025.

⁵⁰ CSMG for FTTH Council, <http://www.ftthcouncil.org/node/723>; Information Technology & Innovation Foundation, ITIF, <http://www.itif.org/files/2009-needforspeed.pdf>

ARPU for wireless and for satellite services are assumed to be the same, and have been set as equal to the FTTP entry level price over time.

The revenue from take up of NBN's Wireless and Satellite products as shown in Exhibit 9.27.

Exhibit 9.27: Satellite and Wireless Revenue (\$ Million) (Nominal Dollars)



Source: NBN Co

9.8 Risks of the Revenue Forecasts

9.8.1 Level of Demand in Speed and Usage

Based on recent historic trends, as well as short-term predictions from external parties, future increases in speed and usage will justify the costs invested in the NBN.

These levels of End-Users' demand are projected to drive NBN Co's revenues over time.

However, although assumptions of speed and usage forecasts appear relatively conservative, the level of demand projected in the revenue forecast may prove to be overstated and therefore be a substantial risk of the Corporate Plan. There is no guarantee that these historic trends will continue in the future. In fact, there are only a few countries, regulators, institutes and companies that give substantiated predictions of speed and usage and typically, these data sets are based on very short timeframes and limited information.

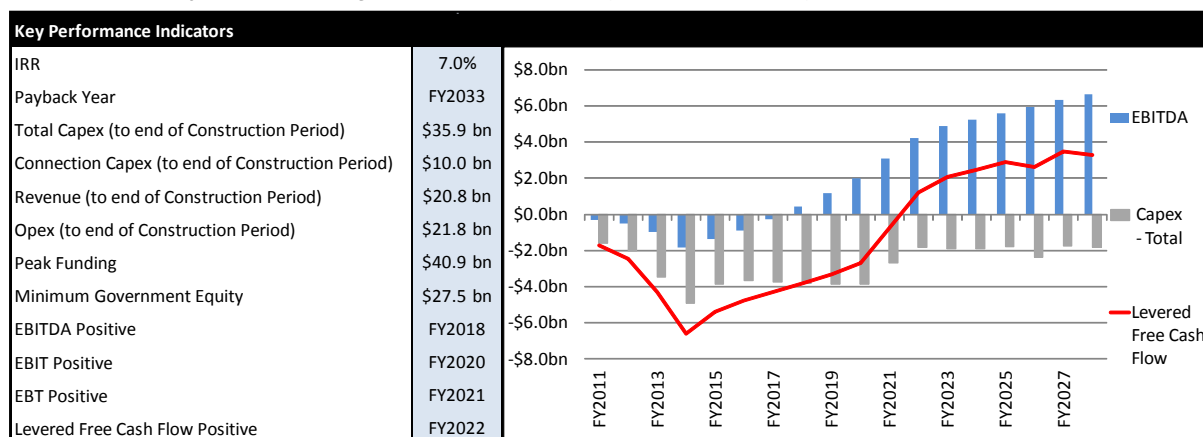
If the rate at which End-Users are willing to consume bandwidth-hungry products and applications slows down over time, and / or End-Users stop moving through tiers because of price and speed inertia, then there is a risk that the growth in speed and usage will plateau after a number of years. This would limit opportunities to grow ARPU in real terms other than by price increases at that time.

Under these circumstances, speed and usage growth would not be sufficient to generate sufficient real ARPU growth in order to deliver the expected returns.

As mitigation, NBN Co has the flexibility to regularly monitor, and adjust accordingly, the rate at which nominal prices are reduced in order to maintain the revenues in case of lower volumes of demand.

10 FINANCIAL FORECASTS

Exhibit 10.1: Key Financial Performance Indicators (Nominal Dollars)



Source: NBN Co

The 30-year extended timeframe has been used in the Base Case because of the long-term nature of the assets in which NBN Co is investing and the long payback period associated with a major infrastructure project of this magnitude.

The majority of the graphs and tables in this section cover the period from FY2011 to FY2028. This approach has been adopted in order that the financials for the period of the three year Corporate Plan can be seen in the wider context of the entire NBN project. The following years are highlighted in order to assist in evaluating the financial forecasts:

- FY2011 – 2013 Period covered by the Corporate Plan;
- FY2021 End of main network construction;
- FY2023 Beginning of the Established Network Operations Phase;
- FY2028 Long term steady state; and
- FY2040 End of 30-year business model.

Exhibit 10.2: Critical Dates in Financial Forecasts

Summary Financials	Total (Construction Period)	Total (FY2011 to FY2021)	Period covered by Corporate Plan			Established Network Operations											
			FY2011	FY2012	FY2013	End Construction (Dec 2020)											
June YE			FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2023	FY2025	FY2028	FY2040			
Total Premises Passed - Fibre ('000s)	12,107	12,202	58	316	1,268	2,711	4,173	5,647	7,116	8,564	9,989	11,403	12,202	12,568	12,931	13,467	15,435
Total Connected - Fibre ('000s)	7,971	8,320	35	137	511	1,589	2,616	3,679	4,712	5,708	6,672	7,623	8,320	8,780	9,052	9,454	10,930
Premises Covered - Satellite & Wireless ('000s)	968	974	165	179	447	545	770	813	858	904	950	962	974	998	1,021	1,055	1,181
Total Connected - Satellite & Wireless ('000s)	226	229	0	13	55	102	151	165	181	198	215	222	229	244	259	283	373
Total Connected ('000s)	8,197	8,549	35	150	566	1,691	2,767	3,845	4,893	5,905	6,887	7,845	8,549	9,024	9,311	9,736	11,303

Source: NBN Co

Note: Total Construction Period indicates July 2011 to December 2020.

10.1 Summary Financial Forecasts

Exhibit 10.1 sets out some of the key financial indicators for NBN Co, including the project Internal Rate of Return (IRR). It should be noted that the projected IRR of 7.04% is above the current 5 year Government bond rate of approximately 5.38% (November 2010) and the last twelve months average of 5.36%.⁵¹

Exhibit 10.3: Summary Financials (Nominal Dollars)

