

nbn Special Access Undertaking Variation 2022 – Supporting submission

Part A: Executive Summary and Key Narratives

November 2022

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Contents

Executive Summary	4
1 Introduction	11
1.1 nbn’s Variation	11
1.2 Structure of this Submission	12
2 Summary of how the Variation addresses ACCC and industry feedback	13
2.1 The Variation responds to ACCC and industry feedback	14
2.2 The Variation achieves the ACCC Outcomes for a revised SAU	21
3 State of competition	25
3.1 Overview	25
3.2 nbn faces significant and increasing competition.....	26
3.3 Mobile/fixed wireless competition	28
3.4 Fixed-line competition	35
3.5 New developments	38
3.6 Satellite	38
3.7 Competition incentivises efficient pricing outcomes.....	39
4 Demand for higher speeds will continue to grow	42
4.1 Overview and context	42
4.2 What the data and research show about internet bandwidth and speed requirements	43
4.3 Detailed analysis of likely future end-user speeds	45
4.4 Ongoing network investment will be required to meet forecast demand	52
5 The rationale for investing in fibre	53
5.1 The policy context	53
5.2 Operational efficiencies	54
5.3 Cost efficiencies arising from rolling out fibre at scale	59
5.4 The growing demand for bandwidth and higher speeds.....	61
5.5 Factoring in lead times.....	61
6 The Variation supports economically efficient outcomes	63
6.1 The commitments in the Variation promote economic efficiency	64
6.2 Broader regulatory framework supports competition and efficiency	67
6.3 Market incentives to set efficient prices.....	68
Abbreviations and acronyms	69



Executive Summary

nbn's Special Access Undertaking (**SAU**) plays a central role in the telecommunications industry's regulatory framework. Originally accepted by the ACCC on 13 December 2013, the SAU provides certainty to **nbn**, retail service providers (**RSPs**) and end-users by governing key price and non-price terms on which **nbn** supplies services to RSPs over the period to 30 June 2040. The SAU also provides for regulatory oversight by the ACCC, which will be enhanced as a consequence of this SAU variation lodged with the ACCC (the **Variation**).

nbn lodged an initial proposal to vary the SAU on 29 March 2022 (the **March Variation**). In response the ACCC and industry identified areas where the proposal did not sufficiently address industry and ACCC concerns – key among these being pricing certainty, revenue controls, service quality and the roles and powers of the ACCC. In parallel, the Minister for Communications supported the withdrawal of the March Variation to provide **nbn** the opportunity to propose further amendments to the SAU to reflect changes in the policy landscape and operating environment that have occurred since March.

While offering significant enhancements to the current SAU, having received industry and ACCC feedback, **nbn** acknowledges that its proposal in the March Variation did not go far enough to address industry concerns or to achieve the ACCC's desired outcomes for an SAU variation. **nbn** believes that the additional changes proposed under this new variation reflect greater alignment with ACCC and industry expectations while at the same time creating a framework for operational efficiency and for **nbn** to have the opportunity (but not the guarantee) to earn minimum revenues necessary to sustain and finance its business. In particular, **nbn** believes that the Variation establishes a regulatory framework that delivers on the consensus formed by the industry working group that moving to a standard utility model of regulation "would assist in maximising the economic and social benefits of the significant public investment in the NBN". In particular, **nbn** has been guided by the five key outcomes identified by the ACCC from these working groups, namely that:¹

- **nbn** has the opportunity to earn the minimum revenues it needs to meet its legitimate financing objectives, including to transition to a standalone investment-grade credit rating;
- **nbn** end-users are protected from price shocks and from prices that are higher than necessary in later years;
- the regulatory framework provides incentives for **nbn** to operate efficiently and promote use of the **nbn**[®] network;
- **nbn** access seekers have greater certainty over the costs that they will face when using the **nbn**[®] network; and
- there is a clear and robust quality of service framework so that access seekers and end-users know what to expect from **nbn** services, including a review mechanism so that service standards remain fit for purpose, (the **ACCC Outcomes**).

Ultimately the ACCC must be satisfied that the Variation meets the statutory criteria set out in section 152CBD(2) of the *Competition and Consumer Act 2010* (Cth) (**CCA**) before it can accept the Variation.

nbn submits that as well as being consistent with the ACCC Outcomes, the Variation satisfies the statutory criteria – and should therefore be accepted by the ACCC.

¹ ACCC, *NBN Co Special Access Undertaking: Summary of industry working group outcomes*, December 2021, p. 1: https://www.accc.gov.au/system/files/ACCC%20-%20Summary%20of%20industry%20working%20groups%20report_0.pdf.



At a high level, the key proposed changes in the Variation which are in addition to those in the March Variation, relate to six areas of **nbn**'s operations:

1. **Pricing.** The March Variation put forward far-reaching reforms to the prices of **nbn**'s core services. These included the introduction of AVC-only prices for wholesale services 100 Megabits per second (**Mbps**) and above, transitioning from discounted bundles of AVC and CVC to new offers with maximum regulated pricing, a shift to charging for any CVC overage on the basis of CVC capacity actually utilised rather than provisioned², and providing RSPs with automatic twice-yearly adjustments to CVC inclusions on TC-4 Bundle Offers to reflect changes in end-user demand.

The proposed changes to **nbn**'s pricing in the Variation further reduce the maximum prices that **nbn** may charge and increase price and cost certainty for RSPs. This will be achieved (among other things) as follows:

- a. **nbn** will transition TC-4 Bundle Offers to \$0 CVC pricing across all wholesale speed tiers (i.e., \$0 per Mbps CVC TC-4 Overage Charge) by no later than 1 July 2026. This will be enabled through a progressive rebalancing of CVC and AVC charges;
- b. relative to the prices proposed in the March Variation, **nbn** will reduce AVC-only charges on the Home Fast (100/20 Mbps), 100/40 Mbps, Home Superfast (250/25 Mbps) and Home Ultrafast (up to ~1000/50 Mbps) speed tiers upon implementation of the varied SAU;
- c. relative to the prices proposed in the March Variation, **nbn** will reduce effective charges through amended pricing or increased inclusions on TC-4 Bundle Offers for the 12, 25 and 50 Mbps speed tiers;
- d. **nbn** has reduced the ongoing charges for the ports typically used by smaller RSPs to interconnect to **nbn**'s network (network-to-network interface, **NNI**), which came into effect on 1 November 2022, and this change is reflected in the pricing included in this Variation; and
- e. additional price controls and price certainty commitments, including:
 - i. individual sub-caps for certain services (in addition to the new Weighted Average Price Control (**WAPC**) framework discussed below);
 - ii. introduction of pricing principles into the SAU to provide clarity over the matters to which **nbn** must have regard in setting new Prices;
 - iii. publication of a Statement of Pricing Intent for each Regulatory Cycle, which will provide guardrails that govern how **nbn** can change or set new prices within that Regulatory Cycle; and
 - iv. publication of an annually updated three-year pricing roadmap of which: year one is committed prices in the short term via an annual SAU Tariff List; year two commits to maintaining price relativities; and year three is indicative pricing.

These changes respond directly to concerns identified by RSPs about ongoing price certainty, as well as concerns about the variability and operational complexity associated with CVC charges on **nbn** TC-4 services. This pricing proposal enables more end-users to access the full capability of the network, and promotes competition by reducing barriers to entry and expansion for smaller RSPs on **nbn**'s network.

² Utilised charging applies to TC-4 CVC on fixed-line and Fixed Wireless networks only.



Further, these enhancements demonstrate **nbn**'s genuine commitment to addressing feedback from the ACCC and industry on the March Variation, including as set out in the ACCC Consultation Paper.³

nbn notes that some RSPs have proposed alternative pricing constructs, which **nbn** has considered. However, these proposals do not appropriately balance the various factors which make up the ACCC Outcomes (e.g., **nbn**'s ability to earn minimum revenues needed to meet its legitimate financing objectives).⁴ Accordingly, **nbn** considers that the pricing proposals set out in the Variation and summarised above better achieve the ACCC Outcomes while also addressing the key concerns raised by the ACCC and industry since the March Variation.

2. **A weighted average price control as the primary form of economic control.** **nbn** will introduce a WAPC or 'basket' price control applicable to all **nbn** services with limited exceptions (e.g., for 'Competitive Services'), with associated sub-caps. This will replace the individual price controls and the long-term revenue control framework in the current SAU.

The proposed WAPC will allow for a transition to 'cost reflective' prices over time with annual average price increases across all products (on a 'use it or lose it' basis) to be capped at CPI during an initial glidepath period (i.e., before **nbn** is expected to first achieve its Core Services Annual Building Block Revenue Requirement (**ABBRR**), currently expected to be between FY30-32). From the financial year after **nbn** is expected to first achieve its Forecast Core Services ABBRR, overall price increases will be capped at a percentage which allows **nbn**'s forecast annual revenue from WAPC services to equal the 'WAPC Revenue Requirement'. In turn, the WAPC Revenue Requirement is based on **nbn**'s Core Services ABBRR for each financial year, plus a portion of **nbn**'s Initial Cost Recovery Account (**ICRA**) determined by reference to a number of principles, including the long-term interests of end-users (**LTIE**). This will allow **nbn** the opportunity, but not the guarantee, to achieve a return on and of its Regulatory Asset Base (**RAB**) as well as recovery of the retained portion of its ICRA over the remaining SAU period.

The introduction of a WAPC will address RSP concerns about pricing certainty, transparency and demand risks in respect of **nbn** wholesale prices. A WAPC creates a stronger link between **nbn**'s efficient costs and its overall price levels. It also provides an appropriate level of flexibility for price-setting in the future and in response to changing economic conditions and infrastructure competition, while also ensuring that **nbn** faces strong incentives to maximise the take-up and use of the **nbn**[®] network. These were material concerns for the industry, which **nbn** believes it has now addressed by proposing to introduce a WAPC.

The proposed WAPC will be based on **nbn**'s prudent and efficiently incurred costs, and is expected to provide **nbn** with the opportunity to earn the revenues it requires over the term of the SAU to meet its investment and financing objectives. This will allow **nbn** to pay down debt so as to achieve and maintain a standalone investment grade credit rating, continue to invest in the network to lift the digital capability of Australia while remaining competitive in a dynamic market environment, and to operate on a commercial basis, which includes the ability to generate a reasonable return on equity.

3. **Service Standards.** The Variation will incorporate a set of benchmark service standards into the SAU (**Benchmark Service Standards**), and **nbn** will commit to include in its Standard Form of Access Agreement (**SFAA**) service standards that are no less favourable to RSPs than the Benchmark Service Standards. This will include service levels, performance objectives, rebates and corrective action.

³ ACCC, *Proposed variation to the NBN Co Special Access Undertaking*, Consultation paper, May 2022.

⁴ Department of Finance, *Commonwealth Government Business Enterprises – Governance and Oversight Guidelines*, January 2018, pp. 26-27: <https://www.finance.gov.au/sites/default/files/2019-10/commonwealth-gbe-governance-and-oversight-guidelines-rmg126.pdf>.



The Variation includes a mechanism whereby **nbn** proposes service standards and rebates for each Regulatory Cycle (i.e., three to five years) as part of each Replacement Module Application. The SAU gives the ACCC the power to set benchmark service standards and rebates as part of an ACCC Replacement Module Determination, which may be the same as or different to those proposed by **nbn** in its RMA.

The Benchmark Service Standards that **nbn** is proposing for the First Regulatory Cycle, commencing 1 July 2023 (i.e., the start of Module 4), will be based on the key **nbn**[®] Ethernet service levels and performance objectives under the current Wholesale Broadband Agreement (**WBA4**), which have recently been supplemented with a targeted set of improvements – specifically the lowering of the dropout threshold for faults, enhanced service levels for CVC and access component modifications, and improved service levels and performance objectives for completion advices.

Under the Variation, in addition to the ability to set new/alternative Benchmark Service Standards for each Regulatory Cycle, **nbn** also proposes that the ACCC may set additional or alternative service standards during a Regulatory Cycle where: (i) a change to **nbn**'s service standards is required for RSPs to comply with new retail service standards regulations, or (ii) the ACCC has identified a systemic issue with **nbn**'s existing service standards that results in a material adverse impact on RSPs and where changes to **nbn**'s service standards are required to address the issue (subject to cost pass-through arrangements).

The proposed approach to service standards under the Variation will provide RSPs and **nbn** with certainty regarding the applicable Benchmark Service Standards that apply for each Regulatory Cycle. Embedding these service levels and performance objectives in the SAU provides meaningful price/quality link that is subject to regular review, which directly addresses key concerns raised by the ACCC and industry.

Further, **nbn** notes that embedding Benchmark Service Standards in the SAU does not preclude **nbn** from agreeing to improved service standards over time with industry. This is appropriate given that **nbn** is continually investing in its network and making operational improvements. This flexibility to commercially agree improved service standards, along with the proposed powers for the ACCC to set additional or alternate service standards over time, should provide RSPs and end-users with confidence that the service level commitments set out in the SAU will continue to reflect industry and consumer expectations of performance on the **nbn**[®] network.

4. **ACCC roles and reserve powers.** The Variation will significantly expand ACCC powers under the SAU, including the power to reset **nbn**'s revenue and pricing regulation framework from 2032.

The significant expansion of the ACCC's role from 2032 should provide long-term confidence to RSPs and end-users that the price and non-price regulation to which **nbn** will be subject remains fit for purpose. The Variation achieves this by reducing the term of Module 2 of the SAU from 2040 to 2032 and introducing a new 'Module 3'. This Module 3 introduces a significant change to the regulatory framework governing access to the **nbn**[®] network by implementing a principles-based approach using the propose-respond model. This gives the ACCC a substantive role, and will allow it to address any concerns that may arise in the future about the outcomes the SAU arrangements deliver for RSPs and end-users. Given that a key purpose of the SAU is to provide **nbn** with long-term regulatory certainty, this is a key concession that **nbn** has made to address the concerns of stakeholders about the ongoing operation of the SAU for up to 17 years from the time the Variation is likely to be accepted.

Relative to the March variation, other new functions and powers for the ACCC under the Variation include:



- a. the power to undertake a review of the Weighted Average Cost of Capital (**WACC**) methodology every Regulatory Cycle;
- b. the power to set additional and alternate service standards in certain circumstances;
- c. the power to approve **nbn**'s Cost Allocation Manual and accounting separation protocols;
- d. new review powers in the event that **nbn**'s prices are inconsistent with its Statement of Pricing Intent or where specified TC-4 discount thresholds are met;
- e. a power to make a determination under the SAU as to whether **nbn** has complied with the WAPC, pricing sub-caps and TC-4 Relativity Restriction (in addition to the ACCC's existing powers to enforce the SAU); and
- f. additional powers to request (and be provided with) information that the ACCC considers reasonably necessary for the exercise of its powers and functions under the SAU, or to administer and assess **nbn**'s compliance with the SAU.

These proposed additional functions and powers mean that the ACCC will have greater ability to address issues that are unforeseen and to address any concerns that may arise in the future about the SAU arrangements delivering outcomes consistent with the LTIE. Importantly, in certain circumstances, including where **nbn**'s prices are inconsistent with its Statement of Pricing Intent, or where specified TC-4 discount thresholds are met, the ACCC will have the power to step in. These are significant changes to the SAU which provide the ACCC with much greater scope to intervene and effect changes to **nbn**'s price and non-price terms and the regulatory framework to which **nbn** is subject.

If the Government relinquishes control over **nbn** before the SAU expiry date (2040), the Variation contains a mechanism to bring forward the SAU expiry date (noting that the Government has stated⁵ that it will retain **nbn** in public ownership for the foreseeable future). This proposal responds directly to ACCC and industry feedback by facilitating the establishment of new regulatory arrangements in the event of a transfer of ownership from the Commonwealth.

The ACCC raised a concern about the potential operation of the Replacement Module Application (**RMA**) and Replacement Module Determination (**RMD**) processes in the SAU. To address this concern, the Variation puts forward a new mechanism that will see these processes operating under the terms specified in the SAU itself, in place of the current requirement for **nbn** to submit variations to the SAU to make Replacement Module Applications. Under this new process, before submitting an RMA to the ACCC in respect of a given Regulatory Cycle, the Variation requires **nbn** to consult with access seekers and consumer advocacy groups on the relevant expenditure which **nbn** proposes to undertake in that Regulatory Cycle.

5. **Recovery of unrecovered losses.** While the March Variation had already proposed a significant reduction in the quantum of past losses **nbn** would be able to recover, and specified a recovery profile that would constrain **nbn**'s revenues in a way the current SAU would not, the Variation further reduces the level of those past losses which **nbn** is able to recover. This is in line with the latest guidance from **nbn**'s Shareholder Ministers that **nbn** should reconsider its approach to the recovery of **nbn**'s historical losses, as captured in the concept of the ICRA, to facilitate a focus on a forward-looking regulatory model for the business.⁶

⁵ Minister for Finance and Minister for Communications, *Letter to nbn co from its Shareholder Ministers*, 27 July 2022.

⁶ Minister for Finance and Minister for Communications, *Letter to nbn co from its Shareholder Ministers*, 27 July 2022.



As a result, under the Variation, the SAU will:

- a. cap the total amount of the ICRA that **nbn** will be allowed to recover over the SAU period. This represents a significant reduction in the ICRA amount from approximately \$44 billion (as estimated at the end of the 2022-23 financial year) down to \$12.5 billion. Any future losses will no longer be added to the ICRA, and the ICRA will only be indexed to inflation over the period to 2040.
- b. The \$12.5 billion ICRA amount will be allocated as follows:
 - i. a Module 2 amount (\$1.1 billion) which may be recovered in the Module 2 period, subject to **nbn** achieving (or being expected to achieve) its Core Services ABBRR for the first time; and
 - ii. a Module 3 amount (\$11.4 billion) which may be recovered over the Module 3 period having regard to a number of principles, including that any RMA and RMD provide **nbn** the opportunity (but not the guarantee) to achieve and maintain a standalone investment-grade credit rating with a stable outlook, and that **nbn** has a reasonable opportunity to recover the full amount of the Module 3 ICRA.

By capping the total amount of ICRA that **nbn** has the opportunity to recover over the period to 2040, in accordance with principles set out in the SAU, the Variation will ensure that the recovery of the ICRA will be predictable, constrained, transparent and subject to ACCC oversight. Together with the post-2032 ACCC powers, this will address RSPs' calls for greater certainty regarding the extent and timing of **nbn**'s recovery of its historical losses and any corresponding uncertainty on future pricing, while providing **nbn** with a meaningful opportunity to achieve and maintain a standalone investment-grade credit rating with a stable outlook, consistent with Government policy and the Commonwealth's GBE Guidelines⁷. As with the current SAU, the Variation contains no *guarantee* that **nbn** will be able to recover this reduced ICRA amount, but only provides **nbn** with the *opportunity* to do so once it first achieves its Core Services ABBRR.

For clarity, this is a once-off adjustment to the ICRA. The proposed arrangements do not allow **nbn** or the ACCC the opportunity to seek any further adjustment of the capped ICRA at any time. The exception to this is that the Module 2 ICRA amount will be adjusted to \$0 on the 30 June 2032 and that the Module 3 ICRA amount will be adjusted to \$0 on the expiry of the SAU. These adjustments will be made so as to provide industry with additional comfort that the ICRA will not be recovered post-FY40.

6. **Prudency and efficiency of nbn's expenditure.** **nbn** also proposes to make a number of changes to the framework for assessing its prudent and efficient costs. In most cases, these proposed changes respond directly to ACCC concerns regarding the proposed framework for assessing the prudency and efficiency of **nbn**'s costs in the March Variation.

The most significant change is to the Expenditure Objective regarding meeting Regulatory Requirements, so that it does not include compliance with Government policy or other Government directions issued to **nbn**. As a result of this change, **nbn** will only be allowed to recover its prudent and efficient costs of complying with Government policy if doing so meets one of the other Expenditure Objectives (e.g., meeting demand, maintaining service quality) or if the Government has issued a formal notice to **nbn** in respect of a particular project. This change will promote greater transparency regarding the costs of Government policy and the extent to which Government policy impacts consumer prices.

⁷ Department of Finance, *Commonwealth Government Business Enterprises – Governance and Oversight Guidelines (Resource Management Guide No. 126)*, January 2018: <https://www.finance.gov.au/sites/default/files/2019-12/commonwealth-gbe-governance-and-oversight-guidelines-rmg126.pdf>.



While the Government has stated that it will retain **nbn** in public ownership for the foreseeable future, **nbn**'s mandate to operate on a standalone commercial basis as a GBE has not changed. It remains imperative that the commitments **nbn** makes in the SAU (and the WBA) continue to support a commercially sustainable **nbn**, and provide **nbn** with the opportunity to continue to efficiently invest in the network, consistent with Government policy and the expectations of RSPs and end-users, and to achieve and maintain a standalone investment-grade credit rating as per the GBE Guidelines.⁸

nbn considers its planned increased deployment of fibre to be an efficient investment in its network in line with Government policy. Continued transition to digital downloads and increased dependence on home broadband, including for work, education and leisure activities, will continue to drive household demand for higher upload and download speeds, as well as increased bandwidth. Strategically upgrading to fibre is the best way to efficiently ensure that the **nbn**[®] network is able to satisfy future demand for higher speeds and increased bandwidth, while reducing operating costs, enabling **nbn** to offer an improved service over time and ensuring that **nbn** is well-placed to vigorously compete with current and emerging alternative broadband technologies. This will benefit both RSPs and end-users in the long term. The Commonwealth recently demonstrated its support of increased fibre in the **nbn**[®] network by announcing \$2.4 billion of investment to upgrade the network that will provide an additional 1.5 million premises the opportunity to access broadband delivered over FTTP technology.⁹

nbn considers that the changes it is now proposing in the Variation, which are in addition to the significant changes that were proposed in the March Variation, substantially address RSPs' concerns – as well as satisfying the ACCC Outcomes and the statutory criteria set out in section 152CBD(2) of the CCA. These changes do not come without cost. The pricing changes that **nbn** proposes to include in the Variation materially reduce **nbn**'s revenues in the short-term, materially reduce **nbn**'s ability to recover its costs by monetising the increased usage of the network that will inevitably take place over coming decades and significantly reduce the current level of regulatory certainty delivered to **nbn** by the SAU. That said, these adverse impacts for **nbn** are balanced by the considerable benefits that the Variation offers to RSPs and consumers, in particular greater price certainty, the establishment of Benchmark Service Standards, greater transparency and operational reporting, as well as increased roles and powers for the ACCC over the duration of the SAU.