June YE	Total (Construction Period)	Total (FY2011 to FY2021)	FY2011 - FY2020												FY2021 - FY2040			
			FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2023	FY2025	FY2028	FY2040	
Total Premises Passed - Fibre ('000s)	12,107	12,202	58	316	1,268	2,711	4,173	5,647	7,116	8,564	9,989	11,403	12,202	12,568	12,931	13,467	15,435	
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Premises Covered - Satellite & Wireless ('000s)	968	974	165	179	447	545	770	813	858	904	950	962	974	998	1,021	1,055	1,181	
Total Connected - Satellite & Wireless ('000s)	226	229	0	13	55	102	151	165	181	198	215	222	229	244	259	283	373	
Total Connected ('000s)	8,197	8,549	35	150	566	1,691	2,767	3,845	4,893	5,905	6,887	7,845	8,549	9,024	9,311	9,736	11,303	
Revenue	20,780	23,660	3	42	160	509	1,075	1,706	2,388	3,130	3,972	4,914	5,760	6,788	7,571	8,769	14,002	
Operating Expenses (Opex)	(21,820)	(23,151)	(309)	(529)	(1,152)	(2,358)	(2,436)	(2,608)	(2,652)	(2,717)	(2,803)	(2,924)	(2,662)	(1,914)	(1,985)	(2,123)	(2,936)	
EBITDA	(1,040)	510	(306)	(486)	(993)	(1,849)	(1,361)	(902)	(263)	413	1,168	1,990	3,098	4,874	5,586	6,647	11,066	
EBITDA Margin (%)	5%	2%	NM	NM	NM	(363)%	(127)%	(53)%	(11)%	13%	29%	40%	54%	72%	74%	76%	79%	
EBIT	(12,397)	(11,875)	(364)	(697)	(1,430)	(2,584)	(2,342)	(2,101)	(1,671)	(1,178)	(600)	48	1,045	2,797	3,451	4,418	8,466	
Interest	(2,703)	(3,202)	8	4	4	(57)	(165)	(257)	(377)	(579)	(790)	(997)	(886)	(889)	(895)	(909)		
EBT	(15,100)	(15,077)	(355)	(693)	(1,426)	(2,580)	(2,399)	(2,266)	(1,928)	(1,556)	(1,179)	(742)	47	1,911	2,561	3,524	9,375	
Capital Expenditure (Capex)	(35,939)	(37,280)	(1,561)	(2,023)	(3,451)	(4,905)	(3,833)	(3,639)	(3,739)	(3,787)	(3,832)	(3,828)	(2,683)	(1,902)	(1,772)	(1,807)	(3,817)	
Working Capital	(13)	(100)	131	48	150	170	(132)	(57)	(47)	(54)	(62)	(72)	(175)	(30)	(40)	(22)	(50)	
Cash Tax	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(635)	(2,812)	
Levered Free Cash Flow	(39,694)	(40,073)	(1,728)	(2,457)	(4,290)	(6,580)	(5,383)	(4,764)	(4,306)	(3,805)	(3,304)	(2,699)	(757)	2,056	2,885	3,288	5,296	
Government Funding			1,928	4,385	8,675	15,255	19,283	22,803	25,916	27,500	27,500	27,500	27,500	25,154	18,022	11,404	-	
Debt Funding			-	-	-	-	3,391	2,701	3,951	6,244	9,672	12,500	13,385	12,389	14,158	11,404	-	
Total Funding			1,928	4,385	8,675	15,255	20,674	25,504	29,866	33,744	37,172	40,800	40,885	37,543	32,800	22,808	-	
Debt / EBITDA			0.0 x	0.0 x	0.0 x	0.0 x	(1.0)x	(3.0)x	(15.0)x	15.1 x	8.3 x	6.3 x	4.3 x	2.5 x	2.5 x	1.7 x	0.0 x	
Debt / Total Funding			0.0%	0.0%	0.0%	0.0%	6.7%	10.6%	13.2%	18.5%	26.0%	31.3%	32.7%	33.0%	44.0%	50.0%	NM	

Source: NBN Co

10.2 Deployment Profile

The Plan assumes that 13.2 million premises will be passed or covered by NBN Co by the end of FY2021 (100% of premises across all platforms). By the end of FY2013, NBN Co forecasts passing or covering 1.7 million premises, of which 1.3 million will be with Fibre.

Exhibit 10.4: Premises Passed and Connected by FY2021

At end of FY2021	Premises Passed/Covered ('000s)	Coverage	Premises Connected ('000s)	Take-up (% of premises passed/covered)
FTTP	12,202	93%	8,320	68%
Wireless	594	4%	123	21%
Satellite	381	3%	106	28%
Overall	13,176	100%	8,549	65%

Source: NBN Co

⁵¹ Reserve Bank of Australia, F2 Statistics, Capital Market Yields - Government Bonds, accessed 13 December 2010.

10.3 Type of Deployment for the Fibre Network: Aerial versus Underground

10.3.1 FTTP GPON Network

The Corporate Plan assumes that the Fibre network will be achieved by passing more than 181,000km of physical distance (based on network configuration and covered road distances of 130,000km).⁵² Other key network features include 25% of the premises to be passed aerially in the Local network, representing 31,000km of aerial deployment.

10.3.2 Transit Backhaul Network

The Corporate Plan assumes that the Transit Backhaul network will be achieved by building or leasing 57,000km of physical distances.

10.4 Capital Expenditure

Exhibit 10.5: Capital Expenditure (\$ Million) (Nominal Dollars)

Capital Expenditure															
June YE	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2023	FY2025	FY2028	FY2040
(\$ million)															
Fibre	600	1,224	2,124	3,451	3,142	3,116	3,116	3,095	3,065	3,047	1,926	353	363	373	358
Last 7 %	526	305	774	906	264	131	152	96	97	21	21	23	25	27	34
Common Capex	274	190	172	17	18	18	19	19	20	20	21	22	23	25	33
Replacement and Other Capex	160	303	381	531	409	373	452	576	650	740	715	1,504	1,361	1,382	3,391
Total Capex	1,561	2,023	3,451	4,905	3,833	3,639	3,739	3,787	3,832	3,828	2,683	1,902	1,772	1,807	3,817

Source: NBN Co

The total capital expenditure from FY2011 to the end of December 2020 in nominal terms is forecast to amount to \$35.9 billion. This represents the estimated cost of completing the fibre, wireless and satellite networks to provide 100% national coverage, with 64% of premises connected by end of December 2020 (65% by end of FY2021).

10.5 Operating Expenditure

Exhibit 10.6: Operating Expenditure (\$ Million) (Nominal Dollars)

Operating Expenses															
June YE	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2023	FY2025	FY2028	FY2040
(\$ million)															
Direct	77	287	854	2,040	2,109	2,264	2,295	2,345	2,418	2,528	2,260	1,516	1,587	1,699	2,298
Other	232	241	298	318	328	344	356	372	385	396	402	397	398	424	638
Gross Opex	309	529	1,152	2,358	2,436	2,608	2,652	2,717	2,803	2,924	2,662	1,914	1,985	2,123	2,936

Source: NBN Co

Operating costs for the period of the Corporate Plan grow in line with the expansion of NBN Co's activities in the lead up to, and immediately following the start of, full scale roll-out in FY2012. During this period there will be a significant increase in network operations staff numbers in order to provide adequate nationwide capability for NBN Co.

By the end of FY2013 there are also significant operating costs relating to the agreement with Telstra.

⁵² Covered road distances have been used as inputs to the network configuration model, which multiplies the road distances by a factor depending on the type of deployment (aerial vs. underground) and the localisation of these distances in the fibre network (local, distribution, shared).

10.6 Working Capital

This Corporate Plan has incorporated an assumption for working capital.

This results in an average working capital of \$110m per annum from FY2011 to FY2013 and \$(54)m per annum from FY2014 to FY2021.

10.7 FY2011 Budget

FY2011 budget is summarised in Exhibit 10.7 and Exhibit 10.8.

'Business as usual' costs and specific 'Project Costs' have been captured and quantified across NBN Co.

During FY2011 NBN Co will be commencing a number of vital projects to support its national roll-out. These include building of the OSS/BSS systems, ERP systems, National Operations Centre and Data Centre. In addition, NBN Co will be conducting its First Release and Release 2 FTTP projects. It is also anticipated that NBN Co will be required to make a down payment on satellites ordered during FY2011.

Exhibit 10.7: FY2011 Capital Expenditure Budget (\$ Million) (Nominal Dollars)

Capital Expenditure (Capex)	
June YE	FY2011
(\$ million)	
Fibre	600
Last 7%	526
Common Systems	171
Common Operations and Facilities	263
Total Capex	1,561

Source: NBN Co

FY2011 will also see the gradual ramping-up of NBN Co's internal resources to support these programs and to prepare for nationwide roll-out.