Finally, **nbn** notes that its proposed commitments are put forward as a single comprehensive Variation proposal. The Variation represents an integrated package of proposals, which **nbn** considers meets the relevant statutory criteria by which such an SAU variation must be assessed, including (as relevant) that the terms of an SAU variation be reasonable and promote the long-term interests of end-users. Ultimately, the Variation submitted by **nbn** must balance the needs and concerns of all parties and enable **nbn** to remain a sustainable commercial enterprise that can continue to efficiently implement Government policy. **nbn** submits that the Variation should be accepted by the ACCC.

⁸ Department of Finance, *Commonwealth Government Business Enterprises – Governance and Oversight Guidelines (Resource Management Guide No. 126)*, January 2018: <https://www.finance.gov.au/sites/default/files/2019-12/commonwealth-gbe-governance-and-oversight-guidelines-rmg126.pdf>.

⁹ **nbn**, *NBN Co welcomes 2.4 billion Government investment to enable 1.5 million more homes and businesses to upgrade to full fibre nbn*, 20 October 2022: <https://www.nbnco.com.au/corporate-information/media-centre/media-statements/nbn-co-welcomes-24billion-government-investment-to-enable-15million-more-homes-and-businesses-to-upgrade-to-full-fibre-nbn>.



1 Introduction

1.1 nbn's Variation

The development of **nbn's** Variation has benefited from numerous rounds of stakeholder consultation, led by both **nbn** and the ACCC (see Figure A1). **nbn** has considered issues raised by stakeholders as part of those consultations, as part of a holistic review of the SAU, and the Variation responds to this feedback.

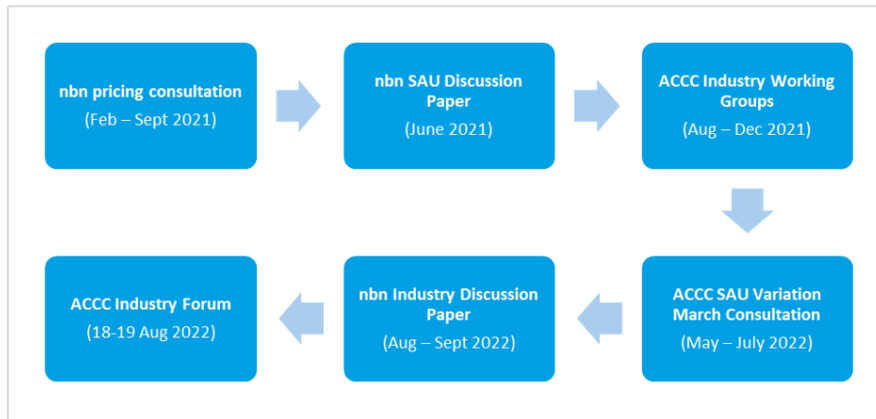


Figure A1. Industry engagement¹⁰

Some of the key commitments **nbn** is proposing in the Variation in response to industry feedback include providing substantially greater pricing and cost certainty for RSPs, incorporating Benchmark Service Standards into the SAU, and providing the ACCC with a number of additional functions and powers, including in relation to key aspects of how **nbn** may be regulated in the future.

The Variation implements a standard utility-style regulatory framework that is appropriately adapted to the circumstances that **nbn** faces, including that:

- **nbn** faces competition from a range of different providers and technologies;
- telecommunications is a highly dynamic industry which makes it much more challenging to predict demand than is the case for monopoly providers meeting a basic physical need such as water;
- **nbn** is a GBE that is a vehicle for the fulfilment of Government policy objectives and it has specific obligations arising from its GBE status; and
- **nbn** has not yet had a reasonable opportunity to recover its significant initial investments that were prudently incurred subject to the terms of the current SAU (accepted in December 2013).

¹⁰ **nbn**, RMID1027 Pricing Review 2021 Consultation Paper 1, February 2021: <https://www.nbnco.com.au/content/dam/nbn/documents/media-centre/media-statements/2021/nbnco-pricing-review-2021-consultation-paper-1.pdf>; **nbn**, RMID1027 Pricing Review 2021 Consultation Paper 2, April 2021: <https://www.nbnco.com.au/content/dam/nbn/documents/media-centre/media-statements/2021/nbnco-pricing-review-2021-consultation-paper-2.pdf>; **nbn**, RMID1027 Pricing Review 2021 Consultation Closure Paper, September 2021: <https://www.nbnco.com.au/content/dam/nbn/documents/media-centre/media-statements/2021/nbnco-pricing-review-2021-consultation-paper-3.pdf>; **nbn**, RMID1064 - nbn Special Access Undertaking Variation 2021 – Discussion Paper, June 2021: <https://www.nbnco.com.au/content/dam/nbn/documents/media-centre/media-statements/2021/nbnco-spcial-access-undertaking-variation-2021-discussion-paper.pdf>; ACCC, Review of NBN regulatory framework: Working group meetings, August-December 2021: <https://www.accc.gov.au/regulated-infrastructure/telecommunications-and-internet/national-broadband-network-nbn-access-regulation/review-of-nbn-regulatory-framework/working-group-meetings>; ACCC, NBN Co SAU variation 2022, May-July 2022: <https://www.accc.gov.au/regulated-infrastructure/telecommunications-and-internet/national-broadband-network-nbn-access-regulation/nbn-co-sau-variation-2022/consultation-paper>; **nbn**, SAU Variation: Proposed changes Discussion Paper on proposed changes to nbn SAU Variation, August 2022: <https://www.nbnco.com.au/content/dam/nbn/documents/media-centre/media-statements/2022/sau-variation-discussion-paper-august-2022.pdf>; and ACCC, ACCC Industry Forum on NBN Co's Special Access Undertaking: Industry Forum Summary, 9 September 2022: <https://www.accc.gov.au/system/files/Public%20summary%20of%20ACCC%20Industry%20Forum%20-%209%20September%202022.pdf>.

1.2 Structure of this Submission

This Submission describes the proposed material changes to the SAU and explains why this comprehensive package of regulatory obligations and constraints meets the relevant statutory criteria by which such an SAU variation must be assessed. The Submission also describes the specific commitments proposed in respect of the First Regulatory Cycle (FY24 to FY26).

Detailed information can be found in the following chapters:

 Executive summary and key narratives	Introduction	Part A chapter 1
	Summary of how the Variation addresses ACCC and industry feedback	Part A chapter 2
	State of competition	Part A chapter 3
	Demand for higher speeds will continue to grow	Part A chapter 4
	The rationale for investing in fibre	Part A chapter 5
	The Variation supports economically efficient outcomes	Part A chapter 6
 Pricing and price controls	Pricing structure and levels	Part B chapter 7
	Weighted Average Price Control and other pricing commitments	Part B chapter 8
 Non-price terms	Incorporation of MTM technologies	Part C chapter 9
	Service quality commitments	Part C chapter 10
	Service level reporting and transparency	Part C chapter 11
	Carry over Module 1 commitments and Accounting Separation	Part C chapter 12
 ACCC roles and powers	Replacement Module provisions	Part D chapter 13
	nbn proposes an expanded role for the ACCC	Part D chapter 14
	Price review mechanism	Part D chapter 15
 Key inputs to nbn's Regulated Revenue Requirement	Recovery of initial costs	Part E chapter 16
	Regulatory Asset Base and nbn's cost allocation approach	Part E chapter 17
	WACC	Part E chapter 18
 Efficiency of nbn's Expenditure and Demand Forecasts	Cost pass-through mechanism	Part F chapter 19
	Expenditure assessment framework	Part F chapter 20
	Specific commitments in respect of the First Regulatory Cycle	Part F chapter 21
	Expenditure forecasts	Part F Appendix A
	Demand forecasts	Part F Appendix B
 Statutory assessment	The Variation satisfies the Statutory Criteria	Part G chapter 22
	Statutory role of the ACCC	Part G chapter 23
 Guide to the SAU and other background materials	Overview of the SAU	Part H chapter 24
	nbn's mandate and regulatory framework	Part H chapter 25
	Statement of Expectations	Part H chapter 26



2 Summary of how the Variation addresses ACCC and industry feedback

nbn submits that the Variation addresses:

- the feedback received from the ACCC and industry in response to the March Variation, and incorporates amendments reflecting recent changes in the policy landscape. As a result, the Variation includes many further changes over and above the significant changes already proposed in the March Variation; and
- each of the ACCC Outcomes (see Box 1) that emerged over the course of the ACCC-convened working groups in the latter half of 2021.

Box 1: ACCC Outcomes

In the latter half of 2021, the ACCC held a series of industry workshops to discuss different aspects of nbn's regulatory framework that should be developed in any revised SAU.

The objectives of the working groups included:

- to identify unresolved issues and possible solutions that nbn should consider in developing its updated SAU variation;
- to ensure a collaborative approach to developing measures to address the issues raised; and
- to expedite the process for developing an SAU proposal capable of being accepted by the ACCC.

ACCC Commissioners chaired the working groups, which were attended by representatives of nbn, RSPs, and industry, consumer, and government bodies. In total, 17 workshops were held to discuss current and emerging issues, and to consider specific options to address those issues in a way that would promote the LTIE under a new regulatory framework to be established by an SAU variation.

At the conclusion of the workshops, the ACCC published a report summarising the matters discussed in the working groups and the positions that were reached.¹¹ In this, the ACCC signalled its view that nbn should move to a similar regulatory framework to that used for established utility businesses now that it has completed its rollout and is fully operational, on the basis that such a regulatory framework would assist in maximising the economic and social benefits of the significant public investment in the nbn.

The ACCC identified five key outcomes that emerged over the course of the working groups which it considered would help guide the development of such a framework. These outcomes were that:

1. nbn has the opportunity to earn the minimum revenues it needs to meet its legitimate financing objectives, including to transition to a stand-alone investment grade credit rating.
2. nbn end-users are protected from price shocks and from prices that are higher than necessary in later years.
3. The regulatory framework provides incentives for nbn to operate efficiently and promote use of the nbn[®] network.
4. nbn access seekers have greater certainty over the costs that they will face when using the nbn.
5. There is a clear and robust quality of service framework so access seekers and end-users know what to expect from nbn services, including a review mechanism so that service standards remain fit for purpose.

¹¹ ACCC, *NBN Co Special Access Undertaking: Summary of industry working group outcomes*, December 2021: https://www.accc.gov.au/system/files/ACCC%20-%20Summary%20of%20Industry%20working%20groups%20report_0.pdf.



2.1 The Variation responds to ACCC and industry feedback

Table A1 summarises **nbn**'s proposed material changes relative to the current SAU and how they respond to both ACCC and industry feedback as provided through the various consultations and industry forums. **nbn** considers this package of changes to the SAU appropriately balances the interests and priorities of RSPs, end-users and **nbn**.

Table A1. Variation overview and response to industry and ACCC feedback

Proposed material change	Description	How does the proposed change respond to industry and ACCC feedback?
Introduction of a WAPC (Chapter 8)	<p>nbn will introduce a WAPC or 'basket' price control applicable to all nbn services with limited exceptions (e.g., 'Competitive Services') with associated sub-caps. To allow a transition to 'cost-reflective' prices, the prices in the weighted basket may increase each year (on a 'use-it-or-lose-it' basis) at:</p> <ul style="list-style-type: none"> • CPI – during an initial glidepath period (i.e., before nbn is expected to first achieve its Core Services Annual Building Block Revenue Requirement (ABBRR)); and thereafter • at a percentage which allows forecast annual revenue from WAPC services to equal a 'WAPC Revenue Requirement', based on nbn's Core Services ABBRR plus a portion of the ICRA. 	<p>The change to a WAPC as the major regulatory control rather than a revenue cap with individual price controls, as per the current SAU (and proposed in the March Variation), was made in response to ACCC and industry concerns that the March Variation proposal did not create a sufficiently strong link between nbn's overall pricing yield and its BBM costs and that a WAPC would better achieve this link.</p> <p>nbn's CPI+3% price control proposal in the March Variation received negative feedback. The revised proposal seeks to balance RSP and consumer ability to absorb price changes and nbn's objective to reach cost reflective prices.</p>
New pricing constructs (Chapter 7)	<p>nbn is proposing the following changes to its existing pricing construct:</p> <ul style="list-style-type: none"> • introducing an AVC-only pricing construct for TC-4 services supplied with a bandwidth profile of Home Fast (100/20 Mbps) or higher in direct response to industry feedback; • transitioning the remaining 12, 25, and 50 Mbps, and FW Plus TC-4 Bundled Offers to AVC only pricing (i.e., \$0 per Mbps CVC TC-4 Overage Charge) by no later than 1 July 2026. This will be enabled through a progressive rebalancing of CVC and AVC charges; • reflecting current TC-4 bundle discounts in the SAU as NBN Offers, and defined rules for twice-yearly adjustments to CVC inclusions to reflect actual changes in end-user download utilisation over time; 	<p>nbn has sought to address industry feedback in a way that balances RSPs' interests with nbn's financial sustainability, particular the ability to generate the required cashflow to sustainably operate and invest in nbn's network.</p> <p>nbn's proposal responds to industry feedback as follows:</p> <ul style="list-style-type: none"> • key feedback from most RSPs received during the March Variation consultation indicated that there was a strong preference from industry to move to an AVC-only pricing construct on all TC-4 speed tiers as soon as possible – in response, nbn has proposed a glidepath to AVC-only on all TC-4 speed tiers by no later than 1 July 2026. This avoids the potential for price shock (for both end-users and RSPs) and enables RSPs to prepare for the transition to the new construct. • several RSPs suggested that prices for premium nbn offers, such as 100 Mbps, are too high for consumers, and that lower



Proposed material change	Description	How does the proposed change respond to industry and ACCC feedback?
	<ul style="list-style-type: none"> elevating the 25 Mbps bandwidth profile as nbn's entry level broadband service across all fixed-line and fixed wireless services by significantly reducing the fixed access charge for this bandwidth profile; significant reductions to AVC-only charges on the Home Fast (100/20 Mbps), 100/40 Mbps, Home Superfast (250/25 Mbps) and Home Ultrafast (up to ~1000/50 Mbps) speed tiers relative to the March Variation, and flatter price gradient between premium speed tiers to facilitate upgrades; in recognition of the diverse needs of end-users across Australia, significantly reducing the effective price of basic voice-only connectivity services on fixed-line technologies (supplied using the 12 Mbps speed tier) to make these services more accessible and affordable; and transforming the CVC billing model from billing 'provisioned' CVC to 'utilised' CVC across TC-4 Bundled Offers, with the effect that RSPs will no longer need to actively forecast and manage CVC provisioning and will only be charged for CVC that is actually utilised, without idle provisioned headroom. 	<p>wholesale prices for higher speed tiers will likely facilitate greater take-up of these services, improving efficient use of nbn's network.</p> <ul style="list-style-type: none"> a number of RSPs provided feedback that wholesale price differences of \$5 or less would facilitate a better upgrade path for higher speed tiers. nbn's proposal addresses this by flattening the price gradient on higher speed tiers; the ACCC and industry have raised concerns that there is a 'gap' in nbn's offering for consumers who only require a basic connectivity service, and that the entry-level offer should be at a higher speed tier to meet growing consumer expectations. nbn's proposed pricing significantly reduces the average price for its 12 Mbps and 25 Mbps speed tiers, designed to offer a choice to consumers between basic connectivity (voice-only 12/1) and entry level broadband (25/5, 25/10) offers. Some RSPs highlighted concerns with the proposed price increase on nbn's 50 Mbps offer. These concerns do not appropriately consider that the change to the 50 Mbps offer is part of a broader price rebalancing across nbn's services, in which the prices for all other major speed tiers have been reduced. This overall price re-balance seeks to encourage take-up of the network by making entry level services more affordable and will also encourage greater take-up of higher speed services which will improve the efficient use of the network. <p>Overall, the proposed pricing is designed to promote greater take-up and efficient use of nbn's network through improved price and cost certainty, and simplification, for RSPs.</p>
<p>SAU Tariff List, Pricing Roadmap, Pricing Principles, and</p>	<p>The Variation commits that on 1 May each year, nbn will publish:</p> <ul style="list-style-type: none"> an annual SAU Tariff List which complies with the WAPC framework and relevant side-constraints and sub-caps, and is consistent with the Statement of Pricing Intent; and 	<p>nbn received feedback from both the ACCC and industry that the March Variation did not go far enough in providing price and cost certainty for RSPs and end-users. The package of pricing certainty commitments nbn is proposing in the Variation addresses this feedback by providing</p>



Proposed material change	Description	How does the proposed change respond to industry and ACCC feedback?
Statement of Pricing Intent (Chapter 8)	<ul style="list-style-type: none"> a three-year Pricing Roadmap – where the first year’s prices are those in the Tariff List, the second year’s prices are indicative but have binding price relativity commitments, and the third year’s prices are indicative but consistent with the Statement of Pricing Intent. <p>nbn will not be permitted to set prices higher than those in the Tariff List for that financial year. The Variation includes a set of Pricing Principles that nbn must have regard to when setting prices in the SAU Tariff List and Pricing Roadmap. nbn must also publish a Statement of Pricing Intent at the beginning of each Regulatory Cycle which sets out matters such as pricing strategies it intends to adopt in that Regulatory Cycle. The ACCC will be conferred additional powers to intervene if nbn’s prices are inconsistent with the Statement of Pricing Intent.</p>	RSPs with substantially greater transparency and certainty over future prices and costs associated with nbn ’s services.
Discounting rules (Chapter 8)	<p>To address concerns about nbn’s discounting practices under the SAU, nbn is proposing three significant changes to how discounting is treated under the Variation:</p> <ul style="list-style-type: none"> Additional powers conferred to the ACCC if nbn’s discounting practices involve the use of discounts as a default pricing structure If nbn does offer long-term broad-based TC-4 discounting, nbn must reduce Prices to the extent that nbn’s TC-4 revenue in a financial year is more than 5% less than the undiscounted TC-4 revenue nbn would have earned had it charged list prices. The SAU continues to limit nbn’s ability to withdraw a discount by providing that nbn can only do so in accordance with the terms for reduction or removal of that discount specified at the time of introduction, but expands the commitments in the current SAU to include minimum notice periods for any withdrawal of or reduction in discounts. 	These changes respond directly to RSP and ACCC feedback that nbn ’s current discounting practices create pricing uncertainty for RSPs and end-users. In addition to providing greater certainty, the discounting rules mean that the Prices in the SAU Tariff List will track the effective market prices for nbn ’s services over time, addressing a key concern associated with nbn ’s use of broad-based discounts.
Cost allocation between Core Regulated Services vs Competitive Services	The Variation includes enhancements to transparency and regulatory oversight by providing for an allocation of costs between ‘Core Regulated Services’ and ‘Competitive Services’ in accordance with the Cost Allocation Principles specified in the SAU, where nbn ’s Core Regulated Services will be	Some RSPs have raised concerns that nbn is cross-subsidising the costs of supplying its business-grade services from revenues earned from the supply of residential grade services. The commitments nbn is proposing will provide comfort and transparency to the ACCC and



Proposed material change	Description	How does the proposed change respond to industry and ACCC feedback?
(Chapter 17)	<p>subject to the WAPC and the Competitive Services will be excluded from the WAPC.</p> <p>The ‘Competitive Services’ are the three nbn services that are subject to the most competition i.e., Enterprise Ethernet, Business Satellite Service and Satellite Mobility for Large Commercial Passenger Aircraft.</p>	<p>industry that nbn is not cross-subsidising the costs of supplying its services in competitive business markets from revenues earned from the supply of residential grade services.</p> <p>Working in tandem with the proposed WAPC, the allocation of costs between Core Regulated and Competitive Services will also ensure that the prices for nbn’s Core Regulated Services reflect the cost of providing those services and will promote the efficient use of the network used to supply those services.</p>
<p>Adjustment of ICRA balance and recovery</p> <p>(Chapter 16)</p>	<p>nbn will cap the total amount of the ICRA that it will be allowed to recover over the SAU period to \$12.5 billion. This amount represents the past losses that nbn should have the opportunity to recover over the duration of the SAU in order to achieve and maintain a standalone investment grade credit rating with a stable outlook, consistent with the GBE Guidelines which provide for nbn to target an optimal capital structure (specifically a standalone target credit rating of BBB)¹² plus generate a return on equity (being the risk-free rate plus a risk premium appropriate to the GBE)¹³. Specifically, nbn will split the capped ICRA amount into two separate amounts – a Module 2 ICRA and a Module 3 ICRA – both of which will account for inflation when setting the annual drawdown amounts. Any additional losses after FY23 will be forfeited.</p> <p>This is a once off adjustment to the ICRA and there is no mechanism by which nbn or the ACCC can seek to further adjust the ICRA other than for inflation - the one exception being that on 30 June 2032 nbn will adjust the Module 2 ICRA to \$0 and on 30 June 2040 nbn will adjust the Module 3 ICRA amount to \$0.</p> <p>An amount of ICRA will not be included in the WAPC Revenue Requirement until the year after nbn is expected to first achieve its Core Services ABBRR.</p>	<p>This proposal responds directly to ACCC and industry concerns that the magnitude and role of the ICRA creates uncertainty regarding future pricing; and to the ACCC proposal that nbn should not be able to recover past losses other than to the extent necessary to enable nbn to achieve and maintain a stable investment-grade credit rating with a stable outlook.</p> <p>This approach also reflects the latest guidance from nbn’s Shareholder Ministers that nbn should reconsider its approach to the recovery of nbn’s historical losses, as captured in the concept of the ICRA.</p>