Exhibit 10.8: FY 2011 Operating Expenditure (\$ Million) (Nominal Dollars)

Operating Expenses (Opex)	
June YE	FY2011
(\$ million)	
Fibre Direct Leasing Costs	23
Other Operating Costs	69
Staff-Related Costs	132
S, G and A Costs	86
Total Opex	309

Source: NBN Co

10.8 Taxation

10.8.1 Income Tax

NBN Co will incur significant income tax losses in the first eleven years of its operations (from FY2010), and it is assumed that these losses will be carried forward and offset against future profits. The Company expects to start utilising brought forward tax losses in FY2021..

A significant change in ownership (greater than 50%) would require the Company to satisfy certain continuity of business rules in order to continue to carry forward past losses.

NBN Co expects that the majority of costs incurred will be deductible or depreciable for tax purposes.

The Company has assumed a corporate income tax rate of 30% throughout the forecast period, on the basis that proposed reductions to this rate (e.g. to 29% and then 28%) have not yet been legislated.

10.8.2 Other taxes and related charges

GST is not expected to create any particular additional costs for NBN Co, other than general cost of compliance. All unit costs and product pricing referenced within the Corporate Plan are ex-GST. The cost of other significant taxes (e.g. payroll tax, superannuation guarantee contributions) has been factored into the base case using the rates currently legislated.

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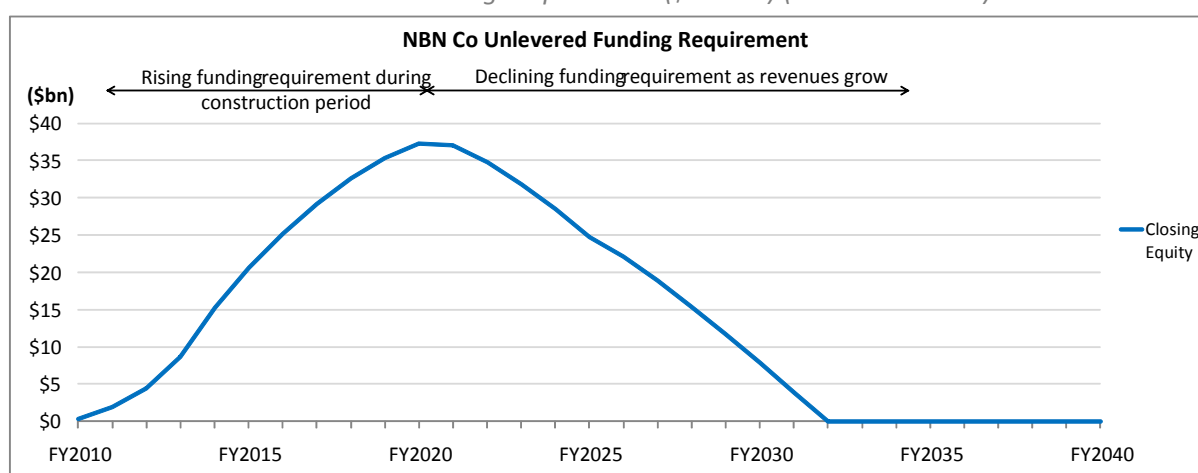
11 FUNDING NBN CO

Funding agreement for calendar year 2010 has been secured with further agreements for the 3-year Corporate Plan to be agreed upon in FY2011. These agreements form part of a total funding commitment for the full deployment period.

11.1 Determining NBN Co's Funding Requirement over 3 Years and 30 Years

NBN Co's funding requirement is driven by the Company's EBITDA and Capex profiles, including working capital. NBN Co's free cash flow profile is shown in Exhibit 10.1 in Section 10, *Financial Forecasts*. Based on this profile it is possible to forecast NBN Co's overall funding requirement, as shown in Exhibit 11.1. The minimum unlevered funding requirement is expected to be approximately \$37.1 billion, which is the total (unlevered) cost of the NBN to the end of the deployment period.

Exhibit 11.1: NBN Co's Unlevered Funding Requirement (\$ Billion) (Nominal Dollars)



Source: NBN Co

In a debt scenario, external funding costs are projected to add an additional funding requirement over the period from July 2010 to June 2021, with peak total funding requirement at \$40.9 billion at the end of FY2021.

11.2 Funding the FY2011 to FY2013 Period

Exhibit 11.2 provides a funding drawdown profile (cash-based) as shown previously on Exhibit 10.3.

*Exhibit 11.2: NBN Co's Forecast Equity Funding Requirement (\$ Million) (Nominal Dollars)**

Year Ending 30 June	Annual (\$ millions)		Cumulative (\$ millions)	
	Forecast Equity Funding Requirement	Forecast Equity Grossed Up	Forecast Equity Funding Requirement	Forecast Equity Grossed Up
2010 (Actual)	312	312	312	312
2011	1,616	1,788	1,928	2,100*
2012	2,457	2,700	4,385	4,800
2013	4,290	4,400	8,675	9,200

Source: NBN Co

Note: *Equity Funding Requirement is calculated assuming external funding (debt) will be available to NBN Co by FY2015.

- The anticipated funding requirements amount to \$8,363 million for the period from July 2010 to June 2013 (FY2011-FY2013).
- These funding requirements, including operating working capital (receivables and payables), would be covered by equity injections from the Shareholders.
- The amount of equity injections requested would be \$8,888 million for the period from July 2010 to June 2013 (this would be a cumulative amount of \$9,200 million when including \$312 million of already received equity in FY2010). This is a grossed up number vs. the currently modelled requirements:

Grossed up by \$525 million at the end of the Plan (FY2013) versus the forecast requirements. Total cash received would be above forecast requirements:

- By \$172 million at 30 June 2011; and
- By \$525 million at 30 June 2013.

This would provide the appropriate protection required for the size of commitments made to external suppliers.

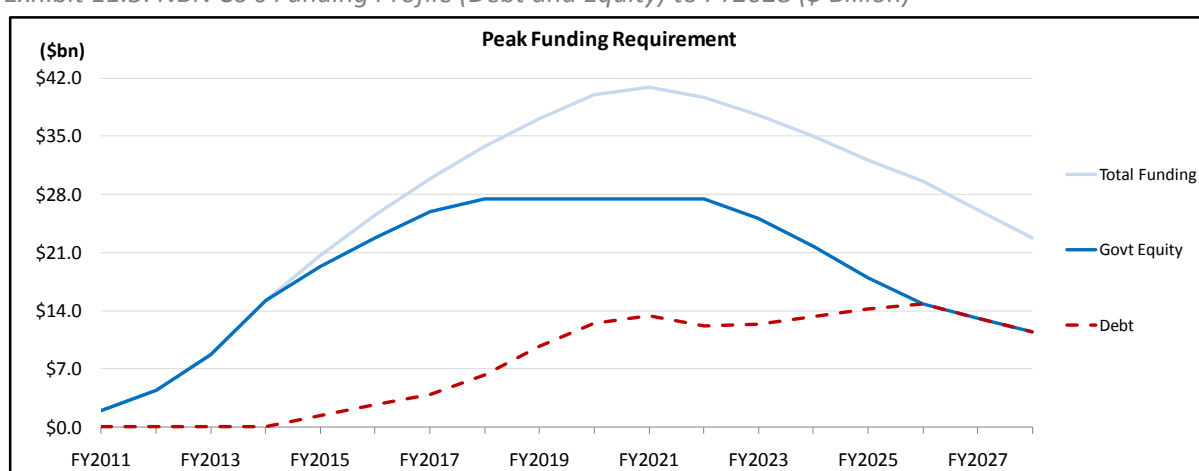
11.3 Part of Long-Term Funding Scenarios

In modelling the profile of long-term funding, NBN Co has assumed that Shareholders would like to reduce the total equity requirements. Therefore, NBN Co would seek external funding from the bank and financial markets without the explicit support of the Shareholders.