¹² Department of Finance, [Commonwealth Government Business Enterprises – Governance and Oversight Guidelines](#), January 2018, p. 26

¹³ Department of Finance, [Commonwealth Government Business Enterprises – Governance and Oversight Guidelines](#), January 2018, p. 28



Proposed material change	Description	How does the proposed change respond to industry and ACCC feedback?
<p>Expenditure Assessment Framework (Chapter 20)</p>	<p>nbn proposes enhancing the existing expenditure assessment framework in the SAU by including an ex-post capex review role for the ACCC (together with a cost pass-through mechanism). The ex-post expenditure process would provide the ACCC with a role to review the prudence and efficiency of actual capital expenditure.</p> <p>nbn has also proposed a set of Expenditure Objectives and Factors in the Variation to provide greater certainty and transparency about how its forecast and actual expenditure will be assessed for prudence and efficiency.</p>	<p>Throughout the consultation process, RSPs and the ACCC have emphasised the importance of the SAU providing nbn with incentives to invest in the network efficiently and ensuring that nbn is provided the opportunity to recover no more than its efficient and prudent incurred costs.</p> <p>The enhancements nbn is proposing to the expenditure assessment framework address these concerns by providing the ACCC with a greater role in approving nbn's expenditure and by providing greater clarity and transparency about how nbn's expenditure will be assessed for prudence and efficiency.</p> <p>Following feedback from industry and the ACCC on the March Variation that the existing framework required more clarity and specificity, nbn made additional changes to the proposed framework to directly address these concerns, including by clarifying that nbn will only be able to recover its prudent and efficient costs of complying with Government policy if doing so meets one of the other Expenditure Objectives.</p>
<p>Service standards and ACCC review powers (Chapters 10, 11 and 14)</p>	<p>nbn proposes to include in the SAU a mechanism whereby:</p> <ul style="list-style-type: none"> nbn proposes service standards and rebates for each regulatory cycle (i.e., three to five years) as part of its Replacement Module Application; and nbn is required to offer in its SFAA service standards that are no less favourable to RSPs than the regulated benchmark included in the SAU. <p>The First Regulatory Cycle (FY24-FY26) will largely reflect the key WBA4 service levels, rebates, performance objectives and other corrective action requirements. However, nbn has proposed additional commitments above the WBA4 levels:</p> <ul style="list-style-type: none"> In response to RSP concerns with the performance of copper services, nbn will lower the dropout threshold for faults from greater than nine to greater than seven in 24 hours. Enhancements have been made to service levels and associated performance objectives 	<p>Throughout the industry working groups and subsequent engagement, RSPs, consumer advocacy groups and the ACCC have maintained the importance of including Benchmark Service Standards in the SAU – establishing a price-quality link in the SAU.</p> <p>In addition, there has been a strong view from RSPs and the ACCC that nbn should offer additional commitments above the existing WBA4 service levels, to reflect effective increases in access pricing.</p> <p>nbn's updated proposal addresses these concerns, embedding key service levels within the SAU as well as associated performance objectives that will provide industry with enhanced certainty regarding the minimum service performance that will be maintained on the nbn[®] network.</p> <p>Furthermore, nbn's commitment to confer on the ACCC additional powers with respect to Benchmark Service Standards not only during the Replacement Module Application process, but also during a Regulatory Cycle, addresses</p>



Proposed material change	Description	How does the proposed change respond to industry and ACCC feedback?
	<p>for service modifications and completion advices.</p> <p>nbn has also amended the utilisation management commitment proposed in the March Variation from 95% to 90% in the revised Variation.</p> <p>The ACCC will have four key powers with respect to Benchmark Service Standards:</p> <ul style="list-style-type: none"> • The ability to accept or set alternative Benchmark Service Standards via an ACCC Replacement Module Determination at the Commencement of a Regulatory Cycle • The ability to accept amendments or determine required amendments mid-cycle where a change to nbn's service standards is required for RSPs to comply with new retail service standards regulations, • The ability to accept amendments or determine required amendments mid-cycle where the ACCC has identified a systemic issue that results in a material adverse impact on RSP access to services covered by the benchmarks • The ability to accept or reject changes to Benchmark Service Standards proposed by nbn. 	<p>feedback from RSPs and the ACCC that service standards need to be able to evolve should an emerging or unforeseen issue arise during a Regulatory Cycle. The Variation also allows for nbn to propose improvements during a Regulatory Cycle, subject to consultation with RSPs.</p>
<p>ACCC functions and powers post-2032</p> <p>(Chapters 13 and 14)</p>	<p>nbn proposes that from 2032, the ACCC will have the power to reset nbn's revenue and pricing regulation framework under the SAU through the Replacement Module process, subject to:</p> <ul style="list-style-type: none"> • the SAU retaining the existing propose-respond framework of regulation; and • the terms of, and matters set out in any RMA or RMD for a Regulatory Cycle within the Post-2032 Regulatory Period must allow nbn a reasonable opportunity to earn Revenues in that Regulatory Cycle equal to the sum of the Annual Regulated Revenue Allowance for each Financial Year in that Regulatory Cycle, in terms of net present value. The Annual Regulated Revenue Allowance for a Financial Year within a Regulatory Cycle must be set to allow nbn a reasonable opportunity to achieve and maintain, for the duration of that 	<p>This ability to reset the revenue and pricing regulation framework before the expiration of the SAU is a significant departure from the current SAU and responds directly to ACCC concerns of being constrained if either industry or nbn's operations evolve in a way that is unforeseen.</p> <p>This was a key point of discussion in the ACCC Industry Forum held in August 2022, with both the ACCC and RSPs seeking additional certainty that the regulatory framework would continue to be effective should the industry or nbn's operations change over the course of the SAU period.</p> <p>The introduction of a new overarching right for the ACCC to revisit the revenue and pricing regulation framework is intended to address this concern, providing the ACCC with an ability to revisit fundamental rights and commitments</p>



Proposed material change	Description	How does the proposed change respond to industry and ACCC feedback?
	<p>Regulatory Cycle, a stand-alone investment grade credit rating with a stable outlook.</p> <p>When making an RMD for a Regulatory Cycle within the Post-2032 Regulatory Period, the ACCC must take into account the matters set out in section 152BCA(1) of the CCA as well as any other matters the ACCC thinks are relevant.</p>	<p>under the SAU in 2032 while ensuring that nbn and industry are provided with appropriate certainty regarding the regulation that will apply until that time.</p> <ul style="list-style-type: none"> • The SAU provides that when making an RMD, the ACCC must take into account the same criteria as when making an access determination, including the long-term interests of end-users, and may take into account any other factors it thinks are relevant. In that context, the ACCC may have regard to various factors when setting the annual portion of ICRA to be included in nbn's annual regulated revenue allowance as part of making an RMD, such as: avoiding price shocks for consumers; • avoiding adverse impacts on competition for the provision of broadband services supplied using nbn's core regulated services; and • avoiding adverse impacts on the efficient use of, and investment in the nbn[®] network.
<p>Product terms and inclusion of 'multi-technology mix' (MTM) technologies</p> <p>(Chapter 9)</p>	<p>nbn proposes to expand the scope of nbn's product-related commitments, including the product development and withdrawal commitments to services delivered over nbn's MTM technologies, being the nbn[®] Ethernet FTTN, FTTB, FTTC and HFC services. nbn has updated the description of these services and their terms in the Variation to reflect the recently commercially negotiated outcomes for the current WBA4, which also reflects the outcomes of the ACCC's three-year inquiry into nbn's Wholesale Service Standards and the ACCC's Pricing Inquiry.</p>	<p>These proposed changes to the SAU provide greater regulatory certainty for both nbn and access seekers.</p>
<p>Change of control clause</p> <p>(Chapter 14)</p>	<p>The SAU expiry date will be brought forward from 2040 if the Government relinquishes control over nbn before that time.</p>	<p>This proposed change to the SAU directly addresses the concern expressed by the ACCC that the SAU may not be the appropriate vehicle for regulation of nbn post-privatisation.</p>



2.2 The Variation achieves the ACCC Outcomes for a revised SAU

Over the course of the ACCC-convened industry working groups in the latter half of 2021, there emerged five key outcomes identified by the ACCC that would help guide the development of a suitable regulatory framework. These outcomes were recognised as those that would be most important for a revised SAU to achieve a meaningful contribution to the LTIE.¹⁴ **nbn** has had close regard to these outcomes during the course of preparing its Variation, and submits that the Variation addresses each of these five key outcomes, as discussed below.

- a. **nbn's revenue requirement:** **nbn** has the opportunity to earn the minimum revenues it needs to meet its legitimate financing objectives, including to transition to a stand-alone investment-grade credit rating.

The purpose of this objective is for **nbn** to reach a point where it can earn its annual revenue requirement, including an appropriate ICRA amount, so that it is able to finance new investments, operate the network efficiently, and provide a suitable return to shareholders. Prices set to reflect this revenue requirement will promote efficient use of the network and maximise the social and economic benefits of the **nbn**. However, as noted by the ACCC, if the SAU provides the opportunity for **nbn** to earn revenues significantly higher than this amount, this may lead to less efficient use of the **nbn** and less incentive for **nbn** to operate efficiently. The ACCC has stated that, for this reason, significant reforms to the ICRA arrangements are required as the arrangements in the current SAU would allow for **nbn** to earn annual revenues above what is required over the course of the SAU.

The following changes in the Variation address this outcome:

- Capping the value of the ICRA at \$12.5 billion in Financial Year 2022/23 dollar terms (meaning that **nbn** will only have the opportunity to recover approximately 28 per cent of the estimated \$44 billion of ICRA accumulated to the end of FY23). This amount will be adjusted in future years for inflation, and will be allocated to:
 - i. a Module 2 amount (\$1.1 billion) which may be recovered in the Module 2 period (to the end of FY32), subject to **nbn** achieving (or being expected to achieve) its Core Services ABBRR for the first time; and
 - ii. a Module 3 amount (\$11.4 billion) which may be recovered over the Module 3 period having regard to a number of principles, including that any RMA or RMD provide **nbn** the opportunity (but not the guarantee) to achieve and maintain a standalone investment-grade credit rating with stable outlook and that **nbn** has the opportunity to recover the full amount of the Module 3 ICRA.
- Further to consultation with the ACCC, **nbn** has agreed to the introduction of a WAPC applicable to all **nbn** services with limited exceptions, with associated sub-caps.
- The WAPC should allow **nbn** to meet its minimum revenue requirements to meet its legitimate financing objectives in the medium term. In the initial glidepath period, the CPI control on the WAPC provides **nbn** the opportunity to transition towards cost reflective pricing. Afterwards, and until end of FY32, the WAPC is linked directly to **nbn**'s efficient costs as well as the potential for a Nominal Annual Drawdown of ICRA amount.
- Conferral of a power on the ACCC to reset the WACC methodology each Regulatory Cycle.

¹⁴ ACCC, *NBN Co Special Access Undertaking, Summary of industry working group outcomes*, December 2021.



- b. **Pricing:** nbn end-users are protected from price shocks and from prices that are inefficiently high in later years.

This objective refers to the need to have a suitable regulatory framework that protects end-users from price shocks in later years. While nbn's updated pricing proposal is a key mitigant for protecting both RSPs and end-users from price shocks, this is considered in detail in the fourth ACCC Outcome which relates to RSP cost certainty. This particular outcome specifically relates to nbn's cost recovery in later years, and the ACCC considered this would be met by having an appropriate depreciation profile to be adopted in the BBM, as well as new provisions relating to how the ICRA is recovered in prices, with minimal deferral of cost recovery to avoid significant price increases in the future.

The following changes in the Variation address this outcome:

- The risk of future potential price shocks will be significantly reduced as a consequence of:
 - i. the material reduction in the amount of ICRA that nbn will have the opportunity to recover over the SAU term; and
 - ii. ACCC discretion and oversight of the profile of nbn's recovery of the ICRA.
- Introduction of a WAPC applicable to all nbn services with limited exceptions, with associated sub-caps, means that nbn is constrained in its ability to increase prices.
- Establishing a multilateral working group to identify possible targeted initiatives to improve access to nbn's network for low-income, vulnerable and unconnected users (a "low-income forum").

- c. **Incentives on nbn to operate efficiently:** The regulatory framework provides incentives for nbn to operate efficiently and promote use of the nbn[®] network.

The ACCC has stated that a suitable regulatory framework would be one where nbn is strongly incentivised to operate efficiently, including price controls that provide incentives for nbn to promote take up of nbn services and tailor products to meet end-user demand, as well as a framework for ACCC scrutiny of expenditure and investments to ensure that this demand is being met at an efficient cost.

The following changes in the Variation address this outcome:

- Introduction of a WAPC, including associated sub-caps, means that nbn will face the demand risk associated with the take up and use of nbn's services and the revenue sufficiency risk arising from its investments. It also incentivises nbn to maximise the take-up and use of the network.
- Changes to the framework for assessing nbn's prudent and efficient costs, including the introduction of an ex-post capital expenditure efficiency review that will complement the SAU's existing processes.
- Requirement to consult with RSPs and consumer advocacy groups on expenditure forecasts before lodging an RMA.



- d. **RSP cost certainty:** RSPs have greater certainty over the costs that they will face when using the **nbn**[®] network.

For this outcome, the ACCC has called out a range of changes that should form part of a suitable regulatory framework which would provide access seekers with increased certainty over the costs that they will face when using the **nbn**[®] network, which in turn would incentivise **nbn**'s direct customers to invest in their own infrastructure and product offerings. These changes include consideration of alternative pricing constructs (particularly in relation to volumetric pricing), price controls, reforms to existing discounting practices as well as more robust demand forecasting.

The following changes in the Variation address this outcome:

- Introduction of a WAPC applicable to all **nbn** services with limited exceptions, including associated sub-caps, which constrains **nbn**'s ability to raise prices each year.
- Commitment to move to AVC-only pricing immediately on TC-4 services with a bandwidth profile of 100 Mbps or higher, and to transition to AVC-only pricing on all other fixed line and fixed wireless TC-4 bandwidth profiles within three years, meaning that RSPs are no longer exposed to cost increases as a result of end-user demand fluctuations.
- Inclusion of bundled AVC/CVC TC-4 services in the SAU as NBN Offers, closing any gap between discounted and list prices.
- Introduction of CVC billing based on capacity utilised, rather than ordered, for TC-4 Bundle Offers reducing the complexity and cost associated with forecasting adequate capacity ahead of time.
- Introduction of a mechanism to automatically and transparently adjust the TC-4 CVC inclusions twice-yearly to reflect changed end-user download utilisation over time.
- Reduction of the fixed charge for the 25 Mbps TC-4 service to promote it as the entry level broadband offer on fixed line and fixed wireless technologies.
- Significant reduction in the price of basic connectivity, or voice-only, services on fixed line technologies.
- New commitments in relation to the extent that **nbn** can discount its prices.
- The introduction of demand forecasting principles in the SAU and a requirement to consult with RSPs and consumer advocacy groups on expenditure forecasts before lodging an RMA.
- Establishment of a framework to provide RSPs with price certainty and transparency in respect of **nbn**'s proposed price changes. This includes the following commitments:
 - i. The introduction of pricing principles into the SAU to provide certainty over **nbn**'s long term pricing intentions;
 - ii. **nbn** will publish a binding Statement of Pricing Intent each Regulatory Cycle;
 - iii. **nbn** will publish an annual SAU Tariff List; and
 - iv. **nbn** will publish a three-year pricing roadmap, where the second two years' prices are indicative, but with additional commitments relating to maintenance of pricing relativity in the second year of the roadmap.



- e. **Quality of service framework:** There is a clear and robust quality of service framework, so RSPs and end-users know what to expect from **nbn** services, including a review mechanism so that service standards remain fit for purpose.

This outcome was a key issue for participants in the industry working groups and subsequent discussions, including the ACCC Industry Forum in August 2022. According to the ACCC's summary of the working group discussions, a suitable regulatory framework would include clear service quality measures, which allow both access seekers and end-users to have greater clarity regarding the service standards of their **nbn** services. The ACCC noted that this should include consideration of investments undertaken to improve service quality, appropriate reporting and transparency measures, and allowing proposed service standards to be checked over time so they remain fit for purpose, including a mechanism to respond to quickly emerging service quality issues.

The following changes in the Variation address this outcome:

- The Variation includes a mechanism whereby **nbn** proposes service standards and rebates for each Regulatory Cycle as part of each RMA. The ACCC has the power to set benchmark service standards and rebates as part of an ACCC RMD, which may be the same or different to those proposed by **nbn** in its RMA. This provides RSPs and end-users with confidence in the minimum level of service that **nbn** will be required to maintain and which is directly linked to the prices, price controls and revenue allowance that apply for each Regulatory Cycle.
- The introduction of a utilisation management commitment to ensure that shared network resources within the transit backhaul component of the fixed line and fixed wireless networks continue to operate below an appropriate utilisation threshold. This commitment, and the associated reporting commitments, promote the LTIE through providing a transparent quality of service commitment while ensuring **nbn**'s costs are incurred as efficiently as possible.
- ACCC powers to set new and/or alternate service standards as part of an RMD.
- ACCC powers to review and update Benchmark Service Standards during a Regulatory Cycle where RSPs are required to comply with new or amended retail-level regulation, or where systemic and unforeseen issues arise during a Regulatory Cycle.

In addition to the proposed changes in the Variation, **nbn** is committed to continued engagement with the ACCC and RSPs on a proposed Record Keeping Rule with appropriate transparency metrics, and a reporting framework to obtain and disclose information regarding network performance by **nbn**.



3 State of competition

nbn is not an unconstrained monopolist for high-speed broadband services in Australia. In this regard, **nbn** should not be considered as a ‘traditional’ infrastructure monopoly provider of essential services.

nbn faces significant and increasing competition from fixed-line network providers as well as from alternative broadband technologies such as fixed wireless and satellite. Some of these alternative networks are operated by RSPs that supply retail broadband services over the **nbn**[®] network that have announced publicly their ongoing intention to continue to migrate customers away from the **nbn**[®] network in favour of their own network. **nbn** also faces ongoing changes in consumer preferences driven by technological change and evolutions in the way people live and work, such as the significant increase in working from home.

Additionally, unlike standard utilities with inelastic demand, **nbn** cannot maximise its profitability by simply rebalancing its fixed and variable price components or increasing prices without affecting demand. For example, if **nbn** were to increase its prices on lower speed tiers this would significantly increase the risk of low-usage end-users switching away from the **nbn**[®] network to viable alternative platforms, such as mobile broadband or low-earth orbit satellites, or further incentivise alternative fixed-line or fixed wireless providers to continue ‘cherry-picking’ in high value and low cost to serve geographies.

The ACCC’s assessment of the Variation should have regard to these market realities as well as the extent to which **nbn** may face increased competition driven by ongoing investment in alternative broadband network technologies, ongoing technological change and changing consumer preferences. Regard should also be had to the extent to which there is asymmetric regulation for the supply of broadband services and the extent to which this distorts competition and encourages inefficient market behaviour.

3.1 Overview

The scale of the **nbn** rollout was unprecedented. It involved, and continues to involve, a substantial investment of capital and operating expenditure, which **nbn** has prudently incurred in accordance with the processes in the SAU regarding network design and procurement. This has been made possible through \$29.5 billion of equity investment contributed by the Commonwealth, the recent \$2.4 billion of investment over the next four years, and the \$22.5 billion of debt raised from the debt capital markets and bank facilities both in Australia and globally.

Market developments and changes in policy since **nbn**’s original policy settings¹⁵ mean that **nbn** faces significant demand-side and revenue sufficiency risks (i.e., the risk that **nbn**’s revenue from access charges may not cover the costs it incurs). These risks arise from established and growing competition in respect of the business, enterprise and new developments segments as well as material and increasing competition in respect of residential (TC-4) services. Additionally, **nbn**’s competitors ‘cherry-pick’ high-value and low-cost geographies while leaving **nbn** to serve high-cost geographies. These risks already constrain **nbn**’s pricing well beyond the SAU’s current price controls, and will continue to do so under the new price controls proposed in the Variation.

This section examines the competitive landscape facing **nbn** with respect to the following: (1) fixed wireless/mobile broadband networks; (2) fixed-line networks; (3) new developments; and (4) satellite networks.

¹⁵ See, for example: Statement of Expectations issued to **nbn**, 20 December 2010: <https://www.nbnco.com.au/content/dam/nbnco/documents/statement-of-expectations.pdf>; *National Broadband Network Companies Act 2011* (Cth); *Telecommunications Legislation Amendment (National Broadband Network Measures—Access Arrangements) Act 2011* (Cth).



3.2 nbn faces significant and increasing competition

nbn faces significant competition in the provision of business, enterprise and new development services. It is also generally recognised that nbn faces increasing competition from 4G, 5G and other fixed wireless networks, alternative fixed-line networks and low-earth orbit satellite operators, in respect of residential services. This competition does, and will, continue to incentivise efficient pricing behaviour by nbn. The ACCC must consider these competitive dynamics when assessing nbn’s proposals in the Variation to ensure nbn can price efficiently and respond to competition. Even if only some of nbn’s services are subject to competition, the competitive constraint will be imposed on all of nbn’s pricing, particularly when nbn is selling via averaged pricing.