For the purpose of this scenario, NBN Co has embedded debt funding costs into the financial model, excluding explicit guarantees from the Government. It is expected that total external funding would contribute up to 33% of the total funding to FY2021.

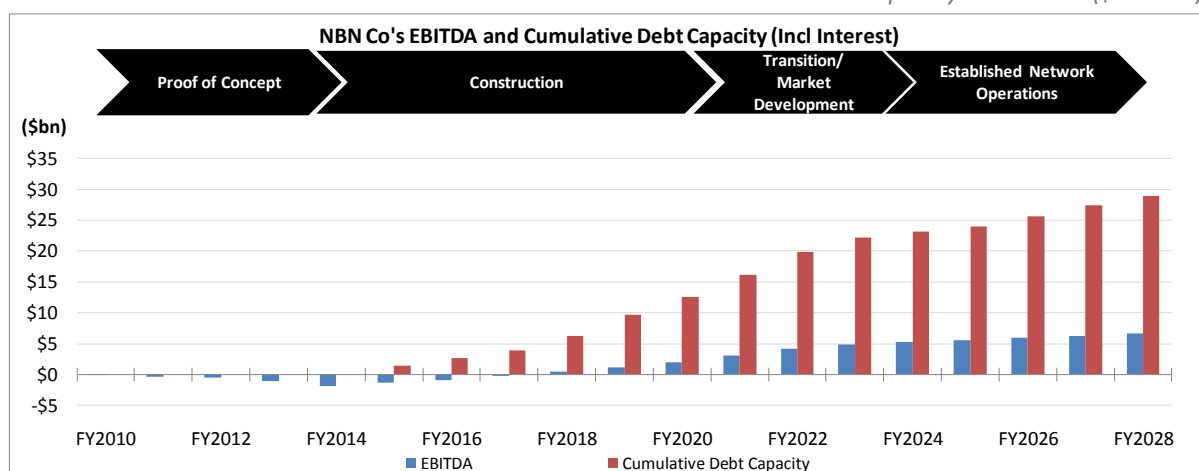
Advice sought from external parties shows that the quantum of debt to be raised from project finance or financial markets could amount to an estimate of \$13.4 billion over the period to June 2021. From FY2023 onwards, it would provide a mechanism for repayments of equity over time.

Exhibit 11.3: NBN Co's Funding Profile (Debt and Equity) to FY2028 (\$ Billion)



Source: NBN Co

Exhibit 11.4: NBN Co's Forecast EBITDA and Estimated Cumulative Debt Capacity to FY2028 (\$ Billion)



Source: NBN Co

Maximum debt funding would start from FY2015. Average issuance per annum would amount to \$1.9 billion over the six-year period (FY2015 to FY2021) and NBN Co would be in the top tier of Australian issuers. This would imply the sourcing of a significant proportion of the debt requirement from overseas investors as the Australian domestic market is unlikely to provide this level of resource today.

The related profile of equity injections in a debt scenario is as shown in Exhibit 11.5.

Exhibit 11.5: NBN Co's Forecast Equity Funding Requirement (\$ Million) (Nominal Dollars)

Year Ending 30 June	Annual (\$ Million)		Cumulative (\$ Million)	
	Forecast Equity Funding Requirement	Forecast Equity Grossed Up	Forecast Equity Funding Requirement	Forecast Equity Grossed Up
2010 (Actual)	312	312	312	312
2011	1,616	1,788	1,928	2,100*
2012	2,457	2,700	4,385	4,800
2013	4,290	4,400	8,675	9,200
2014	6,580	6,600	15,255	15,800
2015	4,028	4,100	19,283	19,900
2016	3,520	3,600	22,803	23,500
2017	3,113	3,200	25,916	26,700
2018	1,584	800	27,500	27,500

Source: NBN Co

*Equity Funding Requirement is calculated assuming external funding (assumed to be debt) will be available to NBN Co by FY2015.

11.4 Achievability of Debt Funding

As a scenario, NBN Co has therefore retained the ability to raise up to \$13.4 billion debt without explicit support from the Government.

Critical to NBN Co's ability to raise external funding without explicit support by Government will be the opinions of debt providers on the Company's achievements, roll-out timeliness and connections uptake, which will form the key metrics of credit quality.

Future cash flow generation potential will be analysed in conjunction with expected unlevered returns of the project over its lifecycle. It is estimated that, so as to encourage debt financing and retain consistency with the significant amount of debt raised in the funding plan, a spread over Government bonds will be required.

Market capacity, and the risk appetite of debt investors, might limit the amount of debt that the Company can actually raise. This would require revising the funding plan at the time to assume a higher level of Government equity.

There is no assurance that this level of debt could be issued. The level and timing of debt will be the major financial risk that NBN Co will continuously assess.

11.5 Cost of Capital

NBN Co's cost of capital can also be estimated through its Weighted Average Cost of Capital (**WACC**).

The WACC is the true, but unobservable *ex ante*, cost to the firm of obtaining capital. It is the return that has to be generated, in expectation, to attract capital investment from equity and debt investors.

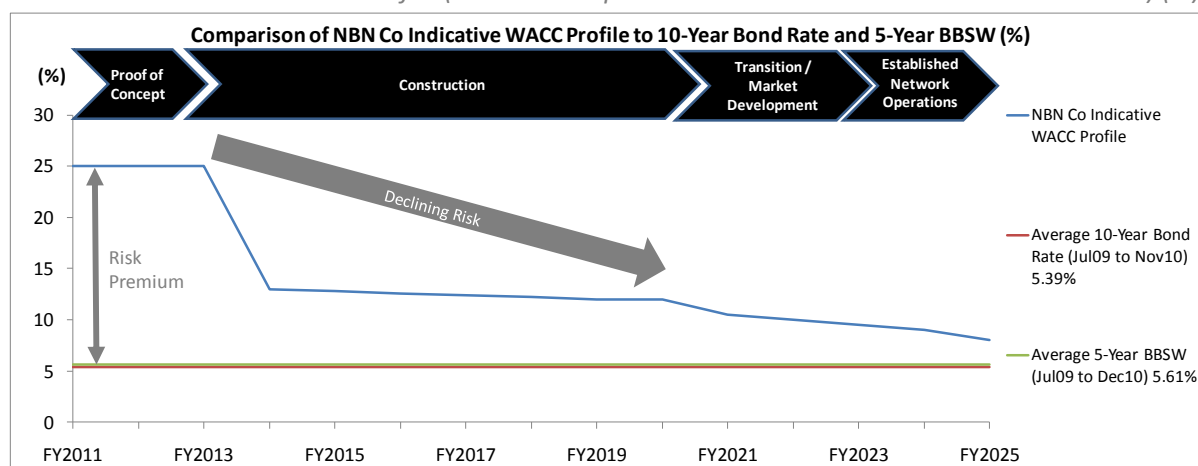
NBN Co developed a detailed review of the WACC parameters. A four stage approach has been used to assess the cost of capital over time.

Preliminary conclusions are as follows:

- During the 'Proof-of-Concept' period, which encompasses the Corporate Plan timeline (FY2011-FY2013), the cost of capital would not be based on relevant comparables. NBN would have the nature of an infrastructure project and an element of Australian Government broader policy in the telecoms industry. A WACC level of 25% akin to account for the risks of the project is used for this period of time;
- During the 'Construction' period (FY2014-FY2021), benchmarks linked to the construction industry are used to derive a WACC value of 12%-13%;
- During the 'Transition / Market Development' period (FY2021-FY2022), as risk tapers off, a WACC value of 9.5%-10.5% is estimated; and
- In the 'Established Network Operations' period (from FY2023 onwards), a WACC value of 8%-9% is estimated, reflecting the nature of established infrastructure of NBN Co by that stage (while keeping a conservative risk premium compared to regulated assets such as water and gas utilities).