The competitive pressures exerted on nbn are detailed in sections 3.3 to 3.7 below. They include competition from fixed wireless (e.g., 4G and 5G home broadband) / mobile broadband (e.g., WiFi dongle, pocket WiFi, etc.), fixed-line and satellite providers. The impact of this competition on nbn is evidenced by the following:

- Approximately 3.6 million out of 12.1 million business and residential premises passed by the nbn® network¹⁶ are not using the nbn today, despite a mandatory disconnection and an expansive migration program in nbn’s fixed-line footprint, which accounts for over 90% of premises. nbn estimates that as at October 2022, approximately 2.9 million (or 26%) of about 10.4 million residential premises are connected to a competing non-nbn broadband network.¹⁷ Of these 2.9 million premises, approximately 2.4 million (or 83%) are connected to a fixed wireless network or use a mobile device alone, underscoring the current substitutability of, and growing competitive pressure exerted by, these services. Figure A2 below illustrates this.

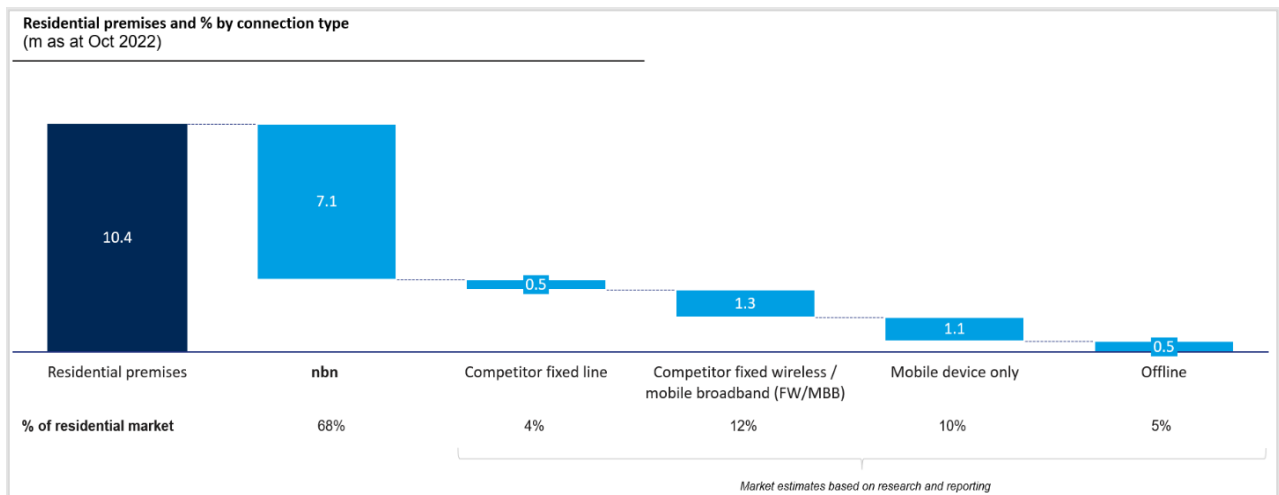


Figure A2. Residential premises numbers (millions) and % breakdown by connection type as at October 2022¹⁸

¹⁶ nbn, National Broadband Network – Rollout Information Weekly report by nbn for the week ending 13 October 2022: https://www.nbnco.com.au/content/dam/nbn/documents/about-nbn/weekly-progress/Public_Progress_data-13102022.pdf.

¹⁷ See footnote 18 for details regarding estimates. Compare this take-up against other industries involving regulated utilities. The National Electricity Market (NEM) supplies approximately 10.7 million customers across Queensland, New South Wales (including ACT), Victoria, Tasmania and South Australia: <https://www.aemo.com.au/-/media/Files/Electricity/NEM/National-Electricity-Market-Fact-Sheet.pdf>. nbn Premises ‘Ready to Connect’ for states and territories in the NEM States and Territories comparatively total about 10.79 million, suggesting that close to 100% of premises are connected to the electricity grid. By comparison, approximately only 70% (7.5 million premises) are connected to the nbn® network. See National Broadband Network – Rollout Information, Weekly report by nbn for the week ending 13 October 2022: https://www.nbnco.com.au/content/dam/nbn/documents/about-nbn/weekly-progress/Public_Progress_data-13102022.pdf.

¹⁸ nbn residential premises number and nbn take-up are actuals from nbn internal data. Data noted as ‘Market estimates based on research and reporting’ were arrived at via triangulation of nbn internal data, four surveys commissioned by nbn and undertaken throughout 2022, relevant company reports and



- **nbn** experienced net churn (disconnections minus reconnections) of 249,000 premises in FY21, representing 3.6% of all connected premises, increasing from 2.72% in FY20. **nbn**'s IOP23 expects churn rates to continue increasing until FY23 (to 285,000 premises) and to remain negative (i.e., disconnections exceed reconnections) in the foreseeable future. If **nbn** did not or was unable to respond to the threat of network churn, then **nbn** expects that net churn (that is, churn from **nbn**'s existing base) would increase to 4% in FY23.
- **nbn** has observed relatively higher negative churn rates across all its access technologies in areas such as Perth, Adelaide, Greater Geelong, Sydney and Brisbane, which generally have greater availability of competing fixed wireless/mobile broadband or fixed-line services.¹⁹ **nbn** has also observed that the FTTB churn rate in these areas is higher than for other access technologies, which supports the contention that competition is material and increasing in Multi-Dwelling Units (**MDUs**). **nbn** has observed that alternative network operators tend to first target MDUs in new or existing developments before expanding their footprints. MDUs are naturally high-value targets for competitors as they are high density and have relatively lower costs to serve (especially when compared with premises in regional areas). FTTB operators, for example, may even offer incentives to building managers or owners, encouraging them to facilitate end-user preferencing of their services over competing **nbn** FTTB services.
- Where **nbn** has identified competing networks (e.g., FTTx including FTTB) in predominantly smaller households, **nbn** take-up is about 36%. This is 25% lower than in smaller households without competing infrastructure.²⁰ **nbn** has also identified a competing FTTB service in approximately 325,000 premises in MDUs nationally and take-up of **nbn** FTTB services in these MDUs is about 37%.²¹ These are likely to be conservative estimates as **nbn** does not have visibility over all competing networks. This difference in take-up rates is a clear indication of the competition that **nbn** faces.
- Take-up of **nbn**'s FTTB service is not ubiquitous and is instead about 41%²² in MDUs in which **nbn** believes it is the only FTTB provider. This lack of uniformity in take-up rates, especially when **nbn** may be the only fixed-line supplier to an MDU, is a clear indication that fixed wireless (e.g., 4G or 5G service via a fixed modem in a premises) or mobile broadband (e.g., via 'traditional' WiFi dongle or pocket WiFi) services are a substitute for **nbn** services for end-users in MDUs. These services are a competitive constraint on **nbn**.
- **nbn** has observed that competitors generally select population-dense areas to cherry-pick (e.g., central business districts or high density inner urban residential areas and MDUs like apartment complexes) or areas in which there is no (or limited) existing infrastructure (e.g., new housing developments and business parks). Figure A3 below demonstrates these observations – it shows the take-up rates in major metropolitan areas of Victoria, the Australian Capital Territory, Tasmania, New South Wales, Queensland and Western Australia. Red indicates lower take-up of **nbn** services.

public reporting of figures including: TPG, *Half-Year Results*, 19 August 2022; Telstra, *Financial results for the year ended 30 June 2022*, August 2022; Optus, *Business Update For The First Quarter Ended 30 June 2022*, 24 August 2022; Uniti, *H1 FY22 Results Investor Presentation*, February 2022; CommsDay, 19 August 2022; CommsDay, *How Gigafy Works*, 17 November 2020; ACCC, *Snapshot of Telstra's customer access network as at 30 June 2022*: <https://www.accc.gov.au/system/files/Snapshot%20of%20Telstra%27s%20customer%20access%20network%20-%20Jun%202022.pdf>.

¹⁹ **nbn** internal data measured over 12 months from October 2021 to September 2022. Areas included in analysis: Adelaide, Adelaide Hills, Adelaide Plains, Brisbane, Greater Geelong, Melbourne, North Sydney, Perth, South Perth and Sydney.

²⁰ **nbn** internal data.

²¹ **nbn** internal data.

²² **nbn** internal data. Again, these are conservative estimates as **nbn** does not have full visibility over all competing fixed-line networks available in MDUs. It may be that such networks are more prevalent than estimated, especially when considering the expansion plans of these networks as outlined in section 3.4 below.

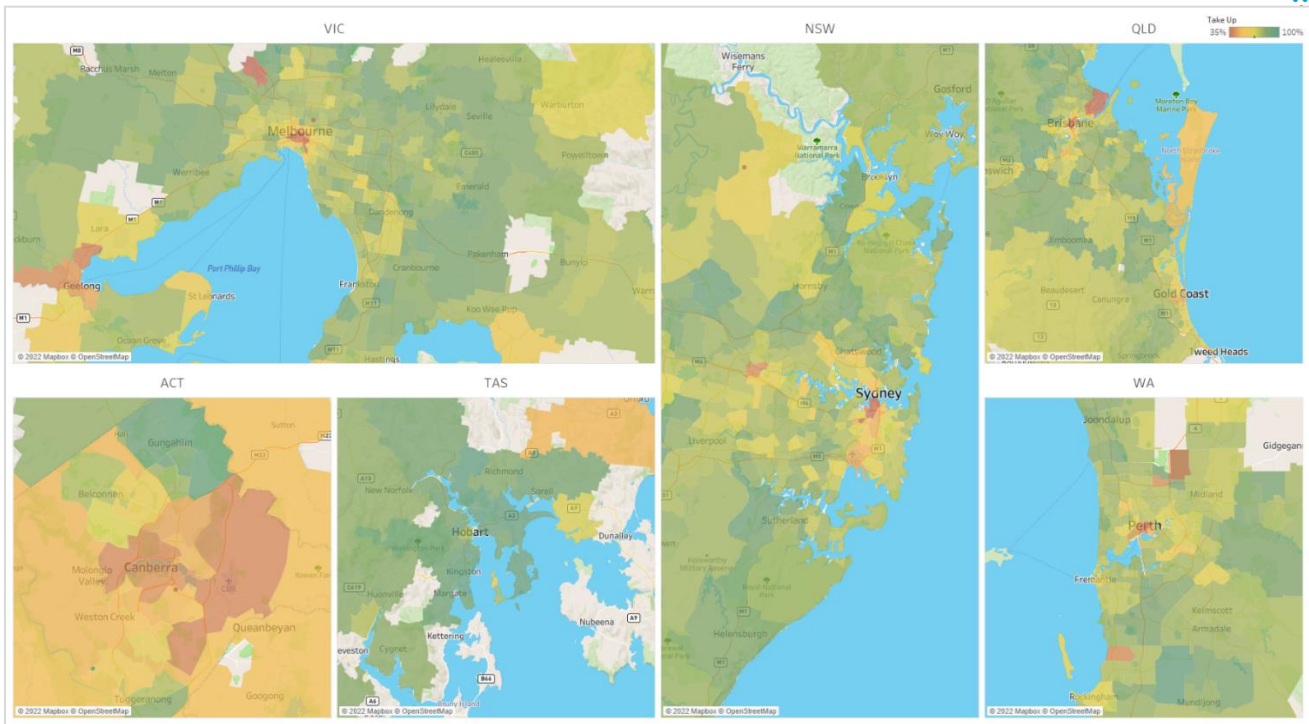


Figure A3. Map of nbn service take-up in major metropolitan areas²³

3.3 Mobile/fixed wireless competition

3.3.1 MNOs

Mobile Network Operators (**MNOs**) (i.e., Telstra, Optus and TPG Telecom) have strong commercial incentives to increase their ‘on-net’ customer base by steering and migrating customers from **nbn** services to their own fixed wireless (particularly 5G) networks.²⁴ MNOs are incentivised to do so as they can realise the benefits of their vertical integration as customers move ‘on-net’.

Mobile Network Investment

There are ongoing material capital investments in expanding the coverage of mobile networks in Australia. MNOs were estimated to have incurred approximately US\$5.07 billion in mobile spend capex between Q1 2020 and Q1 2022.²⁵ Although **nbn** understands that this mobile spend figure may include capex attributable to both wireless (e.g., 5G network) and fixed (e.g., backhaul capacity associated with both wireless and fixed networks, other

²³ nbn internal data.

²⁴ Venture Insights, *Australian Household 5G Fixed Wireless Substitution Forecast*, October 2020.

²⁵ OMDIA, *Communications Provider Revenue & Capex Tracker 1Q22*, 12 August 2022: <https://omdia.tech.informa.com/OM025216/Communications-Provider-Revenue-and-Capex-Tracker-1Q22>. See ‘CSP charts – country’: Australia, Mobile Capex, 1Q22, and Mobile capex – Australia: 3Q13 – 1Q22. OMDIA noted: “Most of the largest CSPs run both fixed and mobile networks under one organizational roof, at least in their domestic market. Therefore, they are converging fixed and mobile operations around a common core infrastructure. This is making the distinction between fixed and mobile CSPs (and their revenue and capex) less clear over time. Technology innovation is allowing a tighter integration of fixed and mobile networks—common billing platforms, for example. That is good for the market but means the measurement of fixed and mobile as standalone markets is getting harder over time. As 5G comes online, many integrated CSPs will view this as an opportunity to further blend fixed and mobile operations. That comes as CSPs also look to the IoT/M2M world for new revenue streams. Effectively, growing IoT/M2M will require an integrated approach across fixed and mobile platforms by CSPs. As such, IoT/M2M adoption will also tend to drive fixed-mobile convergence.”



capex shared between both fixed and wireless networks, etc) investments, **nbn** assumes a material proportion of this mobile spend in at least the last two years is associated with the deployment of MNOs' 5G networks. **nbn** understands that this incremental investment is justified by expectations of the incremental returns generated by competing with **nbn** to both increase revenues by increasing their mobile customer base and also avoiding costs by moving existing fixed line customers 'on-net'.

nbn also expects this investment and competitive behaviour to continue and for competition to become increasingly vigorous into the future. For example, the attractiveness of low-use customers to MNOs and other wireless operators, the incentive for MNOs to add fixed wireless users to their mobile networks where they have spare capacity and the eventual evolution from 5G to 6G will persist. **nbn** also understands that MNOs plan to offer 5G fixed wireless services to their wholesale customers.²⁶

Last year, the ACCC estimated that retail non-**nbn** fixed wireless and satellite SIOs totalled about 31,000 in June 2021.²⁷ Optus and TPG Telecom, however, reportedly have approximately 320,000 4G/5G fixed wireless subscribers.²⁸ MNO and non-MNO 5G fixed wireless subscriptions were predicted to reach 1.2 million by June 2024 as the rollout of this technology matures.²⁹ These estimates suggest that MNOs are increasingly leveraging their 5G wireless network investments to compete with **nbn**. MNOs also continue to sell 'traditional' mobile broadband products (e.g., WiFi dongles, pocket WiFi, etc). These are significant and increasing competitive constraints that **nbn** must be ready to respond to and the regulatory landscape should reflect this and enable **nbn** to respond competitively.

TPG Telecom has announced its strategy of substantially increasing the size of its 'on-net' customer base from 80,000 in 2021 to 160,000 by the end of 2022, targeting 20% of its customer base being served by its own fixed wireless network over time.³⁰ A TPG Telecom survey of its customer base found that two-thirds would consider moving from their existing broadband service onto a fixed wireless service.³¹ TPG Telecom states its approach to fixed-line fibre services to be *"to use our on-net services first to selectively invest where it makes sense and then to expand using NBN as the second option"* (see section 3.4 below for further discussion on TPG's fixed-line FTTB network).³²

²⁶ Optus and TPG announcements at Comms Day Wholesale Forum on 8-9 November 2022.

²⁷ ACCC, *Communications Market Report 2020-21*, 10 December 2021, p. 23 (see Figure 3.7 'Retail non-NBN fixed wireless + satellite' data points): <https://www.accc.gov.au/publications/accc-communications-market-report/accc-communications-market-report-2020-21>.

²⁸ TPG Telecom, *Investor Day Presentation*, 23 June 2022: <https://www.tpgtelecom.com.au/sites/default/files/2022-06/20220623%20TPG%20Telecom%202022%20Investor%20day%20presentation%20FINAL-2.pdf>; Singtel, *Business Update For The First Quarter Ended 30 June 2022*, 24 August 2022, p 14 <https://cdn1.singtel.com/content/dam/singtel/investorRelations/financialResults/2023/Jun-2022-Biz-update-final.pdf>. **nbn** understands these figures do not include customers connected via traditional mobile broadband products such as WiFi dongles or pocket WiFi connections. **nbn** also understands that Telstra does not publicly report these figures.

²⁹ Venture Insights, *Australian Household 5G Fixed Wireless Substitution Forecast*, October 2020.

³⁰ TPG Telecom, *Investor Day Presentation*, 23 June 2022, slide 20: <https://www.tpgtelecom.com.au/sites/default/files/2022-06/20220623%20TPG%20Telecom%202022%20Investor%20day%20presentation%20FINAL-2.pdf>.

³¹ TPG Telecom, *Investor Day Presentation*, 23 June 2022, slide 20: <https://www.tpgtelecom.com.au/sites/default/files/2022-06/20220623%20TPG%20Telecom%202022%20Investor%20day%20presentation%20FINAL-2.pdf>; TPG Telecom Investor Day Presentation Transcript, 23 June 2022, p. 9: <https://www.tpgtelecom.com.au/sites/default/files/2022-06/TPG%20Investor%20Day%202022%20third-party%20transcript.pdf>.

³² TPG Telecom, *Investor Day Presentation Transcript*, 23 June 2022, p. 11: <https://www.tpgtelecom.com.au/sites/default/files/2022-06/TPG%20Investor%20Day%202022%20third-party%20transcript.pdf>.



When asked about Optus targeting **nbn** households, then Optus CEO, Allan Lew said *“Obviously as a strategy we want to look at areas where customers' needs are greatest, areas where, based on our own experience, a 5G service will create a much better experience”*.³³

Competitive pressure from fixed wireless providers is not unique to Australia. Spark in New Zealand adopted a similar approach, having already migrated 700,000 or 26% of its fixed-line broadband connections onto its fixed wireless network. It is now targeting 30-40% of its broadband connections in the medium to long term.³⁴

Additionally, the increasing deployment of 5G mobile networks is likely to result in mobile broadband being an increasingly vigorous competitor to **nbn** services. As the ACCC has noted, all of the MNOs have advanced the rollout of their 5G networks and services and are *“well placed to not only offer improved mobile broadband, but also provide fixed wireless alternatives to homes and small businesses, in competition with traditional fixed-line broadband and NBN technologies”*.³⁵

That mobile broadband and fixed wireless services are substitutes for fixed-line broadband is also demonstrated by the fact that Australia's median mobile broadband speeds are already higher than fixed broadband speeds (83.59 Mbps relative to 52.62 Mbps as of August 2022).³⁶ Mobile broadband prices in Australia are also among the lowest in the world, with an average price per GB of US\$0.57 (compared to US\$1.09 in Singapore, US\$0.61 in the United Kingdom, US\$5.62 in the United States and US\$6.72 in New Zealand).³⁷

Indeed, competition from 5G mobile broadband and fixed wireless services is already accelerating in the market. MNOs are increasingly advertising 5G home broadband products as alternatives to **nbn** services and pricing them below comparable **nbn**-powered retail services. MNOs also highlight key aspects of their 5G home broadband services that are comparable or better than similarly priced **nbn** plans. In addition, **nbn** is aware that MNOs have targeted **nbn**® network end-users with direct marketing such as in response to price increases or based on their usage of **nbn** services to compare and promote their own home broadband products. Despite the fact they are marketed as direct substitutes for an **nbn** fixed-line service, 4G/5G fixed wireless services to premises are not required to pay the Regional Broadband Scheme (**RBS**) levy. This gives them a \$7.45 per month (indexed annually), per chargeable premises cost advantage over **nbn**. Examples of these marketing approaches are set out in Table A2 below.

³³ James Fernyhough, 'Looming 5G threat to NBN just got real', *The Australian Financial Review* (online, 8 November 2019): <https://www.afr.com/companies/telecommunications/looming-5g-threat-to-nbn-just-got-real-20191108-p538rq>.

³⁴ Spark, *Spark Investor Strategy Update*: https://investors.sparknz.co.nz/FormBuilder/_Resource/_module/gXbeer80tkel4nEaF-kwFA/Spark%202023%203-Year%20Strategy%20FINAL.pdf.

³⁵ ACCC, *Communications Market Report 2020-21*, 10 December 2021, p. xi.

³⁶ Ookla Speedtest Index: <https://www.speedtest.net/global-index>.

³⁷ Cable.co.uk, *Worldwide Mobile Data Pricing as at 11 October 2022*: <https://www.cable.co.uk/mobiles/worldwide-data-pricing/>.



Table A2. MNOs' market approaches

MNO	Fixed wireless product advertising	MNO's nbn product advertising
TPG Telecom (via its Vodafone brand)	TPG Telecom promotes \$50-\$65/month for a 50 Mbps 5G home broadband plan ³⁸ or \$50-\$70/month for a 100 Mbps 5G home broadband plan (with further discounts for bundling a mobile phone plan).	TPG Telecom advertises \$65 (with a bundled mobile plan) or \$80/month for a 50 Mbps nbn broadband plan or \$80 (with a bundled mobile plan) or \$95/month for a 100 Mbps nbn broadband plan. ⁴⁰
	TPG Telecom is specifically advertising 5G home broadband plans as " <i>Our alternative to nbn™</i> ". ³⁹ The prices for these services suggest that they are positioned as alternatives.	
	nbn is aware that TPG Telecom has recently sent electronic direct marketing to customers after it increased the price of a retail nbn plan. In this email TPG Telecom suggested customers could save money by switching to its 4G Home Wireless Broadband service. Customers are required to click through to a speed guide to obtain further information about the speed of this 4G connection.	
Optus	Optus promotes a 50 Mbps minimum guarantee on 5G with a 83 Mbps typical busy period download speed on its 5G Internet Everyday plan (priced at \$69/month). ⁴¹	Optus advertises 50 Mbps typical busy period download speed for its nbn Internet Everyday plan (priced at \$79/month). ⁴²
	Optus' 'home internet' landing page compares its nbn retail service to its 4G and 5G fixed wireless products, describing its 5G Home Internet product as providing "UNCAPPED SPEED" in capitalised and bold letters (with the typical busy period speed of 225 Mbps in disclaimer text below), next to a description of Optus' nbn Home Internet service with the typical busy period speed of 400 Mbps stated upfront (not in a disclaimer). ⁴³	
Telstra	Telstra promotes average download speeds on its 5G home broadband of 378 Mbps (for \$85/month). ⁴⁴	Telstra advertises typical evening download speeds of 25 Mbps on its \$80 'Telstra Upfront Internet Plan Basic' and of 50 Mbps on its \$85/month 'Telstra Upfront Internet Plan Essential'. ⁴⁵
	Telstra has expanded its 5G network, transitioning from covering approximately one third of the Australian population in August 2020, to covering 80% of the Australian population as at October 2022. ⁴⁶ Telstra has more than two million 5G devices on its network and is using 5G as a competitive alternative to the nbn . ⁴⁷	

³⁸ Vodafone, 5G Home Internet Plans: <https://www.vodafone.com.au/home-internet/5g> (accessed 3 October 2022).

³⁹ Vodafone, 5G Home Internet Plans: <https://www.vodafone.com.au/home-internet/5g> (accessed 3 October 2022).

⁴⁰ Vodafone, Unlimited **nbn** plans from Vodafone: <https://www.vodafone.com.au/nbn> (accessed 3 October 2022).

⁴¹ Optus, 5G Home Broadband Plan: <https://www.optus.com.au/broadband-nbn/5g-home-broadband/5g-home-broadband-plan> (accessed 3 September 2022).

⁴² Optus, **nbn** Plans from Optus: <https://www.optus.com.au/broadband-nbn/home-broadband/plans/shop> (accessed 3 October 2022).

⁴³ Optus, Home Internet landing page: <https://www.optus.com.au/broadband-nbn> (accessed 3 October 2022).

⁴⁴ Telstra, 5G Home Internet plans from Telstra: <https://www.telstra.com.au/internet/5g-home-internet> (accessed 3 October 2022). The first month on this plan is \$0.

⁴⁵ Telstra, **nbn** Plans from Telstra: <https://www.telstra.com.au/internet/nbn> (accessed 3 October 2022). The monthly charge for the 'Telstra Upfront Internet Plan Essential' increases to \$95/month after the first six months.

⁴⁶ See: <https://www.telstra.com.au/5g> (accessed 3 October 2022).

⁴⁷ Telstra, *Investor Day Transcript*, 16 November 2021, pp. 45 and 8-9: <https://www.telstra.com.au/content/dam/tcom/about-us/investors/pdf-g/2021-Investor-Day-Transcript.pdf>.



MNO	Fixed wireless product advertising	MNO's nbn product advertising
	Telstra noted in 2021 <i>“For home and business internet. NBN headwinds are now also largely behind us, and we have a pathway for margin growth as a lean NBN reseller. We see growth in Fixed wireless, in-home services and scaling our energy retailing business”</i> and stated that it will <i>“... move toward a more technology agnostic approach – talking less about complex industry jargon... FTTN, HFC, Mid Band, mmWave... and focus on using the best technology available for customers to deliver the experience they want, whether that is the NBN or fixed wireless, 4G or 5G”</i> . ⁴⁸	

The presence of 5G home broadband services in the market, advertised as **nbn** alternatives and priced lower than equivalent **nbn** services, creates very strong competitive constraints on **nbn**'s residential and small-business pricing. As 5G coverage rapidly increases, 5G broadband services will become increasingly vigorous competitors, making it challenging for **nbn** to raise prices in a manner that would be inefficient or detrimental to competition or consumers.

The competitive constraint of 5G broadband services is further demonstrated by the increasing 'worth what you pay' (**WWYP**) score of mobile broadband services. As seen in Figure A4, **nbn**'s fixed-line services have remained relatively stable on this metric, while the WWYP percentage of mobile broadband services has increased during the period 2017 to 2022.⁴⁹ This suggests that end-users are perceiving increasing value from these services. For **nbn** to continue maintaining customers in this environment (and recover the substantial investments in its network), **nbn** will need to ensure that its services continue to deliver value-for-money, which may require **nbn** to reduce prices or increase inclusions. The numbers below indicate the percentage of surveyed households agreeing that their current home Internet service is 'worth what they pay'.⁵⁰

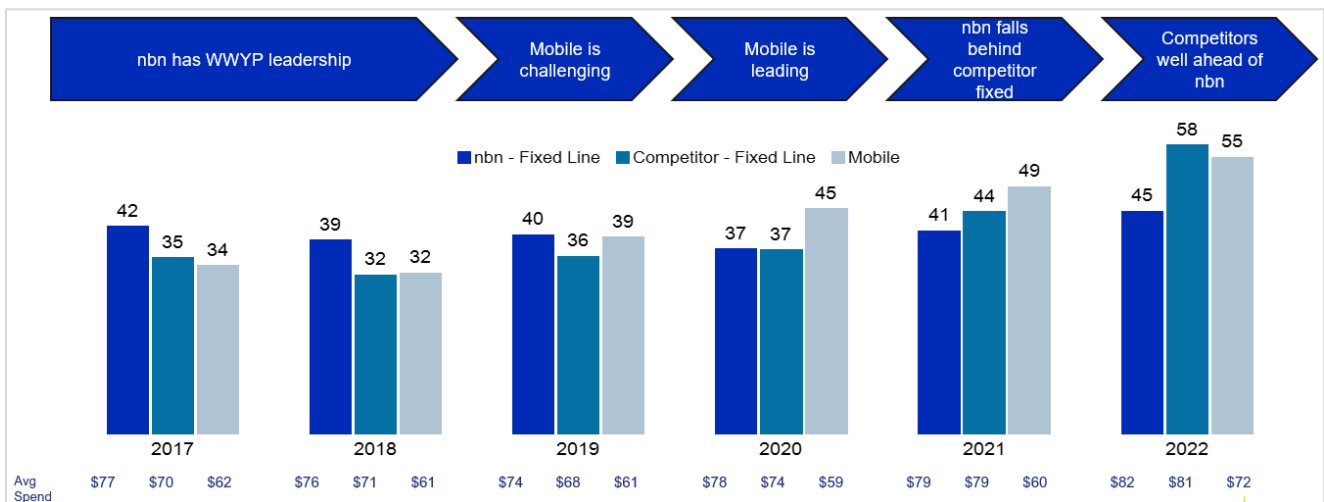


Figure A4. “Worth what you pay” scores for fixed-line and mobile broadband services⁵¹

⁴⁸ Telstra, *Investor Day Presentation pack*, 16 September 2021, at pp. 11 (slide 18), 13 (slide 20) of speech notes.

⁴⁹ ERGO Strategy primary research on behalf of **nbn**.

⁵⁰ ‘Mobile’ includes both home fixed wireless broadband as well as mobile-only customers.

⁵¹ Based on a survey commissioned by **nbn** of internet-enabled households, N = 3,985. ‘Competitor fixed-line’ excludes legacy connections such as ADSL and includes non-**nbn** fixed-line home internet services. Respondents were asked, for example: ‘What is your total monthly bill for your home Internet service/for just the Internet part of your bundled home Internet service?’; ‘Considering everything about your current home Internet service - the connection, data allowance, service, etc. - how strongly do you agree or disagree that your current home internet service is worth what you pay?’.



3.3.2 Emerging alternative fixed wireless networks

Competition from other (non-MNO) alternative fixed wireless networks is similarly intensifying. Localised competition from certain smaller wireless networks (additional to those sampled in the ACCC's December 2021 estimate of retail non-nbn fixed wireless and satellite SIOs⁵²) is growing through a mix of acquisition strategies and geographically focussed network builds (particularly in higher value metropolitan areas, as is evidenced by the churn and take-up rates outlined in section 3.2 above). Further detail is set out in Table A3 below.

Table A3. Market position or approach of alternative fixed wireless providers

Alternative fixed wireless provider	Summary of market position or approach
Swoop⁵³	<p>Recently Swoop announced several acquisitions including Moose Mobile (September 2022), Luminet (April 2022), iFibre (February 2022), VoiceHub (November 2021). Swoop's strategy is focused on infrastructure expansion and high margin products.</p> <p>Swoop's Investor Presentation noted the "<i>Massive opportunity to increase market share in areas already covered by Swoop infrastructure.</i>"⁵⁴ For example, areas like Metro Perth (~930k addressable premises) and Geelong/Metro Melbourne (~1.9 million addressable premises) are noted as having 80% Swoop on-net coverage.</p> <p>Swoop saw FY22 revenue up 67% to \$51.7 million, underlying EBITDA up 129% to \$13.0 million (organic growth of 9%, plus contributions from five acquisitions: Speedweb, Beam, Countrytell, Voicehub, Luminet). It saw total SIO growth of 26% to 38.6k, with business SIOs up 56% to 6.3k and residential SIOs up 10% to 25.9k.</p> <p>The number of Swoop's towers increased 24% to 485, driven by organic rollout in Victoria and WA and recent acquisitions. Swoop's on-net SIOs increased to 56%, up 10% from FY21.</p>
Field Services Group (FSG)⁵⁵	<p>FSG's FY22 results were reportedly driven by organic growth and enhanced by its TasmaNet acquisition with revenue and EBITDA up 127% to \$43 million and 113% to \$4.6 million, respectively.</p> <p>FSG has 16 new networks under construction due to be delivered in FY23 and currently has over 150 towers. This is part of the 41 potential (21 contracted) to be built from 2023-25 spanning over 93,000km², with the majority in Queensland and New South Wales.</p> <p>FSG announced in January 2022 that it has been appointed as a OneWeb distribution partner in Australia, delivering OneWeb's LEO satellite services to rural and regional Australia. OneWeb will trial LEO backhaul in FSG's Australian Neutral Host Pilot under the Federal Mobile Blackspot program. Other FSG partnerships include Nokia/Mavenir as technology partners to build FSG's Regional Australia Network, wholesale supply agreement with MyRepublic and Optus 4G/5G MVNO agreement.</p>
Pentanet⁵⁶	<p>With Pentanet's traditional fixed wireless network reaching capacity, the operator added 9 new towers in FY22, expanded tower dark fibre backhaul network and renewed its Axicom Master Access Agreement (which could increase its tower footprint by up to 180 sites).</p>

⁵² See ACCC, *Internet Activity RKR*, 19 May 2022, subclause 4(1) for providers subject to the RKR. nbn understands data was used from these providers in the relevant part of the ACCC's Communications Market Report 2020-21. nbn notes for example the Venture Insights estimates referred to in footnote 24.

⁵³ Swoop, *FY22 Financial and Operational Results Investor Briefing*, 29 August 2022.

⁵⁴ Swoop, *FY22 Financial and Operational Results Investor Briefing*, 29 August 2022, p. 20.

⁵⁵ Field Solutions Group, *Annual Report 2022*, 30 June 2022.

⁵⁶ Pentanet, *FY22 Full Year Results*, 19 August 2022.



Alternative fixed wireless provider	Summary of market position or approach
	<p>It also announced the launch of its 'neXus' fixed wireless product (a next generation mesh wireless network for Perth which aims to overcome line of sight issues inherent in fixed wireless services) in June 2022, with coverage initially available in more than 15 Perth suburbs. During beta testing, neXus reached peak speeds of 970/857 Mbps with an average of 535 Mbps.</p> <p>Pentanet's FY22 revenue increased 54% to \$17 million with underlying EBITDA losses deepening to (-\$4 million) from (-\$2 million) in FY21. Its total SIOs increased 34% to 16.7k, of which 39% are on-net. Pentanet's on-net fixed wireless gross margin is at 86%, up 3% from FY21 (compared to average company gross margin of 44%).</p> <p>Figure A5 below shows Pentanet's fixed wireless coverage map for Perth and a subset of that coverage area as an nbn access technology map. nbn expects, for example, that Pentanet would be incentivised to target customers in nbn's FTTN and FTTC footprints with its fixed wireless products given the location of Pentanet coverage and mmWave-enabled towers in these areas.</p>
Superloop ⁵⁷	Superloop owns 305 fixed wireless towers and operates over 100,000km of fibre connecting 466 data centres and buildings (may include some APAC outside of Australia).

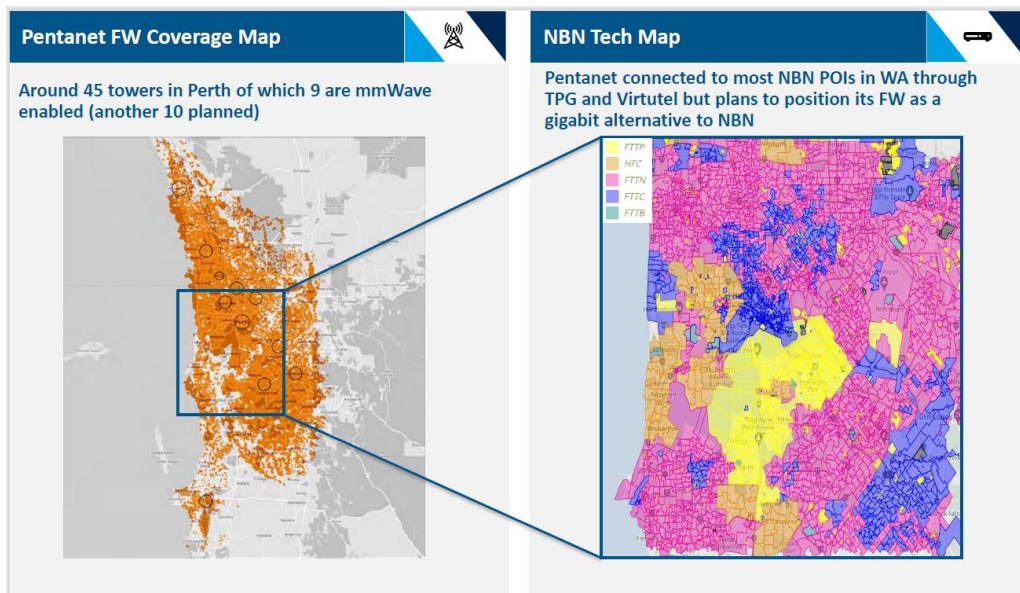


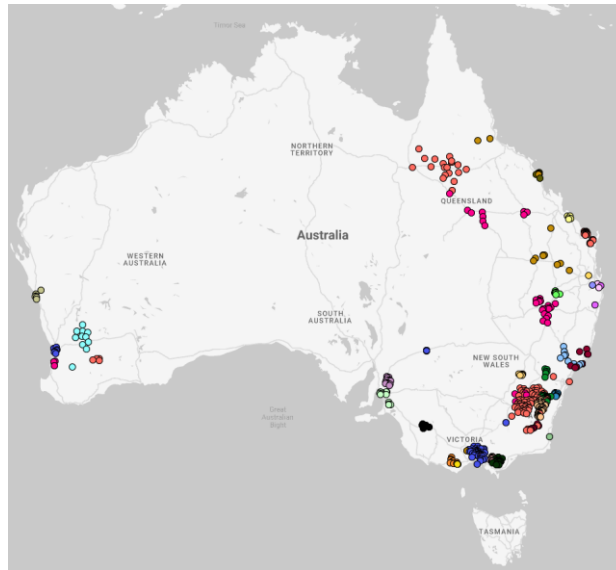
Figure A5. Pentanet coverage map and nbn access technology map⁵⁸

The growth of on-net subscribers for these alternative fixed wireless providers and their continued and increasing investment in their infrastructure portfolios (including via acquisitions) suggests that competition from them will significantly intensify over time.

⁵⁷ Superloop, *FY22 Full Year Results*, 26 August 2022.

⁵⁸ Pentanet, *Investor Presentation* and Pentanet coverage map accessed about October 2021 (nbn notes that Pentanet's coverage map was previously available via a link on the following webpage however this link no longer directs to that map: <https://help.pentanet.com.au/hc/en-us/articles/4403257087635-Everything-you-need-to-know-about-PentaMAX#heading-2>); nbn internal mapping software.

In addition, **nbn** understands that there are over 40 non-MNO fixed wireless providers who target certain regional and remote areas of Australia. Figure A6 shows the distribution of many of these ‘rural focused’ providers across Australia.



Note: The different coloured markers refer to different wireless providers

Figure A6. Coverage map of various ‘rural focused’ non-MNO fixed wireless providers⁵⁹

3.4 Fixed-line competition

Competition from alternative fixed-line network operators is also intensifying. The pricing of services on competing networks in respect of residential services is usually below **nbn**’s pricing as expected given that (as discussed below) they serve limited geographic regions and do not incur losses that arise from having an obligation to operate a national network connecting premises and supplying services upon reasonable request.⁶⁰ Alternative fixed-line networks are also growing in size and bandwidth capability. As the ACCC has itself noted, *“the rollout of superfast telecommunications infrastructure by network operators other than NBN Co in both new ‘greenfield’ developments as well as existing ‘brownfield’ areas provides an opportunity for network providers to enter and expand their market presence. It also applies competitive pressure on NBN Co to continue upgrading technology and improving service levels.”*⁶¹

nbn has observed that fixed-line competitors generally target large business end-users, areas where large numbers of end-users are concentrated (e.g., central business districts or high density inner urban residential areas and MDUs such as apartment complexes), or areas in which there is no, or limited, existing infrastructure (e.g., new housing developments and business parks). As **nbn** establishes its prices for wholesale access to residential fixed-line services on a national basis, and **nbn**’s prices reflect a cost base that includes the cost of

⁵⁹ Better Internet for Rural, Regional and Remote Australia: <https://birraus.com/alternative-fixed-wireless-providers/>. See Interactive Map: <http://www.zeemaps.com/pub?group=2307253> (accessed 3 October 2022). Image extract excludes Christmas Island.

⁶⁰ For example, TPG’s retail 50 Mbps services (using **nbn** services as an input) are priced at \$69.99 per month, while FTTB services with a typical evening speed of 90 Mbps are priced at \$59.99 per month: <https://www.tpg.com.au/nbn> and <https://www.tpg.com.au/fttb>. Similarly, GigaComm advertises a 200/50 Mbps service for \$79 per month, which is well below the prices offered by RSPs for **nbn**-powered 200 Mbps services: <https://www.gigacom.net.au/residential/apartment>.

⁶¹ ACCC, *Communications Market Report 2020-21*, December 2021, p. 13.



servicing many remote, difficult to access or complex installation premises, competitors can offer lower prices, or higher speeds at the same price, in lower-cost or high-population-density locations.

These factors enable competitors to ‘cherry-pick’ high value locations and attract customers that would otherwise be relatively low cost for **nbn** to service and generate higher margins on. Some smaller fixed-line providers may not need to contribute to the RBS levy, providing them with a \$7.45 per month (indexed annually), per chargeable premises, cost advantage over **nbn**. In addition, **nbn** is required to service higher cost locations under TiND policy obligations (and in some instances **nbn** is unable to recoup the cost contribution of servicing these premises from developers) as the default infrastructure provider for new developments. **nbn** can be required to provide services under its SIP obligations to developments where **nbn** was not selected as the broadband provider by the developer. It is likely to be more expensive to deploy infrastructure to these sites, generating lower profit margins for **nbn**.

nbn also faces direct competition from an increasing range of fixed-line network operators. As noted by the ACCC, alternative fixed-line networks often co-exist and compete directly with **nbn** services at a particular premises.⁶² Some of the market positions or approaches of major alternative fixed-line providers are described in Table A4 below.

Table A4. Market position or approach of alternative fixed-line providers

Alternative fixed-line provider	Summary of market position or approach
<p>TPG Telecom</p>	<p>TPG Telecom has an FTTB network in metropolitan apartment buildings across Australia (around 200,000 premises), as well as VDSL and HFC networks (around 90,000 and 100,000 premises, respectively).⁶³ Jonathan Rutherford, TPG Telecom group executive Wholesale, Enterprise and Government, noted that “<i>Vision Network’s mix of high-speed broadband technologies and our extensive network reach position us as a great alternative to NBN services.</i>”⁶⁴</p> <p>TPG has significantly expanded its FTTB network footprint recently, from 169,000 premises in FY19 to 244,000 premises in FY21.⁶⁵ TPG has also recently announced technology upgrades, such as G.Fast, which will enable it to provide speeds of up to 1000 Mbps via its FTTB network, facilitating deeper competition with nbn across a greater range of speed tiers.⁶⁶ TPG has also recently announced that it is conducting a review of its Vision Network and may be considering selling this business. nbn expects that potential sale will result in an injection of capital into TPG Telecom, allow it to focus on its fixed wireless strategy and would likely result in the new owner competing vigorously in fixed line to make a return on its acquisition.⁶⁷</p>

⁶² For example, the ACCC estimates that **nbn** fixed services are available at 94% of the 240,000 premises in high-density apartment buildings in Sydney, Melbourne, Brisbane, Adelaide, Perth, and other metro areas to which TPG Telecom FTTB services are available. ACCC, Communications market report 2020-21, 10 December 2021, p. 14.

⁶³ TPG Telecom HY22 Investor presentation cites 400k premises passed by its own infrastructure, p. 9: [Investor Relations | TPG Telecom 02555203.pdf \(weblink.com.au\)](https://www.tpgtelecom.com.au/sites/default/files/mediarelease/Media%20release_TPG%20Telecom%20launches%20superfast%20G.Fast%20network%20Upgrade.pdf) (accessed 10 November 2022).

⁶⁴ CommsDay, 26 September 2022.

⁶⁵ **nbn** internal data.

⁶⁶ TPG Telecom, *TPG Telecom launches superfast G.Fast broadband services*, 19 May 2022: https://www.tpgtelecom.com.au/sites/default/files/mediarelease/Media%20release_TPG%20Telecom%20launches%20superfast%20G.Fast%20network%20Upgrade.pdf (accessed 10 November 2022).