Averaging the WACC values over time on the basis of invested capital would derive a range estimate of WACC values of 10%-11%.

Exhibit 11.6: Indicative WACC Profile (NBN Co Compared to 10-Year Bond Rate and 5-Year BBSW) (%)



Source: NBN Co

In estimating its cost of capital at 10%, NBN Co considered the following:

- The perception of the risk profile by investors of NBN Co will decline sharply over time as the Company evolves into an established, regulated wholesale network operator, with a financial track record;
- Cost of capital should be considered independently of the nature of ownership therefore regardless of the costs of funding equity for the Government;
- No specific rate of return has been stipulated by the Shareholders for NBN Co;
- A discount rate of 10% was used by NBN Co to assess the value of the proposed transaction described in the Financial Heads of Agreements; and
- Non-incumbent European telecoms WACC is estimated at around 7%-8% and the regulated utilities / infrastructure WACC is assessed around 6.5%-7.5%.

Exhibit 11.7: WACC Values Universe

Companies Universe	WACC Values
European Regulated Utilities	5.7% - 7.5%
Australian Toll Roads	8.8%
European Toll Roads	6.5% - 7.5%
UK Water Utilities	6.0%
US Rail	8.6%
US Gas Distribution	6.1%
US Electricity Distribution	5.2%
US Water Utilities	6.3%
European Non-Incumbent Telecoms	6.8% - 8.1%

Source: NBN Co's Financial Advisors analysis and company reports.

12 RISK MANAGEMENT

This section describes the major risks that NBN Co will address by June 2013.

12.1 Risk Management System

NBN Co is seeking to develop a sound system of risk oversight, management and internal control and the associated culture, processes and structures to support achievement of its business objectives. Embedding a risk culture requires time and attention, as disciplines take time to form 'Business As Usual' (**BAU**) activities.

NBN Co has established an enterprise-wide risk management system to facilitate the identification of significant business risks and implementation of appropriate risk mitigation or treatment plans and monitoring processes. The system is built upon the premise that all employees have responsibility for risk management in their job areas.

The approach adopted by NBN Co is consistent with the international risk management standard, Australia/New Zealand Standard ISO 31000:2009. NBN Co's Risk Management Policy details the way in which the Company establishes the risk context, identifies, assesses, analyses, evaluates and treats risk to effectively manage its business, assign roles and responsibilities for risk management, and establish a risk register and reporting framework to facilitate the process and meet reporting obligations.

Risk profiles will be defined and managed for each of NBN Co's business functions and major activities. The aggregation of these profiles forms the NBN Co Group Risk profile and also forms the basis for Management and Board reporting of risks and associated management processes. Risks, the risk mitigations in place, and treatment plans are reported quarterly to the Board under the following categories:

- Safety and Environment;
- Demand and Revenue (Product and Competition);
- Technology;
- Execution and Delivery;
- Security (Physical, Networks, Information Technology);
- Policy and Regulatory;
- Resourcing - Suppliers;
- Resourcing – People and Skills;
- Financial;
- Quality; and
- Reputation.

The risk categories, with the corresponding likelihood and impact are reported to the Board.

Risk management is also being integrated with NBN Co's Program processes, with weekly recording and reporting of issues and risks that also form part of the reporting above.

NBN Co's operating environment is dynamic, and subject to many external factors, many of which are outside of NBN Co's control. The risk management system will play an important role in identifying and responding to risks as the operating environment changes in both the short and longer terms. Finance provides policy, strategies, tools, guidance and a cross-company reporting capability to manage risk, while additional risk specialists are distributed throughout the organisation with responsibility for addressing specific risk areas.

Whilst the execution of the risk management system aims to identify risks before they occur, for a number of reasons this is not always possible. As such, NBN Co also places an equal emphasis on risk readiness, business resilience and fostering a preparedness to respond to risk events; with the risk reporting and communication disciplines being established to facilitate this. The regular risk reporting processes that have been established facilitate appropriate oversight and ownership of risks, and also serve as a mechanism for regular updating of risk registers and considering the completeness of risks identified and mitigation plans in place.

Risk management is seen as an ongoing process as part of all business activities and not a cyclical event. NBN Co seeks to foster a risk aware culture, open to risk identification and treatment of risk. This includes the promotion of education and awareness of the risk management system and key risk management principles amongst its staff.

The Risk Management Policy that establishes and underpins the risk management system will be reviewed at least annually and updated as required to reflect NBN Co's needs. This will ensure the risk management system remains fit-for-purpose as NBN Co's primary activities move through planning and design, to construction and commercial operation.

12.2 Corporate Plan Risks

As of 1 December 2010, NBN Co had identified over 150 risks to the project. Of these risks, the Board and Management of the Company have identified six key risks. These are:

- Safety;
- Quality;
- Construction;
- Revenue;
- Funding; and
- OSS/BSS.

Safety

With tens of thousands of people working on the project in traffic exposed locations using large machines or potentially working at heights close to power lines, the probability of an accident is high.

Mitigation strategies include:

- Comprehensive Health Safety and Environment (HSE) established to AS4801/ISO 14001;
- Appointment of HSE General Manager;
- NBN Co HSE manager assigned full time to each construction site;
- Fortnightly HSE review chaired by CEO;
- HSE Key Performance Indicators reported at beginning of every Board meeting;
- Stringent HSE requirements in all construction contracts; and
- Use of industry experts to advise on establishing a “no blame” safety culture across NBN Co.

Quality

The Quality risk lies in product or process failures resulting in unacceptable operational performances.

Mitigation strategies include:

- Establishing a quality program to ISO 9001;
- Appointment of a Quality Manager;
- NBN Co quality specialists employed full time on each construction site;
- NBN Co quality specialists embedded in Design and Network Operations;
- Fortnightly Quality review chaired by CEO;
- Quality Key Performance Indicators reviewed at each Implementation Committee meeting;
- Requirement specifications, qualifications and audits for vendors and suppliers;
- Increasing use of statistical control methods; and
- A staged deployment.

Construction

The failure to achieve budgeted construction costs is a significant risk.

Mitigation strategies include:

- A willingness to slow rollout to achieve cost targets;

- A strong focus on continuous improvement in the areas of cost, quality and time of large number of largely repeatable projects;
- The use of a modular methodology for supply chain and construction; and
- A willingness to start with a “primary construction partner” rather than initial awards to multiple contractors.

Revenue

The key risks to revenue projections are described in Section 9, *Revenue Forecasts*. They include speed and usage, wireless substitution, cherry picking and the effect on take-up of imperfect Uniform National Wholesale Pricing (**UNWP**).

Mitigation strategies include:

- Complete Telstra Definitive Agreements to mitigate take up risk;
- Not attempting to match low-end products;
- Supporting video-based application development;
- The passing of effective anti-cherry picking protections; and
- Backhaul limitations: ACCC to intervene in market if necessary.

Funding

A major risk is the ability of NBN Co to attract funding as planned as described in Section 11, *Funding NBN Co*.

Mitigation strategies include:

- Execute to plan; meet cost, take-up and revenue targets; and
- The establishment of a multi-year investor relations and communications plan, which will include regular meetings with major domestic and international banks, rating agencies, debt holders and other market participants to keep them briefed on project and to obtain financial market views.

OSS/BSS

The Operational Support Systems (OSS) and Business Support Systems are key support systems to the project. The OSS provides the capabilities needed to provision, configure, manage and operate the network where as BSS provides the capabilities needed to manage customers, take orders, process bills and collect payments. Delays in deployment of these key systems are a key risk to the project.

Mitigation strategies include:

- Phased delivery of the systems to align with rollout;
- Maximum use of “off-the-shelf” software components;
- Using of proven vendors; and
- The use of proven software development methodologies.

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GLOSSARY OF TERMS

Access Aggregation Region (AAR)	The area served by a Point of Interconnect (PoI) located in an Aggregation Node (AN) and connected via Transit Fibre to regional Fibre Access Node (FAN) sites. The backhaul from the regional FAN to the AN is termed Transit Backhaul.
Access Seeker	A customer acquiring NBN Co wholesale services with the intention to supply internet services to Retail Service Providers (RSPs) or End-Users.
Access Virtual Circuit (AVC)	The bandwidth allocated to the End-User premises.
Aggregation Node (AN)	A facility that provides a Point of Interconnect (PoI) to RSP's / WSP's for an Access Aggregation Region (AAR), comprising a number of regional FAN sites. Note that an AN will also have a co-located FAN site for its local area.
Analogue Telephone Adapter (ATA)	The port on an NBN Co Network Termination Unit (NTU) is used to connect one or more standard analogue telephones to a digital phone system.
Asymmetric Digital Subscriber Line (ADSL)	A technology for delivering high-speed data transmission over a copper phone line. As the name suggests, it provides different downstream (network to end-user) and upstream (end-user to network) bandwidth.
Australian Broadband Guarantee (ABG)	The Australian Broadband Guarantee is an Australian Government initiative designed to help residential and small business premises access a high quality broadband service. The program targets premises unable to access commercial metro-comparable services, particularly those living in remote parts of Australia.
Average Busy Hour Throughput (ABHT)	A factor in network provisioning decisions, ABHT is the average transmission speed per end-user that can be expected during the hour in which a network is loaded the heaviest. ABHT varies from network to network depending on the end-user profile.
Average Revenue Per User (ARPU)	The total revenue divided by the number of subscribers.
Average Revenue Per User (Restated)	ARPU excluding non End-User related charges which distort ARPU particularly in early years when number of End-Users is low. Restated Fibre ARPU excludes Network-to-Network Interface (NNI) charge and Multicast Domain charge.
Bank Bill Swap (BBSW) Reference Rate	The rate for a reset date will be the average mid rate, for Australian Dollar bills of exchange, accepted by an approved bank, having a tenor with a designated maturity, that appears on an approved information vendors service (e.g. Thomson Reuters Screen BBSW page) at approximately 10.08am AEST, on the reset date.
Basis Points (bps)	One Basis Point is equal to 1/100 th of 1%.
BOT (Build-Operate-Transfer) Greenfields	Build-Operate-Transfer Greenfields premises for which NBN Co will sub-contract third party fibre providers to build the network on NBN Co's behalf.
Broadacre	A type of Greenfield development where a new premise is planned to be built on currently undeveloped land (i.e. where no copper services are

	currently available in the surrounding area). Broadacre Premises are assumed to account for 40% of the growth market.
Brownfields	A pre-existing premise that will be covered by either Fibre, Wireless or Satellite services.
Build Greenfields	Greenfields premises which are considered part of NBN Co's roll-out.
Business Support System (BSS)	The set of systems that will provide NBN Co with the capabilities to manage Access Seekers, take orders, process bills and collect payments.
Business-to-Business (B2B)	Commerce transactions between businesses.
Capital Expenditure (Capex)	The cost of purchasing tangible and intangible assets.
Committed Information Rate (CIR)	The guaranteed amount of bandwidth that NBN Co will provide to End-Users.
Compound Annual Growth Rate (CAGR)	Year on year growth rate, over a specified period of time.
Connectivity Serving Area (CSA)	A logical collection of End-User Premises defined by NBN Co. Each CSA has approximately the same number of End-User Premises.
Connectivity Virtual Circuit (CVC)	Determines the capacity required to serve each CSA. The CVC is an aggregation of the AVCs from the End-User premises back to the PoI.
Customer Premises Equipment (CPE)	Any telephone terminal and associated Internet equipment that is located at a End-User's premises and may require broadband connectivity.
Dark Fibre	Optical fibre with no active electronics attached.
Data Over Cable Service Interface Specification (DOCSIS)	An international standard that allows high-speed digital data transmissions over existing Hybrid-Fibre Coaxial (HFC) cable infrastructure.
Deal Case	The base case used for the 3-year Corporate Plan, assuming Definitive Agreements are entered into with Telstra in line with the Financial Heads of Agreement.
Digital Subscriber Line (DSL)	A family of technologies that deliver high-speed data transmission over a copper phone line.
Digital Subscriber Line Access Multiplexers (DSLAMs)	Network devices normally located in telephone exchanges providing multiple ports connecting end-user copper lines for the provision of DSL broadband service.
Distribution Fibre	Connection between the Fibre Distribution Hub (FDH) and the FAN, for both Regional FANs and the Metro FANs, as well as the connectivity between the non adjacent Fibre Serving Area Modules in the Capital Cities and the Metro FANs. Distribution Fibre routes are designed in a ring structure to minimise the impact of any fibre break on consumer services as well as providing diverse paths for protected commercial point to point services.
Distribution Network	The part of the network that connects the FAN to the FDH.
Drop (Final Drop)	The connection from the Local Network to the Premise. This is also referred to as the Lead-in Fibre Connection to the Premise from the

	Network Access Points (NAPs).
Drop Fibre	Connection from the NAPs to the termination point on an individual premise or building. Connections can be provided as either an underground or aerial connection. The drop fibre can be configured as a single fibre connection to a consumer Network Termination Unit (NTU), while still allowing a dual fibre connection to commercial services if required.
Earnings Before Interest and Taxes (EBIT)	The operating profit before deduction of interest and income taxes.
Earnings Before Interest, Taxes, Depreciation and Amortisation (EBITDA)	The operating profit before deduction of interest, income taxes, depreciation and amortisation.
End-Users	Customers to NBN Co's Access Seekers and/or Retail Service Providers (RSPs).
Enterprise Resource Planning (ERP)	The system that will provide NBN Co with the capabilities to manage enterprise functions such as finance, fixed assets, human resources, project management, supply chain management, and contract management.
Ethernet	A frame based transport protocol for forwarding traffic across Local Area Networks (LANs).
Ethernet Aggregation Switch (EAS)	An Ethernet switch that aggregates end-user traffic coming from OLTs for high bit-rate transmission and logical separation to each RSP / WSP.
Ethernet Fanout Switch (EFS)	An Ethernet switch that provides Point of Interconnect (Pol) for RSP / WSP to deliver telecommunication services to end-users on NBN Co's network.
Fair Work Principles	Under the Department of Education, Employment and Workplace Relations, these principles support the creation of quality jobs by ensuring that NBN Co procurement decisions are consistent with the Fair Work Act and its aims, including promoting fair, cooperative and productive workplaces.
Fibre Access Node (FAN)	A facility that houses the active equipment providing services to a Fibre Serving Area (FSA). Note that Urban FANs will also provide a Point of Interconnect to Access Seekers.
Fibre Distribution Area (FDA)	The area served via a single Fibre Distribution Hub (FDH) which connects addresses to the serving FAN site(s) via Local Fibre.
Fibre Distribution Hub (FDH)	The equipment located in a Fibre Distribution Area where Distribution Fibre is split to provide Local Fibre that runs down each street.
Fibre Footprint	The 93% of premises that will be serviceable by NBN Co's FTTP network by the end of the Roll-out Period.
Fibre Ready Area	Premises which are capable of connection to the NBN in order to receive an active NBN Co FTTP service (that is, Premises in an area which has already been passed by the NBN fibre network and has been operationally approved as 'ready for service').
Fibre Serving Area (FSA)	The area served by a FAN site, which for the regional areas will be a cluster of FDAs and for the 16 city metropolitan locations will be a cluster