⁶⁷ Goldman Sachs, *TPG Telecom Ltd Announces strategic review of Vision Network; Potential for special dividends & simplified go to market for FWA; Neutral*, 31 October 2021.



Alternative fixed-line provider	Summary of market position or approach
Uniti Group	Uniti Group (which includes Opticomm and LBN Co) was acquired in July 2022 by a consortium comprising Morrison & Co and Brookfield Asset Management. It has an open access FTTP network focused on newly built commercial and residential projects and owns legacy FTTP networks that it acquired from Telstra (around 618,000 premises connected, ready to connect, in construction or contracted). ⁶⁸ The ACCC has also noted that Uniti <i>“has established itself as the largest residential fixed-line challenger to NBN Co with more than 565,000 premises connected, ready to connect, in construction or contracted, as at 30 June 2021”</i> . ⁶⁹
DGtek	DGtek is building an open access FTTP network in central Melbourne and has announced plans to extend its network to other cities. In June 2021, DGtek acquired FG Telecom, which reportedly expanded its network coverage by 25% allowing DGtek to have a target of one million premises passed by 2024. ⁷⁰ In October 2021, DGtek acquired the consumer infrastructure business of Spirit Technology Solutions for \$5.1 million. ⁷¹ This provided DGtek with access to residential customers in multi-unit buildings in Melbourne, Geelong, Brisbane, and the Gold Coast and more broadly <i>“materially increases DGtek’s footprint and number of connections, and will help accelerate its fibre rollout”</i> . ⁷²
GigaComm	GigaComm is a fibre and fixed wireless provider supplying services to business and residential customers. In August 2021, GigaComm announced expansion to apartments and businesses in inner-city Melbourne suburbs including Southbank, Docklands, Port Melbourne and South Yarra. ⁷³ In June 2022, GigaComm announced it successfully raised \$20.5 million to support expansion in New South Wales and Victorian inner-city suburbs, and entry into new markets including Brisbane and Canberra. ⁷⁴
Gigafy	Gigafy's business model focuses on providing wholesale broadband services to developers of residential complexes. Gigafy announced a partnership with InfraCo in October 2021 to leverage its dark fibre and significantly expand its addressable market across Australia, increasing its reach into six capital cities. Its first symmetrical gigabit fibre services were launched in Brisbane in December 2021. Gigafy COO Chris Hawke noted, <i>“With one month free and no contracts, Gigafy is finding it gets about 70-80% take-up when it goes head-to-head against NBN”</i> . ⁷⁵
New developments-focused	Competitors in the new developments market include Opticomm (part of Uniti Group), Lightning Broadband (part of Lynham Networks), FiberCorp, Interphone and Redtrain.

nbn’s largest retail service providers, including Telstra, Optus, TPG Telecom, Vocus and Aussie Broadband, who offer their own fibre-based broadband services directly to businesses, do so predominantly in the business districts of major cities. Telstra, Optus and TPG Telecom are also targeting government and enterprise end-users at the wholesale level.

⁶⁸ Uniti, *HY22 investor presentation (including Velocity)*, p. 20: [PowerPoint Presentation \(unitigrouplimited.com\)](#).

⁶⁹ ACCC, *Communications Market Report 2020-21*, 10 December 2021, p. 14.

⁷⁰ DGtek: <https://dgtek.net/tpost/kxmh5vzpp1-independent-full-fibre-network-dgtek-acq> (accessed 10 November 2022).

⁷¹ DGtek: <https://dgtek.net/tpost/el3fzdt241-dgtek-to-acquire-consumer-infrastructure> (accessed 10 November 2022).

⁷² DGtek: <https://dgtek.net/tpost/el3fzdt241-dgtek-to-acquire-consumer-infrastructure> (accessed 10 November 2022).

⁷³ GigaComm: <https://www.gigacomm.net.au/blog/super-charging-connection-melbourne> (accessed 10 November 2022).

⁷⁴ GigaComm: <https://www.gigacomm.net.au/blog/gigacomm-secures-20million-funding> (accessed 10 November 2022).

⁷⁵ CommsDay, November 2020.



3.5 New developments

nbn faces competition from Uniti Group as well as a growing range of smaller players (e.g., Gigafly) in new developments. The same competitive forces that have been outlined earlier in the submission are prevalent in new developments (i.e., competition with alternative fixed-line infrastructure providers and fixed wireless operators), though it should be noted that **nbn** is bound by policy, regulation and legislation that its competitors are not. This has an impact on **nbn**'s ability to operate in the same commercial manner as its competitors in the new developments market.

Uniti Group, like other network operators that service new developments, is a functionally separated competitor without lines of business restrictions equivalent to **nbn**. The lines of business restrictions prohibit **nbn** from supplying certain services and places **nbn** at a competitive disadvantage in this market.

The practical effect of **nbn**'s lines of business restrictions in new developments is that they present Uniti Group, and other network operators that serve new developments, with an artificial competitive advantage in the supply of certain building fibre infrastructure. This includes, for example, free-to-air TV and non-communications services, such as intercoms and CCTV. Alternative providers can bundle these services with a fibre build as a zero-cost add-on. In contrast, lines of business restrictions mean that **nbn** can only offer these features as a wholesale service offering to an RSP intermediary. This adds unnecessary cost and complexity for the developer. Aside from not serving the policy imperatives that the lines of business restrictions were designed to accomplish in residential telecommunications, in the new developments context they also yield an outcome that is detrimental to consumer choice, affordability and long-term sustainable competition by militating against the free availability of such fibre-based infrastructure within new developments served by **nbn**.

Indeed, while consumers and businesses rely on broadband access to enable a range of digital services, much revenue growth is captured above the connectivity layer. This encourages bundling of such services to increase revenue and potential cashflow for reinvestment including in underlying infrastructure. As above, **nbn** cannot offer such services given its lines of business restrictions. **nbn** considers that it is at a competitive disadvantage, created by legislation, to competitors which can do so.

3.6 Satellite

Satellite technology is currently undergoing significant and rapid changes. This is creating risks of unpredictability in future consumer demand and buying behaviour. **nbn** considers it will likely face significantly increasing competition from substitute technologies that are currently unknown, unforeseen, or only emerging, such as low earth orbit satellite (**LEOSAT**) technologies.

LEOSAT operators are still in the early stages of deploying their constellations, and customer terminal costs and plans remain high compared to other access technologies including retail services supplied over **nbn**'s network. LEOSATs, however, may be able to provide greater throughput and lower latency compared with traditional geostationary satellites. Research in the United States by Morgan Stanley suggests that the addressable market for LEOSATs should be thought of as broader than merely remote households and underserved populations.⁷⁶ Morgan Stanley estimates that this addressable market could be at least 100 times larger, potentially including every moving device (e.g., IOT services in vehicles) as well as enterprise level services.

⁷⁶ Morgan Stanley Research Update: Space | North America, 13 September 2022.



SpaceX's 'Starlink', for example, is licensed to provide satellite broadband services across Australia and is currently supplying services via its LEO constellation in parts of Australia. **nbn** understands Starlink has over 3,000 LEOSATs in orbit and is targeting a constellation size of between about 12,000 to 42,000 depending on approvals and other factors. Starlink in Australia was considered the fastest satellite provider in Oceania with median download speeds of 124 Mbps and latency of 47ms.⁷⁷ **nbn** understands Starlink stated download speeds for its residential service should range between 50 Mbps and 200 Mbps with latency of 20ms to 40ms and download speeds for its business plans were advertised as capable of speeds of 350 Mbps.⁷⁸

Other emerging LEOSAT operators include OneWeb (428 LEOSATs currently in orbit with a targeted constellation size of 648 LEOSATs),⁷⁹ Telesat (targeted constellation size of 188 LEOSATs)⁸⁰ and Amazon's Kuiper (targeted constellation size of 3,236 LEOSATs, though **nbn** understands this could increase to 7,774).⁸¹ **nbn** understands that Astra Space Platform Services and Boeing may also have LEOSAT aspirations as they made relevant regulatory filings with the Federal Communications Commission (FCC).

nbn expects that LEOSATs will focus on maximising customer ARPU rather than the total number of customers, given what may be initially limited network capacity. **nbn** predicts this will involve LEOSAT operators initially cherry-picking customers with greater ability to pay in regional or outer metropolitan areas to then build out their customer bases.

While **nbn** appreciates that regional customers may benefit from this choice and competition, there are currently relatively high costs associated with a residential LEOSAT connection (e.g., Starlink's service fee is currently \$139/month with a hardware charge that increased in around May 2022 from \$709 to \$924).⁸² This suggests that there will still need to be a default infrastructure provider of affordable services, such as **nbn**. Cherry-picking behaviour risks lower revenues and operating margins for **nbn** or any provider of last resort. **nbn** would also still need to charge uniform prices to subsidise higher cost regional and remote locations, even if revenues fell as a result of cherry-picking in those locations and others as outlined above.

3.7 Competition incentivises efficient pricing outcomes

To retain customers on its network in these competitive circumstances, **nbn** will be required to dynamically respond to pricing and product trends in the market. **nbn** is not incentivised to raise effective prices to inefficient levels or in a way that would be detrimental to competition or the long-term interests of consumers.

nbn faces substantial and increasing competition from other fixed and wireless network operators in numerous segments. These network operators are often also RSPs who supply **nbn** services. They are increasingly focusing on migrating or substituting services on their own networks to replace **nbn** services. **nbn** is observing churn and decreased take-up rates of **nbn** services as a result of this competition. The regulatory (including pricing) landscape must account for these impacts.

⁷⁷ Ookla: <https://www.ookla.com/articles/starlink-hughesnet-viasat-performance-q1-2022> (accessed 10 November 2022).

⁷⁸ See: <https://www.whistleout.com.au/Broadband/Guides/Starlink-Australia-Everything-you-need-to-know>.

⁷⁹ OneWeb press release, 10 February 2022: <https://oneweb.net/resources/oneweb-confirms-successful-launch-34-satellites-delivering-ongoing-momentum-start-2022>.

⁸⁰ See: <https://www.satellitetoday.com/business/2022/05/06/telesat-downsizes-light-speed-constellation-plans/>.

⁸¹ See: FCC report, 4 November 2021, <https://fcc.report/IBFS/SAT-LOA-20211104-00145/13337525>.

⁸² See: <https://www.starlink.com/> (accessed 5 October 2022).



Assuming that **nbn** is an unconstrained monopoly such that it could extract monopoly rents is inconsistent with evidence from the telecommunications market over the last 20 years. Prices for connectivity products have experienced declines in real and quality-adjusted terms. It is also inconsistent with increased proliferation of competition across access technologies. Such an assumption would require that **nbn** faces no competitive constraint at all and can price unconstrained by any actual or potential competition. This is not the case.

The extent of competition and substitution risk outlined above mean that **nbn** faces substantial revenue sufficiency risk. The consequence of this is that **nbn** faces the risk of being unable to generate sufficient cashflows to sustain its business and continue to invest in the network to meet its policy obligations and the needs of end-users.

Unlike standard utilities with inelastic demand, **nbn** cannot maximise its profitability by rebalancing its fixed and variable price components or increasing prices without affecting demand. If **nbn** were to increase prices on lower speed tiers, this would for example significantly increase the risk of entry level end-users switching away from the **nbn**[®] network to viable alternative platforms, such as mobile broadband. Price increases would increase the incentives for RSPs to offer those alternative services, where they have the ability to do so, and would undermine the efficiency of **nbn**'s pricing for higher usage end-users, who derive greater value from its services, and hence have a greater willingness to pay.

Additionally, **nbn** is the default SIP under the *Telecommunications Act 1997* (Cth) (**Telecommunications Act**) and is subject to Category B standard access obligations (**SAOs**) in the CCA to supply eligible services on request. This means **nbn** cannot refuse to connect premises to the **nbn**[®] network to reduce its costs. Furthermore, the charges that **nbn** can levy on developers for rolling out broadband infrastructure in new developments is capped as set out in the Government's TiND Policy. **nbn** is therefore unable to reduce its incremental investments and sweat existing assets in the face of growing competition or increasing network substitution.

Rather, **nbn** is incentivised, wherever a commercial business case exists (but subject to capital budget constraints and sufficient regulatory certainty) to invest in improvements in the quality of its services, in order to compete to attract and retain customers on its network. Examples of this include **nbn**:

- announcing and expanding the Fibre Connect Program as part of **nbn**'s \$4.5 billion plan to upgrade FTTN and FTTC connections to FTTP, enabling access to the wholesale download speeds of close to 1 Gbps on demand for more end-users;⁸³
- overprovisioning the downlink component of its Home Fast and Home Superfast products by around 10 – 15% and launching three new residential wholesale products (Home Fast, Home Superfast and Home Ultrafast) in 2020;⁸⁴
- entering into co-funding arrangements with the Federal Government to invest an additional \$750 million to fast track 5G-enablement of **nbn**'s fixed wireless network and enhance data allowances and network performance on **nbn**[®] Sky Muster and Sky Muster Plus services,⁸⁵ and also entering into co-funding

⁸³ **nbn**, *NBN Co offers further fibre upgrades as part of \$4.5 billion plan*, 22 March 2022: <https://www.nbnco.com.au/corporate-information/media-centre/media-statements/nbn-co-offers-further-fibre-upgrades-as-part-of-four-and-half-billion-plan>.

⁸⁴ **nbn**, *NBN launches three new residential wholesale higher speed tiers*, 29 May 2020: <https://www.nbnco.com.au/corporate-information/media-centre/media-statements/nbn-launches-three-new-residential-wholesale-higher-speed-tiers>.

⁸⁵ **nbn**, *\$750 million investment to 5G-enable nbn™ Fixed Wireless to deliver faster speeds to regional Australia*, 22 March 2022: https://www.nbnco.com.au/content/dam/nbn/documents/media-centre/media-statements/2021/media-release-750-million-investment-to-5G-enable-nbn-Fixed-Wireless_220322.pdf.



arrangements with the Federal and various State Governments to deepen fibre in the **nbn**[®] network including in rural, regional and remote areas;

- launching the Business Satellite Service (**BSS**) in 2019 and expanding its coverage to 100% of the Australian mainland and surrounding large islands to help RSPs deliver business-grade services to businesses with hard-to-reach remote operations,⁸⁶
- launching the Enterprise Ethernet wholesale product in 2018 to offer business customers high speed symmetrical plans, enhancing Enterprise Ethernet in 2022 to provide access to wholesale speed tiers of up to 10 Gbps,⁸⁷ expanding Business Fibre Zones across Australia and introducing a Service Delivery Guarantee with a commitment to complete the design and construction of new fibre infrastructure in most business locations within the **nbn**[®] fixed-line footprint within 50 business days,⁸⁸ and
- launching **nbn**[®] Sky Muster Plus plans in 2018, delivering a wholesale 25 Mbps product that can burst above the 25 Mbps wholesale speed when applications and network support allows and removing monthly data allowance towards essential internet services – like internet banking and email.⁸⁹

If infrastructure providers perceive demand-side and revenue risks to be significant, the incentives for providers such as **nbn** to act efficiently when investing in and operating its network will be greater.⁹⁰ The large-scale nature of the investment and the significant (and expected) losses made in the construction phase also significantly influence **nbn**'s incentives to ensure that it migrates end-users to, and retains end-users on, the **nbn**[®] network, particularly given this demand-side uncertainty.

In summary, the revenue sufficiency risk faced by **nbn** provides it with strong commercial incentives to:

- continue to invest in its network and to price at levels that maximise demand for **nbn**'s services;
- develop new products to drive the take-up and use of the **nbn**[®] network; and
- only incur costs that it has a high degree of confidence that it can recover over the lifecycle of **nbn**'s network and service offerings.

⁸⁶ **nbn**, *Coverage increase and reduced wholesale prices to enhance business **nbn**[™] satellite service*, 25 March 2021: <https://www.nbnco.com.au/content/dam/nbn/documents/media-centre/media-statements/2021/nbn-media-release-coverage-increase.pdf>.

⁸⁷ **nbn**, *Up to ten-times faster wholesale speed options for business*, 30 June 2022: <https://www.nbnco.com.au/corporate-information/media-centre/media-statements/up-to-ten-times-faster-wholesale-speed-options-for-business>.

⁸⁸ **nbn**, *'NBN Co creates 44 new **nbn**[™] Business Fibre Zones, offers wholesale discounts on business **nbn**[™] Enterprise Ethernet services*, 9 August 2021: <https://www.nbnco.com.au/content/dam/nbn/documents/media-centre/media-statements/2021/media-release-nbn-co-to-create-44-new-nbn-business-fibre-zones-and-introduce-national-discounts-for-enterprise-ethernet-business-broadband.pdf>.

⁸⁹ **nbn**, *NBN Co boosts wholesale data allowances and bush connectivity with new Sky Muster[™] Plus*: <https://www.nbnco.com.au/content/dam/nbnco2/2018/documents/media-centre/media-statement-sky-muster-plus.pdf>.

⁹⁰ ACCC, *NBN Co Special Access Undertaking – Final Decision*, 13 December 2013, p. 95.



4 Demand for higher speeds will continue to grow

Australia's internet speed requirements will continue to grow in line with the digitisation of the country and 50 Mbps will not be sufficient for most end-users in the future. This view is supported by a large and growing body of network usage data and consumer research from both Australia and internationally.

nbn's modelling, based on **nbn's** consideration of the technical requirements for applications used on the **nbn**[®] network suggests that approximately 52% of customers today require download speeds of 50 Mbps or more. **nbn** projects that this may reach 70% by 2028. **nbn** considers this is a relatively conservative estimate because as at June 2022 more than 76% of AVCs are 50 Mbps or higher. This modelling is supported by observable global trends as well as by direct observations of end-user experience on the **nbn**[®] network.

nbn's estimates contrast with those relied upon by the ACCC in its May 2022 Consultation Paper which suggest that in 2028, the median needs of end-users will only be 29 Mbps – this would suggest that Australia is an international outlier in speed requirements – which has not been **nbn's** experience over the past decade.

Even today the characteristics of the TCP/IP protocols used to deliver internet services, the algorithms used by applications such as streaming video services, and the increasing level of concurrency of usage of services on the **nbn**[®] network suggest that 50 Mbps may be required to deliver a reasonable level of service in most cases. This is borne out by the real-world experience observed by **nbn** on its network.

nbn's traffic modelling methodology and **nbn's** 10-year usage and speed forecasts which are relied upon by **nbn** for commercial and operation purposes have been independently assessed by Roberson and Associates who found that *“the **nbn** model is a reasonable and conservative means of producing estimates of future capacity needs.”*⁹¹ This finding followed an in-depth and independent assessment by Roberson and Associates of **nbn's** traffic modelling methodology and **nbn's** 10-year usage and speed forecast.

Additionally, Analysys Mason concluded that **nbn's** future investments to upgrade the network to meet **nbn's** 10-year usage and speed forecasts were both prudent and efficient. Specifically, Analysys Mason concluded that *“making FTTP available across the network would represent a prudent and efficient approach to ensuring that **nbn** is able to meet anticipated bandwidth demand at least up to 2040.”*⁹²

4.1 Overview and context

The demand for higher access speeds will grow at much faster rates than expressed in the ACCC's May 2022 Consultation Paper⁹³ and, in **nbn's** view, forecasts of the Bureau of Communications and Arts Research (**BCAR**) in relation to future household speed requirements are low and are not supported by broader evidence regarding broadband usage trends in Australia and internationally. There are long-term observable trends that point to the ongoing demand for higher-speed services over time.

In **nbn's** opinion (and consistent with global thinking), internet speed requirements will continue to grow in line with the digitisation of the country and 50 Mbps will not be sufficient for most end-users in the future. The

⁹¹ Roberson and Associates LLC, *Future Bandwidth Requirements in Australia – Independent Expert Report*, 2 November 2022.

⁹² Analysys Mason, *Prudence and efficiency review of **nbn's** network selection, upgraded methodology and the design of its FTTC network*, 20 June 2022, p. 8: <https://www.accc.gov.au/system/files/Analysys%20Mason%20FTTC%20architecture%20and%20upgrade%20to%20FTTP%20-%20final%20report.pdf>.

⁹³ ACCC, *Proposed variation to the NBN Co Special Access Undertaking*, Consultation paper, May 2022.



reasons for this are expanded on further in section 4.3 below. **nbn**'s views are firmly based on real-world experience and actual tests of **nbn** end-user requirements. While **nbn** is in broad agreement with the BCAR forecasts for long-term usage growth, **nbn** does not agree with BCAR's analysis (which was relied on by the ACCC in its May 2022 Consultation Paper) about how this would translate into end-user requirements for higher speeds in order to achieve an acceptable level of performance.

These issues have been considered in detail by **nbn**, including by conducting traffic modelling. In addition, an independent expert review of **nbn**'s traffic modelling methodology and its 10-year usage and speed forecasts was conducted by Roberson and Associates.

In summary, **nbn** notes that the independent review found that (among other things):⁹⁴

- *the **nbn** model is a reasonable and conservative means of producing estimates of future capacity needs;*
- ***nbn** utilises a model for predicting traffic that should provide realistic expected data usage given current user trends;*
- *the usage and speed modelling results from **nbn** are reasonable, and Roberson and Associates agree with the predictions derived by **nbn**'s model; and*
- ***nbn**'s modelling effort is both valid and appropriate – in fact, **nbn**'s predictions may be conservative (particularly over a longer five to ten year timeframe) in the sense that **nbn** could benefit in the future from reviewing potential inflection points and new usage patterns as predicted by groups such as the Institute for the Future.*

nbn believes that ongoing investment in its network is required to ensure **nbn** can meet demand and continue the remarkable benefits of digitisation witnessed in Australia for the last 20 years. This is what **nbn** was created to do. The significant lead time in building the physical infrastructure required to support increasing speed and data demand and the consequences of underestimating demand (and therefore failing to make the necessary network investments in time to meet that demand) could take years to correct. The SAU must allow **nbn** to make required investments in a timely way.