	of FSA Modules. The FDAs and FSA Modules will be connected via Distribution Fibre.
Fibre Serving Area Module (FSAM)	A series of up to 24 FDAs linked in a double closed loop configuration.
Fibre-To-The-Building (FTTB)	The network design in which the fibre network is deployed to the boundary of each building. Where a building is an MDU, the final connection to the individual premises is made by alternative technologies.
Fibre-To-The-Home (FTTH)	Same as Fibre-To-The-Premise.
Fibre-To-The-Premise (FTTP)	The network design in which the fibre network is deployed to each premise.
Financial Heads of Agreement (FHOA)	The agreement entered into between NBN Co and Telstra Corporation on 20 June 2010.
First Release Site (FRS)	The first locations (after the Pre Release Sites in Tasmania) where NBN Co will deploy Fibre services.
FY20XX	Financial Year ended 30 June 20XX.
Geocoded National Address File (GNAF)	GNAF information is provided by PSMA Australia Limited (PSMA). GNAF lists all valid physical addresses in Australia. It contains approximately 12.6 million physical addresses, each linked to its unique geocode (that is, the specific latitude and longitude of the address). Data used to build GNAF comes from contributors that include the Australian Electoral Commission, Australia Post, state, territory and Australian Government mapping agencies and land registries. GNAF is provided by PSMA Australia Limited (PSMA).
Gigabit-capable Passive Optical Network (GPON)	A point to multi-point fibre to the premise network architecture that uses combination of electronics network and passive optical splitters to deliver speeds up to 1,000Mbps to end users. The GPON active layer technology uses electronics that are designed to be compatible with a fibre that is subsequently split into multiple downstream fibres.
Gigahertz (GHz)	Unit for measurement of frequencies. One Gigahertz is equal to 10 ⁹ hertz.
Greenfields	A new development that can be either Broadacre or Infill Premises (see the Glossary definitions of 'Broadacre' and 'Infill' for more information). Greenfields developments represent the growth of the premises market.
Health, Safety & Environment (HSE)	A supporting division of NBN Co that will not be directly involved in the operation of the NBN but will be responsible for establishing and maintaining the company's policies regarding employee health, safety and environment issues.
Home Run Topology	Topology where a dedicated access fibre connects every individual premise to the fibre exchange.
Hybrid Fibre Coaxial (HFC) Network	A network utilising both optical fibre and coaxial cable for the delivery of Pay TV, internet and voice services.
Infills	A type of Greenfields development where a new premise or a redevelopment (i.e. demolition and rebuild) is planned to be built on

	currently developed land that is surrounded by established areas, where Telstra copper services are currently available. Infill Premises are assumed to account for 60% of the growth market.
Information Technology (IT)	An umbrella term for technologies that process, store and communicate information.
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.
Internet Protocol (IP)	The international standard by which data is transmitted between networks (packet data protocol by which data is routed between IP enabled devices (computers) and networks).
Internet Protocol Television (IPTV)	A service where video streams are delivered across Internet (broadband) connections for viewing at an End-User premise.
Internet Service Provider (ISP)	An organisation that offers access to the Internet to its End-Users.
Ka-band	Satellite radio frequency spectrum from 27 – 40GHz.
Kilobits per second (Kbps)	One Kilobit Per Second is equal to 1,000 bits per second.
Key Performance Indicator (KPI)	A metric used to measure the progress or degree of fulfilment of a particular success criterion.
Ku-band	Satellite radiofrequency spectrum from 15 – 17GHz.
Last 7%	The percentage of the Australian premises that will be connected via wireless or satellite technologies.
Layer 1 Network/Wholesale Services	The physical network layer providing electrical impulse or wavelength based services on a point-to-point basis.
Layer 2 Network/Wholesale Services	The transmission layer that encodes and decodes information bits across layer 1 infrastructure. Layer 2 is the active layer of an optical fibre network
Layer 3 Network/Wholesale Services	The Network layer responsible for defining how interconnected networks function; it includes routing, flow control, segmentation, error detection and error correction.
Line Sharing Service (LSS)	LSS is a regulated product that enables ISPs to access the frequencies within a copper phone line not used for voice, allowing the provision of DSL service using their own DSLAM equipment.
Local Fibre	Connection between the FDHs and the individual GNAFs or buildings via a series of radial fibre cables containing Network Access Points (NAPs), then a Drop Fibre to the building. Note that the Local Network fibre cables are not tapered, but the 'ends' of each segment are interconnected to provide through connection of the Distribution and Trunk fibres.
Local Area Network (LAN)	A computer network that connects computers and devices in a limited geographical area (e.g. home, office building).
Local Multipoint Distribution Services (LMDS)	A wireless broadband access technology that commonly operates on microwave frequencies across the 26 GHz and 29 GHz bands.

Local Network	The part of the network from the Fibre Distribution Hub down each street. Typically serving between 50 and 200 premises each.
Long Term Evolution (LTE)	Standardisation work by the 3 rd Generation Partnership Project (3GPP) 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 transmission speeds. One Megabit Per Second is equal to 1,000kbps. X/YMbps means a maximum downstream speed of XMbps and a maximum upstream speed of YMbps.
Megahertz (MHz)	Unit for measurement of frequencies. One Megahertz is equal to 10 ⁶ hertz.
Metro FAN	A Fibre Access Node (FAN) serving a metropolitan area.
Multiple Dwelling Unit (MDU)	A premise that contains more than one dwelling unit, which can range from duplexes to 200+ unit apartment blocks. Each dwelling unit is equivalent to one GNAF (e.g. a 50 unit apartment block will have 50 GNAFs).
Naked Broadband	A marketing label for broadband services provided on an access line on which no voice service is active (this service offered by RSPs to enable homes without a fixed voice connection to have access to fixed broadband and potentially use a third party VOIP service).
National Broadband Network (NBN)	The nation-wide broadband network that will be deployed by NBN Co and third parties engaged on behalf of NBN Co.
National Broadband Network Company Limited (NBN Co)	The legal entity of National Broadband Network Company Limited.
National Code of Practice for the Construction Industry	Sets minimum standards that businesses must meet to be eligible for certain Australian Government building and construction work.
National Housing Supply Council (NHSC)	An independent group established by the Australian Government that produces an annual State of Supply Report that assesses information on land supply and demand for housing from all levels of government and the private sector.
NBN Co Satellite Access Service (NSAS)	Also known as the Long term Satellite Access Service solution, it is a Layer 2 wholesale Ethernet access product suite delivered by satellite to End-User Premises. The NSAS will deliver at least 12Mbps peak download speed, and an ABHT of 300Kbps, for up to 200,000 users.
Network Access Points (NAP)	The point at which Drop Fibre is connected to Local Fibre.
Network and Services Operations Centre (NSOC)	Facility overseeing management and operation of the network infrastructure.
Network Termination Unit (NTU)	NBN Co's termination point on each premise, for residential fibre services (typically) featuring 4 Ethernet and 2 telephone interfaces.
Network-to-Network Interface (NNI)	The port at NBN Co's Point of Interconnect (Pol) where Access Seekers connect their internet transmission backhaul.
No Deal Case	Alternative to the Deal Case, assuming no deal with Telstra.
Occupational Health & Safety (OHS)	A discipline concerned with protecting the safety, health and welfare of

	people engaged in work or employment.
Office of the Telecommunication Authority Hong Kong (OFTA)	The arm of the Telecommunications Authority in Hong Kong that is responsible for telecommunications regulation.
Operational Support Systems (OSS)	The set of systems that will provide NBN Co with the capabilities to provision, configure, manage, and operate the NBN.
Operating Expenditure (Opex)	The ongoing cost of running a business, system or product.
Optical Line Terminal (OLT)	The equipment to provide the GPON signals to each of the FDAs.
Optical Transport Platform (OTP)	The equipment providing data transport between FAN sites. It is also referred to as 'Transmission' and 'Transit Backhaul – Active Equipment'.
Passive Optical Network (PON)	An active layer technology that uses electronics that are designed to be compatible with a fibre that is subsequently split into multiple downstream fibres.
Payback	The payback period is the length of time required for the cumulative incoming returns (e.g. cumulative revenues) to equal the cumulative costs of an investment (e.g. the sum of the capital expenditure and operating expenditure). It is measured in years.
Peak Information Rate (PIR)	The theoretical speed that an End-User could receive if there were no other End-Users using at the same time. PIR is limited by the speed of the physical port of connection.
Personal Protection Equipment (PPE)	Safety equipment worn by NBN Co construction staff.
Point of Interconnect (PoI)	The connection point that allows RSPs and WSPs to connect to the NBN Co access capability. In the field, this is the physical port on the Ethernet Fanout Switch (EFS) switch located at NBN Co's PoI, where an Access Seeker connects to establish exchange of traffic with NBN Co's network.
Point-to-Point (P2P)	A network design in which a dedicated access fibre connects an individual premise directly to the fibre exchange.
Power Supply Unit (PSU)	A component which provides power to a device.
Pre Release Sites	The locations in Tasmania where fibre-to-the-premise was first deployed, before the First Release Sites.
Public Switched Telephone Network (PSTN)	The network of traditional voice telephone systems.
Public Works Committee (PWC)	The PWC was established in 1913 and is one of the oldest investigative committees of the Parliament. The Committee is constituted by the Public Works Committee Act 1969. The PWC Act provides that (with certain limited exceptions) a public work with an estimated cost exceeding \$15 million shall not be commenced unless it has been referred to the Parliamentary Standing Committee on Public Works (PWC).
Quality of Service (QoS)	The traffic engineering term Quality of Service (QoS) refers to resource reservation control mechanisms rather than the achieved service quality. Quality of Service is the ability to provide different priority to different applications, users, or data flows, or to guarantee a certain level of performance to a data flow.

Radio Frequency (RF)	The frequency of electrical signals used to produce and detect radio waves.
Radio Frequency over Glass (RFOG)	A fibre network design in which the coaxial portion of a HFC network is replaced by a single-fibre, passive optical network architecture.
Regional Backhaul Blackspots Program	An initiative of Department of Broadband, Communications and the Digital Economy (DBCDE), as part of the NBN, which is investing up to \$250 million to immediately address areas where existing backhaul does not provide broadband access throughout regional Australia.
Regional Contractor Package (RCP)	NBN Co has sub-divided the FTTP network into 16 Roll-out Regions. The 16 regions have been further sub-divided for the purposes of awarding 31 nominal work packages (RCPs) to contractors. The RCPs do not necessarily align with a specific geographic boundary within the region but provide NBN Co with the flexibility to allocate any FSAM within a region to a contractor who has been successfully contracted within that region, thereby fostering a competitive framework.
Release 2 Sites	The locations where NBN Co will deploy Fibre services after the First Release Sites.
Retail Service Provider (RSP)	A third party provider of retail broadband services to end -users.
Request for Capability Statement (RCS)	An invitation for suppliers to submit a statement of their capabilities to perform a specific activity.
Request for Proposal (RFP)	An invitation for suppliers to submit a proposal on a specific commodity or service.
Request for Quote (RFQ)	An invitation for suppliers to submit a quotation to estimate the price that a specific set of requirements would cost to complete.
Sales, General and Administration (SG&A)	The operating costs which are not directly related to the production and delivery of the company's products and services.
Single Dwelling Unit (SDU)	A premise that contains only one dwelling unit. One SDU is equivalent to one GNAF.
Shared Topology	Topology where a single fibre runs from the fibre exchange to a passive 'splitter' in the field. This splitter divides the optical signal multiple times, with each split signal travelling down a separate fibre to an End-User premise. Splits of 1:32 are common in FTTP systems and reduce the amount of fibre that must be run from an exchange to the point of the splitter.
Significant Development	Any Greenfields development that is projected to yield no less than 100 Dwellings within a three year period and which receives stage 5 development approval after 1 January 2011.
System Integrator (SI)	The supplier that is chosen to implement and integrate a system.
Telecommunication Standardisation Sector (ITU-T)	Co-ordinates standards for telecommunications on behalf of the International Telecommunication Union (ITU).
Telstra Definitive Agreements	The Definitive Documentation referred to in Section 3.2 of the Financial Heads of Agreement.
Time Division Multiplexing (TDM)	A variant of PON that utilises TDM technology to deliver Point-to-

Passive Optical Network	Multipoint services in a fibre to the premise network architecture.
Transit Backhaul	The fibre rings which connect the regional FAN sites and the nearest POI, served by Transit Fibre.
Transit Fibre	Connection between Points of Interconnect (POIs) where the Retail Service Providers connect to the NBN, and the regional based FANs. Transit Fibre can also provide connectivity for the Metro FANs to POIs if required.
Unconditioned Local Loop Service (ULLS)	A regulated product allowing Internet Service Providers to rent a physical copper line between an exchange and a customer, which when connected to an ISP's DSLAM is the platform for the delivery of Internet and voice services.
User Network Interface (UNI)	The physical port on the NBN Co NTU at the End-User premises which connects the End-User's residential gateway or Ethernet enabled device to the NBN.
Video-on-Demand (VoD)	A technology or service that allows people to select and watch video content at the time of their choosing, unrestricted by a linear schedule.
Voice Over Internet Protocol (VOIP)	Technology that allows voice and video calls to be made over a data network, most often the Internet.
Wavelength Division Multiplexing (WDM) Passive Optical Network	A type of PON in which the multiple wavelengths of a WDM-PON can be used to separate Optical Network Units into several virtual PONs co-existing on the same physical infrastructure.
Weighted Average Cost of Capital (WACC)	The cost of capital determined by the weighted average, at market value, of the cost of all sources of capital in the company's capital structure.
Wholesale Broadband Agreement (WBA)	A document which sets out the terms and conditions of access to NBN Co's services and products and will constitute NBN Co's standard form of access for the purposes of the Access Arrangements Bill.
Wholesale Service Provider (WSP)	A provider of wholesale services to RSPs.
Wide Area Network (WAN)	A computer network that connects computers and devices in a large geographical area, typically across metropolitan or regional boundaries.
Worldwide Interoperability for Microwave Access (WiMAX)	A telecommunications protocol (IEEE 802.16) designed for high speed wireless data transmission.
xDSL	Any form of Digital Subscriber Line technology (e.g. Asymmetric Digital Subscriber Line, Very-fast Digital Subscriber Line).

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