Sections 4.2 and 4.3 below provide further information about expected future internet bandwidth and speed requirements, as well as likely future end-user speeds.

4.2 What the data and research show about internet bandwidth and speed requirements

nbn's network utilisation data shows that:

- as of April 2022, 45% of all **nbn** 25 Mbps services in operation reach their maximum possible utilisation at least twice a month, suggesting that these services are being used at the limit of their bandwidth capacity.⁹⁵ This has significantly increased from 33% in April 2021;
- Across all speed tiers, 29% of **nbn** services in operation achieve their plan's maximum utilisation threshold at least twice a month. This suggests a high level of usage intensity of **nbn**[®] network, which is rapidly increasing over time; and

⁹⁴ Roberson and Associates LLC, *Future Bandwidth Requirements in Australia – Independent Expert Report*, 2 November 2022, pp. 2-3.

⁹⁵ **nbn** internal data.



- The median fixed download speeds in Australia have already reached 51.90 Mbps as of May 2022, almost double the household speed requirements predicted by BCAR for 2028.⁹⁶

The above data and observations call into question the veracity of the BCAR modelling, relied on by the ACCC, which suggested the median household speed requirement in 2028 will be only 29 Mbps.

The BCAR's projection is also inconsistent with global broadband usage trends. In May 2022, the top 25 countries by median fixed broadband speed in the world all had median download speeds above 100 Mbps.⁹⁷ In the 12-month period between June 2021 and May 2022, the global median download speed rose from 50.78 Mbps to 64.70 Mbps, a growth of 18.1% in a single year.⁹⁸ The growth rate is even more impressive when calculated from October 2020, with global median speeds rising by 61.9% between October 2020 and May 2022.

Supporting **nbn's** view, earlier this year the FCC in the United States circulated a Notice of Inquiry proposing a change in the definition of a broadband connection in the United States from 25 Mbps to a 100 Mbps minimum download speed. It was noted by FCC Chairwoman Jessica Rosenworcel that:

the needs of internet users long ago surpassed the FCC's 25/3 [Mbps] speed metric, especially during a global health pandemic that moved so much of life online. ...we need to raise the standard for minimum broadband speeds now and while also aiming even higher for the future, because we need to set big goals if we want everyone everywhere to have a fair shot at 21st century success.⁹⁹

This proposal to increase the thresholds in the definition of broadband from a foremost global telecommunications authority supports the view that minimum broadband requirements are increasing – which, **nbn** submits, must be adequately accounted for in Australia, as well.

Consumer research also indicates that end-users are increasingly valuing speed of service compared to other attributes, such as price, and are willing to pay a premium for higher-speed services. Evidence in support of this view includes:

- in 2017, 18% of households chose speed as the most important factor when selecting an internet service provider, with 32% choosing price as the most important factor;
- in 2021 **nbn** noted that household preferences had shifted with 25% of households choosing speed and only 23% choosing price as the most important factor;¹⁰⁰ and
- the number of households acquiring a non-**nbn** fixed-line service with speed tiers of 100 Mbps and above increased from 13% in 2020 to 20% in 2022, suggesting that increased demand for higher-speed services is a general, consumer-led trend that arises independently of **nbn's** pricing construct.¹⁰¹

In **nbn's** view, this evidence does not support BCAR's view¹⁰² that 95% of households will not require speeds greater than 56 Mbps by 2028.

⁹⁶ Ookla Speedtest Global Index, May 2022: <https://www.speedtest.net/global-index>.

⁹⁷ Ookla Speedtest Global Index, May 2022: <https://www.speedtest.net/global-index>.

⁹⁸ Ookla Speedtest Global Index, May 2022: <https://www.speedtest.net/global-index>.

⁹⁹ FCC media release, 15 July 2022: <https://www.fcc.gov/document/chairwoman-rosenworcel-proposes-increase-minimum-broadband-speeds>.

¹⁰⁰ ERGO Strategy primary research on behalf of **nbn**.

¹⁰¹ ERGO Strategy primary research on behalf of **nbn**.

¹⁰² Bureau of Arts and Communications Research, *Demand for fixed-line broadband in Australia – 2018-2028*, Working paper, July 2020, p. 26: <https://www.infrastructure.gov.au/sites/default/files/documents/demand-for-fixed-line-broadband-in-australia-2018-2028-working-paper.pdf>.



In this context, **nbn** considers it highly unlikely that in six years, median speeds will remain only slightly above the capabilities of the 25 Mbps speed tier as assumed by the ACCC in their March discussion paper. To the contrary, based on current bandwidth growth patterns and trends, it is more likely that over the course of the next decade (and beyond), end-users will increasingly switch to higher-speed services of 100+ Mbps. This is likely to result in an upward shift in the field of product differentiation, with a progressive convergence among sub-100 Mbps speed tiers coexisting with increased differentiation of products above 100 Mbps.

4.3 Detailed analysis of likely future end-user speeds

Figure A7 below illustrates **nbn**'s estimates of monthly downloads per AVC on an application basis between June 2021 to June 2031. **nbn** projects that total downloads will grow over time, to approximately 700 GB by June 2028, and that video will continue to grow as an overall proportion of application usage over time.

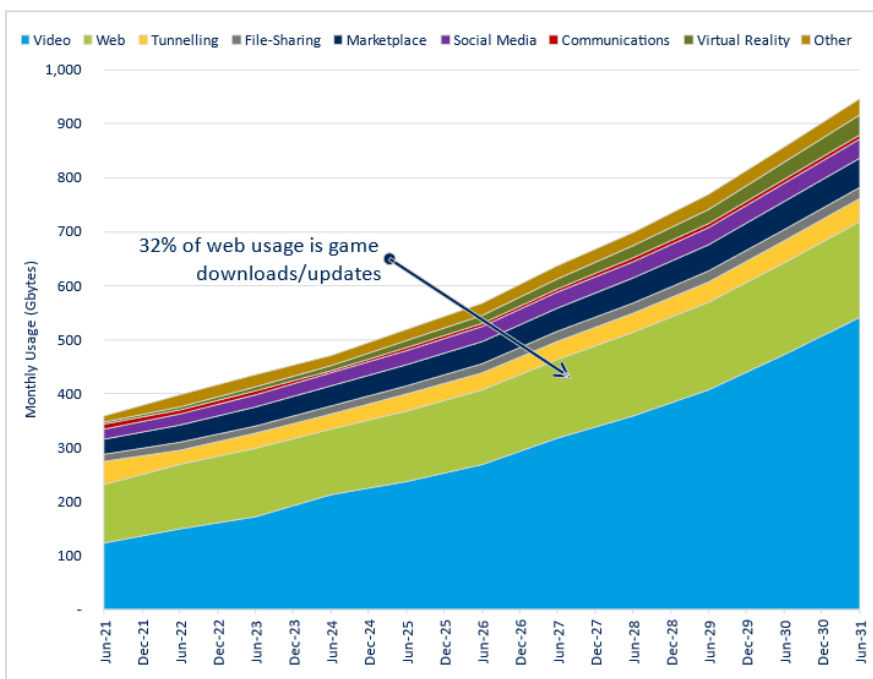


Figure A7. Downstream Application Usage Forecast to 2031

nbn's modelling, based on 10-year usage forecasts, suggests that approximately 52% of customers today require download speeds of 50 Mbps or more. **nbn** projects this may reach 70% by 2028 (see Figure A8). **nbn** considers this is a relatively conservative estimate because, as at June 2022, more than 76% of TC-4 AVCs supplied by **nbn** are 50 Mbps or higher. It is important to note that this analysis focuses solely on technical bandwidth requirements as an indicator of speed preference and does not account for other aspects of consumer preferences, including consumers who may prefer a higher speed due to its expediency benefits rather than based on their bandwidth requirements. Equally, it does not account for consumers' tolerance for congestion as some consumers may prefer a lower speed (and price) at the cost of performance. That is, the material in this section is based on **nbn**'s consideration of the technical requirements for applications used on the **nbn**[®] network, rather than pricing and commercial considerations.

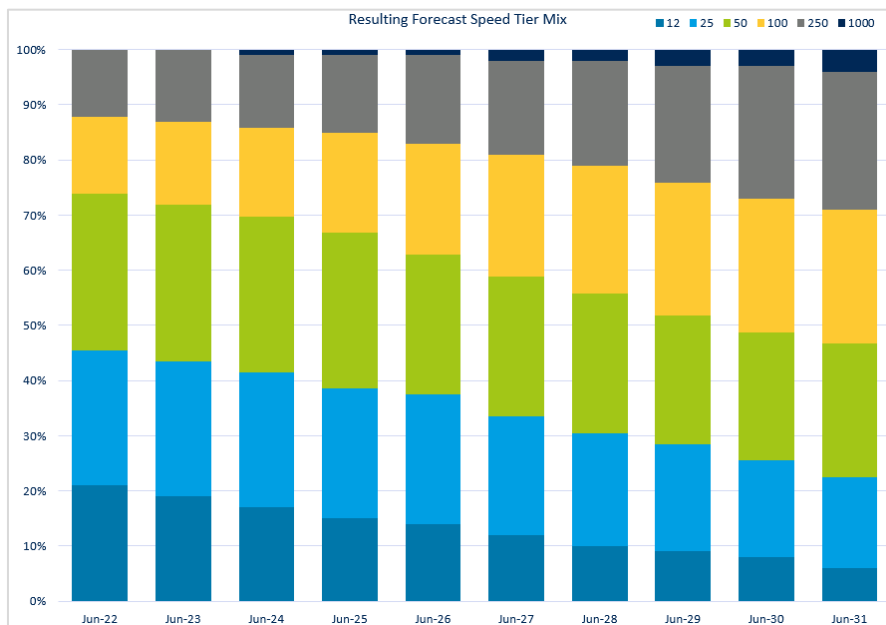


Figure A8. nbn Forecasting of Speed Tier Mix to June 2031

While growth in downstream application usage is predicted to be significant, there are many other relevant data points when considering what end-user speeds will be required by Australian consumers in future. As monthly household downstream application usage is likely to comprise considerable video traffic, it is important to accurately understand how video applications function and utilise the capacity of each household connection, and the impact this has on end-user experience. The prevalence of and likely increase in simultaneous / concurrent application usage (concurrency) within a household (especially as applications demand greater bandwidth over time) also impacts video streaming applications. **nbn** considers these factors are likely to translate into end-user experiences that drive demand for household speeds much greater than a median of 29 Mbps by 2028.

nbn notes that BCAR has forecasted that average monthly household data downloads would rise from 199 GB in 2018 to 767 GB in 2028.¹⁰³ It also noted that video comprised 75% of internet traffic in 2017 and expected this to reach 82% worldwide by 2022.¹⁰⁴

While **nbn** broadly agrees with the growth in total download volumes used by the BCAR, **nbn** does not agree with the way the BCAR has applied these volume forecasts to its projections of future household peak bandwidth demand. BCAR’s methodology for projecting such demand relied on assumptions about video streaming throughput requirements which are inconsistent with how streaming applications function in practice and the impact of concurrency. For example, BCAR estimated peak speeds by averaging streaming application bit rates across an hour, which over-simplifies the way in which applications use the network, as explained in the following section.

¹⁰³ Bureau of Arts and Communications Research, *Demand for fixed-line broadband in Australia – 2018-2028*, Working paper, July 2020, p. 9.

¹⁰⁴ Bureau of Arts and Communications Research, *Demand for fixed-line broadband in Australia – 2018-2028*, Working paper, July 2020, p. 9.



4.3.1 Peak download rates and the ‘bursty’ nature of applications

While focusing on the sustained average bandwidth requirements of applications¹⁰⁵ may be appropriate for some purposes, it is not appropriate when the aim is to understand application performance and impacts on end-user experience. The throughput requirements of streaming applications should instead be measured according to peak download rates rather than average sustained bandwidth. This is because peak download rates are better able to explain changes in streaming bit rates (which determine observable video quality and thus end-user experience), especially when accounting for available household bandwidth and concurrency. This is because of the nature of TCP/IP connections generally and streaming application buffer behaviour in particular.

Generally, applications require higher connection bandwidths to sustain a particular level of average throughput (due to how TCP/IP works). Simply measuring and adding each individual application’s *average* bandwidth requirement is not appropriate for calculating *peak* speeds. A server sending data to a connection does not know the bandwidth available for the application being used. It needs to continually probe the connection to determine the bandwidth available to that application, which can change over time.

At the start of the connection (known as TCP slow start), the server increases the sending rate to the end-user exponentially until packet loss or increased delay is experienced (via acknowledgments) (‘A’ in the figure below). Delay and packet loss trigger the server to reduce the sending rate (‘B’ in the figure below and the process of increasing the sending rate occurs again). This repeating pattern (TCP congestion control) results in an average speed (measured over seconds) less than the peak (measured in milliseconds) (‘C’ in the figure below). A peak bandwidth greater than the average bit rate is therefore required to achieve this average. For an individual TCP stream, the average bit rate will always be lower than the provisioned connection bandwidth. Figure A9 below is a visual representation of this process.

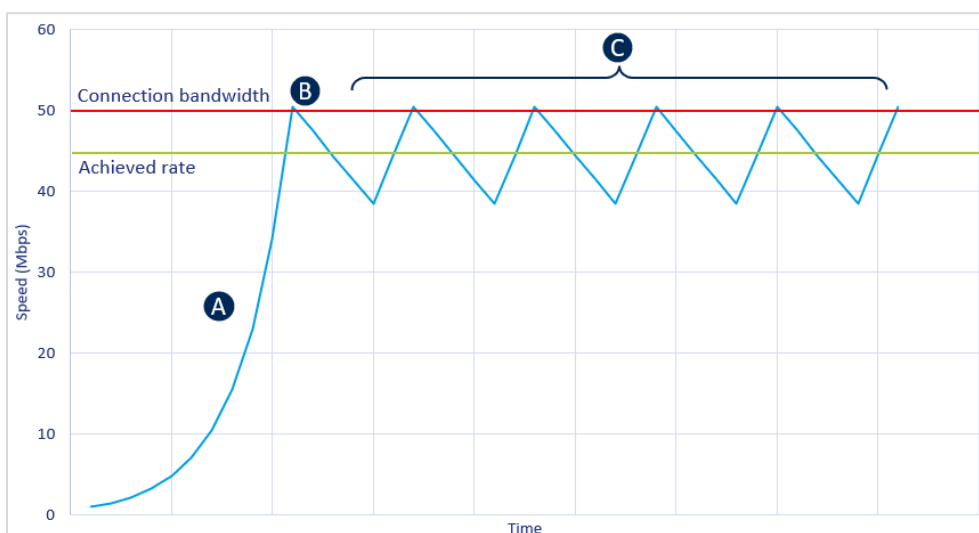


Figure A9. Simplified Example of TCP Congestion Control

Figure A10 below is an example of a file download on an **nbn** Home Ultrafast¹⁰⁶ connection. The left chart shows the throughput achieved for the file download in one second intervals. The chart on the right shows the throughput achieved for the same download measured on millisecond timeframes. While the chart on the left

¹⁰⁵ See BCAR, *Demand for fixed-line broadband in Australia 2018-2028*, Working paper, July 2020, p. 73 Appendix F: Caveats to the analysis: <https://www.infrastructure.gov.au/sites/default/files/demand-for-fixed-line-broadband-in-australia-2018-2028-working-paper.pdf>.

¹⁰⁶ The Home Ultrafast speed tier supports wholesale download speeds of 500 Mbps to close to 1 Gbps.



presents a relatively ‘clean’ average throughput, the chart of the right demonstrates how TCP/IP functions as the throughput oscillations (i.e., ‘burstiness’) can be observed.

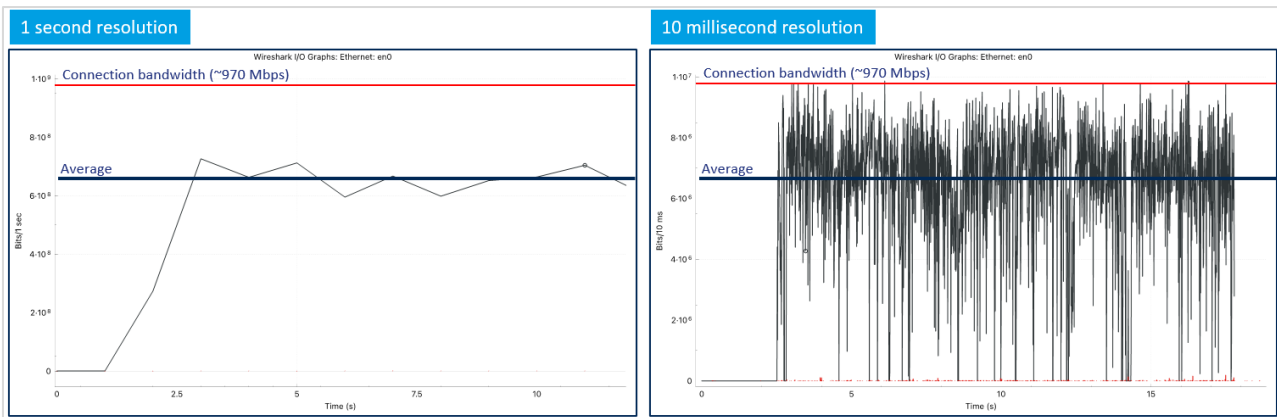


Figure A10. Micro-level Measurement of Download on nbn Home Ultrafast Connection

Servers for streaming services do not generally ‘trickle’ video at the required content bit rate. The server is either sending video data as fast as the end-user’s connection supports or not sending this data. A streamed video is many small file downloads spaced apart so that the playback remains continuous. Streaming video clients are continually checking to see if the buffer can be filled up in time to maintain continuous playback. If there is contention and the buffer is depleting too fast, the quality and/or resolution will be reduced. Bandwidth headroom is therefore required to allow for contention of the service (especially with concurrent streaming) and to ensure consistent video quality. Figure A11 below is based on an **nbn** test conducted using a major streaming client of a popular streaming series in UHD for a single video stream. It uses the results of this test to illustrate two theoretical concurrent video stream scenarios (one without and one with overlapping buffering/throughput, i.e., ‘collision’).

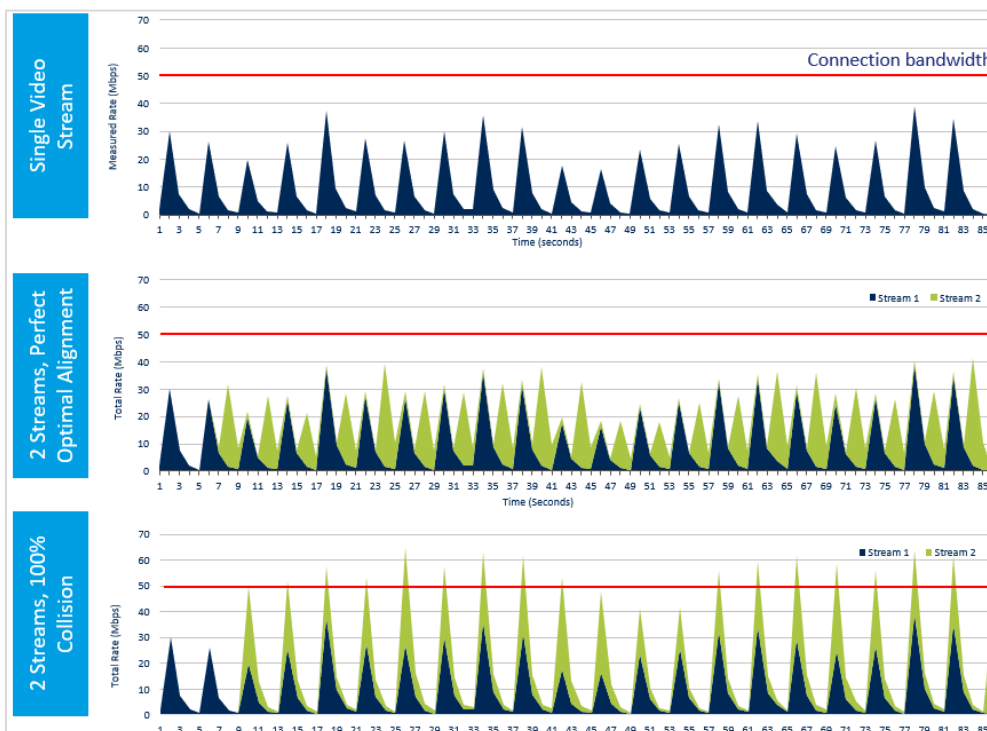


Figure A11. Lab Test of a Streaming Service and Concurrent Buffering Collision

If capacity is provided only to support a streaming application’s stated codec rate (e.g., 15 Mbps for 4K video), then the streaming client is likely to detect that it cannot keep its buffer from emptying, causing jarring interruptions in playback and will consequently reduce the codec rate so that a buffer can be created. This may, for example, result in a poorer quality 4K image or even a reduction in image resolution in certain circumstances.

It is not correct to simply add up each application’s average demand to determine a maximum household bandwidth requirement. Most applications, especially video streaming applications, are ‘bursty’ in the way they download data. In the case of video streaming, for example, the streaming client downloads at a high rate and then falls back to low or zero bit rates (filling the ‘buffer’). When that buffer is approaching its end the client downloads at a high rate again and falls to low or zero bit rates until the next time the buffer needs to be filled. These bursts have a probability of collision with other applications in use on the end-user’s connection. The provisioned bandwidth of an end-user’s connection needs to cater for this ‘bursty’ behaviour. If the maximum household bandwidth is exceeded, including during a burst, application performance will be impacted (e.g., image quality or resolution degradation, interrupted playback, delay on other concurrent applications, etc.).

Figure A12 below compares the simple approach of adding up application averages to determine maximum bandwidth requirements (Stacked Average Bit Rates) against an Actual Instantaneous Demand approach. Actual Instantaneous Demand takes into account the ‘bursty’ nature of applications (e.g., their peak download rates) and the probability of each application’s ‘burst’ colliding across time. **nbn** considers this is a more accurate method for assessing end-user bandwidth requirements and ultimately end-user experience. In comparison, the Stacked Average Bit Rates approach (which is the approach used by the BCAR in determining their expectations of future bandwidth requirements) of averaging and adding application bit rates may downplay end-user experience as it does not recognise the incidence of application collision (with potential resultant application performance degradation) in the busy period.

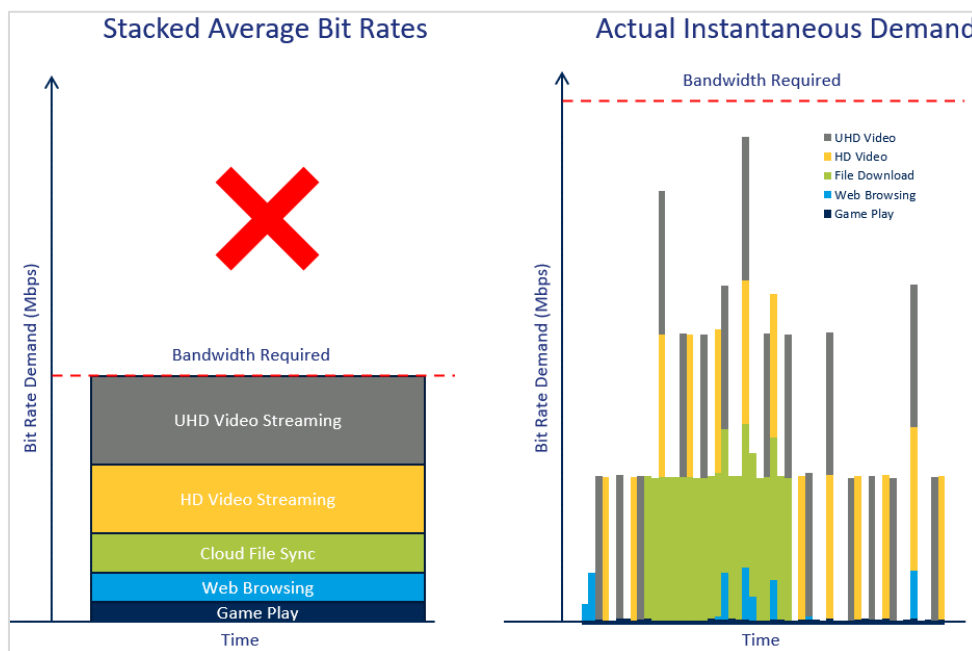


Figure A12. Example Comparison of Summed Averages vs Instantaneous Demand (Simplified)



4.3.2 The prevalence of concurrency

As was suggested by Figure A11 above, the amount of concurrency (and collision) experienced on an end-user’s connection impacts application performance where there is inadequate household bandwidth.

nbn has observed that concurrency is common, with approximately 60% to 95% of AVCs experiencing concurrency during the busy hour of 9pm. **nbn** has also observed that the amount of time AVCs experience concurrency ranges from 35% to 50% of that busy hour (depending on speed tier). Figure A13 below shows the amount and duration of concurrency across 72,000 AVCs **nbn** sampled during the busy hour of 9pm.

Lower speed tier (12 to 50 Mbps) AVCs also experience some level of concurrency (i.e., two or more concurrent applications). Measured concurrency within the home for these speed tiers is high, with 60-73% of these connections (‘A’ in the figure below) using two or more applications for approximately 20-25 minutes during the busy hour (‘B’ in the figure below).

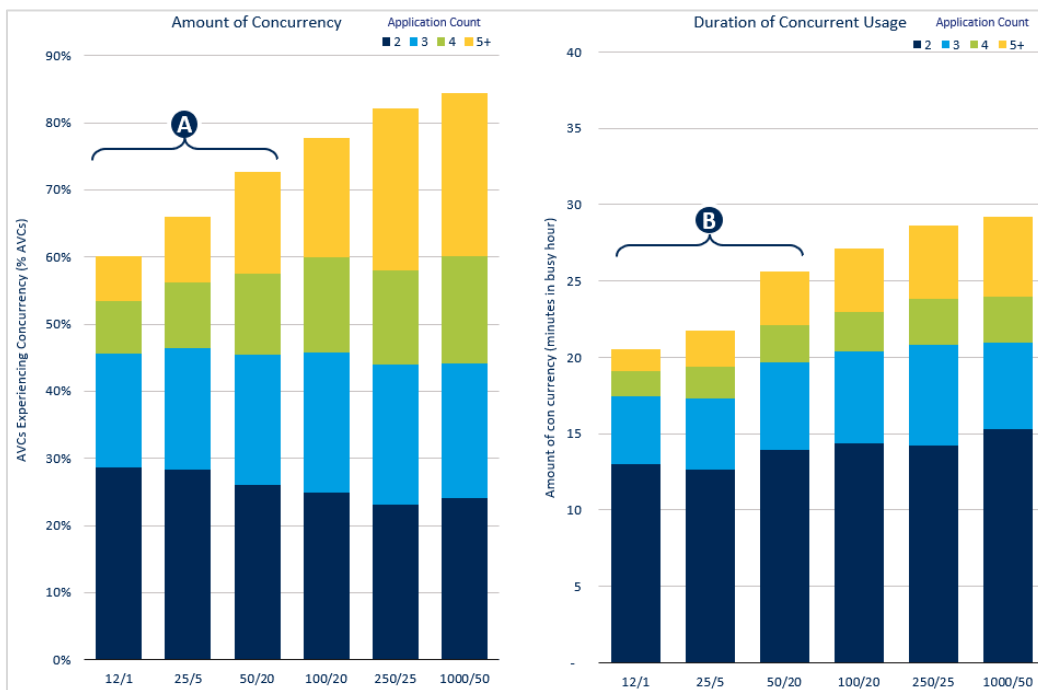


Figure A13. Amount and Duration of Concurrency Across Sampled AVCs During 9pm Busy Hour

nbn lab testing and measurements of actual AVC performance suggest that speeds greater than 50 Mbps yield a materially better experience for video streaming (the dominant application used during busy hours).

nbn testing also suggests that customers on a 50 Mbps plan may not receive the full 4K experience (even without concurrency). This is because there may not be enough bandwidth headroom available to stream at the maximum peak 4K bit rate. As explained above, only having regard to average bandwidth is likely to downplay the impact that not having such headroom would have on ‘bursty’ application performance and thus user experience. **nbn** lab testing has also suggested that 4K streams without concurrency are able to stream at a streaming client’s



maximum peak 4K bit rate on a 100 Mbps plan.¹⁰⁷ Concurrent usage and increased adoption of 4K is likely to drive demand for higher download speeds in light of these observations. **nbn** has found that 4K usage currently accounts for around 13% of hours of video content viewed (which represents 50% of all traffic on a popular streaming service analysed by **nbn**). This is expected to increase.

Increased adoption of current applications (e.g., 4K) and future applications (e.g., 8K, continued transition to digital downloads, increased dependence on home broadband for work, etc.) will continue to drive household demand for higher download speeds. Large digital downloads are already common, with some game downloads and updates reaching 200 GB. The lower the maximum available bandwidth, the longer applications such as game downloads will take to complete. Even with services operating at their maximum speed, these game downloads can take several hours to half a day to complete. **nbn** believes this is a poor customer experience that is likely to be compounded by concurrency.

nbn expects that concurrency will also rise as the number of devices per household continues to trend up, further driving demand for higher download speeds. **nbn** understands that there were approximately 20.5 internet-connected devices per Australian household in 2021, with a projected increase to 33.8 by 2025.¹⁰⁸

These projections are consistent with numerous studies predicting that connection bandwidth will continue to grow.¹⁰⁹ These studies suggest that speeds greater than 100 Mbps may be common, and some suggest large households may require gigabit speeds by 2030.

It is both allocatively and dynamically efficient, and ultimately in the LTIE, to ensure that the pricing construct allows and incentivises **nbn** to satisfy these changing bandwidth needs over time and ensures that end-users are able to access products that meet their requirements. In addition, there are also broader efficiency benefits on network capacity management if a greater proportion of consumers take up higher speed tiers. Higher speed tier plans increase users' maximum throughput, reducing the length of time they are actively utilising the network, which in turn reduces demand on the network's peak bandwidth requirement as traffic collision events occur less frequently, enabling available network capacity to be utilised much more efficiently and reduces the need for capacity augmentations.

¹⁰⁷ **nbn** conducted testing using one streaming provider's streaming client for one of its most popular streamed series. Other shows on that streaming client and across alternative streaming clients may have relatively higher or lower minimum and maximum 4K peak streaming bit rates.

¹⁰⁸ See, for example: <https://www.statista.com/statistics/1202887/australia-average-number-of-internet-connected-devices-per-household/>.

¹⁰⁹ See, for example: <https://www.fiberbroadband.org/blog/new-fba-research-reveals-fiber-can-close-the-rural-digital-divide>; and <https://copenhageneconomics.com/publication/analysis-of-user-needs-for-broadband-2025-2030/>; <https://www.cisco.com/c/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.pdf>; and <https://www.nngroup.com/articles/law-of-bandwidth/>; <https://docs.fcc.gov/public/attachments/DOC-366980A1.pdf>.



4.3.3 Customer usage is forecast to grow

While peak speeds are forecast to increase over time, **nbn** expects the user demand (utilisation) to continue increasing over time as well. **nbn** currently forecasts that the AVC mean busy hour throughput (a good measure of user utilisation over the **nbn**® network) will nearly triple to an estimated 5.5 Mbps in 2031, as illustrated in Figure A14.

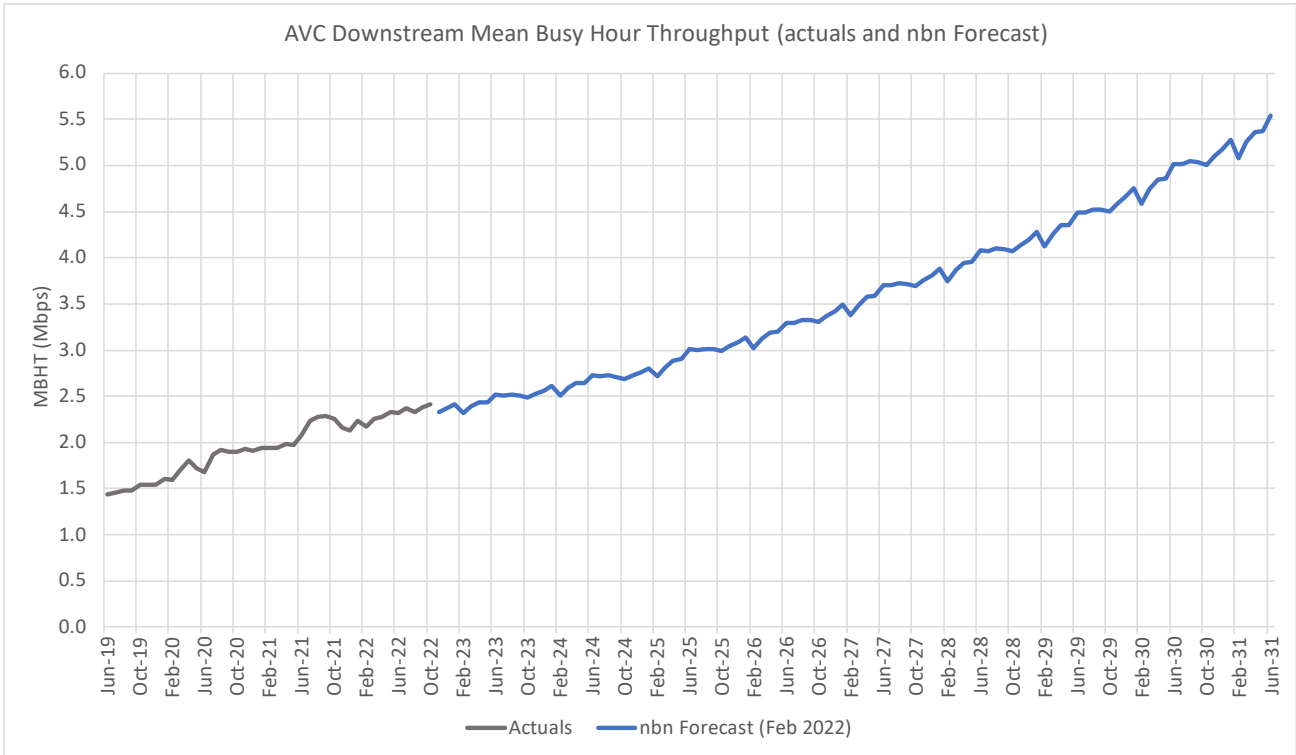


Figure A14. AVC Mean Busy Hour Throughput (Mbps)

4.4 Ongoing network investment will be required to meet forecast demand

As discussed in chapter 5, **nbn**'s forecast of future bandwidth and speed requirements inform **nbn**'s forward-looking network investment strategy, which involves strategically upgrading parts of the **nbn**® network to fibre. In March 2022 Analysys Mason undertook an independent review of the efficiency and prudence of **nbn**'s methodology and processes for determining upgrades to the fixed network technology used in each geographical area over time¹¹⁰. In undertaking that review Analysys Mason concluded that:

*...making FTTP available across the network would represent a prudent and efficient approach to ensuring that **nbn** is able to meet anticipated bandwidth demand at least up to 2040.*

¹¹⁰ Analysys Mason, *Prudence and efficiency review of nbn's network selection, upgrade methodology and the design of its FTTC network*, 20 June 2022, p. 85: <https://www.accc.gov.au/system/files/Analysys%20Mason%20FTTC%20architecture%20and%20upgrade%20to%20FTTP%20-%20final%20report.pdf>.



5 The rationale for investing in fibre

The SAU must allow **nbn** the opportunity to invest in, and recover its investment in, increased fibre in the **nbn**[®] network.

Given the ultimate intention is to upgrade the **nbn**[®] network to fibre over time, there are operational and cost efficiencies that can be achieved by rolling out fibre at scale. Investment in fibre is therefore a significant and important feature of **nbn**'s demand and expenditure forecasts over the term of the SAU.

Relative to other fixed line technologies, fibre is capable of delivering faster upload and download speeds and reduces ongoing network maintenance and operating costs. Strategically upgrading to fibre is the most efficient way to ensure that the **nbn**[®] network is able to satisfy future demand for higher speeds and increased bandwidth, while reducing operating costs and enabling **nbn** to offer improved service levels over time. This will increase **nbn**'s ability to respond to competition over time and it will ultimately benefit both RSPs and end-users in the long term. The Commonwealth recently demonstrated its support of increased fibre in the **nbn**[®] network by announcing \$2.4 billion of investment to support the upgrade of an additional 1.5 million premises to fibre.

5.1 The policy context

nbn considers that strategically upgrading to fibre is the best way to efficiently ensure that the **nbn**[®] network is able to satisfy future demand for higher speeds and increased bandwidth, while reducing operating costs and enabling **nbn** to offer improved service levels over time. This will ultimately benefit both RSPs and end-users. The Commonwealth recently demonstrated its support of increased fibre in the **nbn**[®] network by announcing \$2.4 billion of investment to support the upgrade of an additional 1.5 million premises, currently on FTTN or FTTC, to fibre.¹¹¹

As a GBE, **nbn** has a primary obligation to build and operate the **nbn**[®] network in accordance with its legislative obligations and the policy objectives communicated through the SOE issued to the **nbn** Board over the years. The policy directives under the SOEs have evolved since **nbn** was first established – and so too has the design and architecture of the **nbn**[®] network. This policy context is important for understanding **nbn**'s past, present and future network investment decisions as well as the need for the SAU to allow **nbn** the opportunity to invest in increased fibre in the **nbn**[®] network.

nbn's original mandate was to roll out a predominantly fibre-based network. Specifically, **nbn** was directed to rollout to 93% of Australian premises using FTTP technology, with the remaining seven percent of premises (largely in regional and rural areas) to be served by a mix of fixed wireless and satellite access technologies.¹¹²

¹¹¹ **nbn**, *NBN Co welcomes 2.4 billion Government investment to enable 1.5 million more homes and businesses to upgrade to full fibre nbn*, 20 October 2022: <https://www.nbnco.com.au/corporate-information/media-centre/media-statements/nbn-co-welcomes-24billion-government-investment-to-enable-15million-more-homes-and-businesses-to-upgrade-to-full-fibre-nbn>.

¹¹² Minister for Finance and Minister for Communications, *Statement of Expectations*, 2010.



The use of fibre and non-fibre technologies in the **nbn** fixed line network was recommended in the **nbn** Strategic Review (2013)¹¹³ and Vertigan Report (2014)¹¹⁴ and confirmed in a revised SOE (2014). The reasons for leveraging existing copper and HFC networks in the MTM approach were to reduce costs and speed up **nbn**'s network rollout – but, importantly, the intention was always to upgrade to fibre when it made sense based on cost and future growth in demand. **nbn**'s investment decisions were never intended to be static.

nbn has now completed its initial network rollout and is selectively upgrading to fibre in a strategic, efficient and economical manner that aligns with its most recent SOE (2021).¹¹⁵ This approach was reiterated by **nbn**'s Shareholder Ministers in a public letter to the company in July 2022.¹¹⁶

The MTM approach has enabled more Australians to access high speeds sooner, and served the nation during the COVID-19 pandemic – but it is critical to keep looking ahead to scale the network, improve network reliability and resilience, enable **nbn** to respond to competition over time, and deliver efficiencies in **nbn**'s underlying cost base. The SAU plays a key role in delivering these outcomes.

5.2 Operational efficiencies

Technological differences between fibre and non-fibre fixed-line network technologies can have significant operational (and by extension, cost) impacts. A fibre-based network, as compared to a copper-based network, is typically more reliable, and less complex and costly to operate and maintain, as discussed below.

5.2.1 Improved network reliability

End-to-end service availability sufficient to ensure that **nbn** delivers a reliable wholesale service is important to ensure that RSPs can in turn provide a reliable service to end customers. The figures below provide a snapshot of service availability across network technologies highlighting the comparatively high reliability of FTTP. These figures demonstrate the improvements to network reliability that can be achieved by investing in more fibre.

In Figure A15, the average minutes of downtime for customers on the FTTN network is consistently higher than for customers on the FTTP network. There is also greater variability and larger swings in the performance of the FTTN network. For example, Figure A16 shows a spike in June 2021 (Victorian storms in Dandenong Ranges) and an accentuated peak in March 2022 when both FTTN and FTTP experienced increases in downtime (Queensland/North New South Wales floods).

¹¹³ **nbn**, *nbn Strategic Review*, 12 December 2013, pp. 18, 19 and 88. For example: “NBN Co recommends that it develops an optimised multi-technology approach to rolling out the NBN that balances fast deployment of 50 Mbps broadband with better economics, to the highest number of Australians... On this timetable it is economically more efficient to upgrade over time. In addition, upgrading over time provides significant economic ‘option value’ for NBN Co as technologies evolve, enabling NBN Co to utilise the most appropriate upgrade technology at the time... [I]t will be more economical to first build FTTN then upgrade later as long as FTTN can be used for several years before upgrading. **Specifically, the 10-year present value of costs at an 8% discount rate is lower to build FTTN now and later upgrade to FTTP provided FTTN is used for more than 5 years before upgrading and distribution fibre can be re-used**” (Emphasis added).

¹¹⁴ Dr Michael Vertigan, Ms Alison Deans, Professor Henry Ergas, and Mr Tony Shaw, *Independent cost-benefit analysis of broadband and review of regulation*, August 2014, pp. 11-12. For example: “The panel has reached seven principal conclusions: 1(c) The most efficient way to deploy high-speed services in those areas is through a ‘multi-technology’ approach, which uses a mix of copper and fibre-based technologies, along with HFC. 1(d) While the future growth in demand for high-speed services is inevitably uncertain, the MTM approach can be upgraded should demand growth prove much greater than expected... The MTM approach is therefore robust to variation in the growth in demand.”

¹¹⁵ Minister for Finance and Minister for Communications, *Statement of Expectations*, August 2021. For example: “Within its capital constraints, NBN Co will continue to upgrade the network technologies to support retailers to meet demand from end users which exceeds these minimum requirements, including implementing current plans to expand access to peak download speeds of up to 1 gigabit per second.”

¹¹⁶ Minister for Finance and Minister for Communications, *Letter to nbn co from its Shareholder Ministers*, 27 July 2022. For example: “The government has stated that it will retain NBN Co in public ownership for the foreseeable future, **expand full-fibre access to more homes and businesses, and ensure the NBN delivers for consumers and facilitates productivity.**” (Emphasis added)

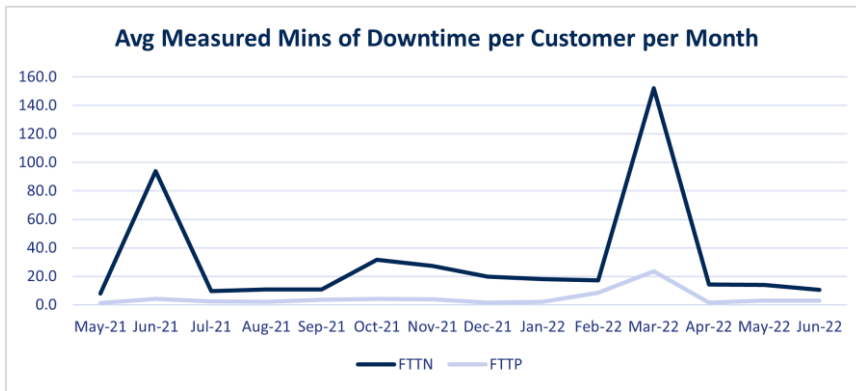


Figure A15. Average Measured Minutes of Downtime per Customer per Month

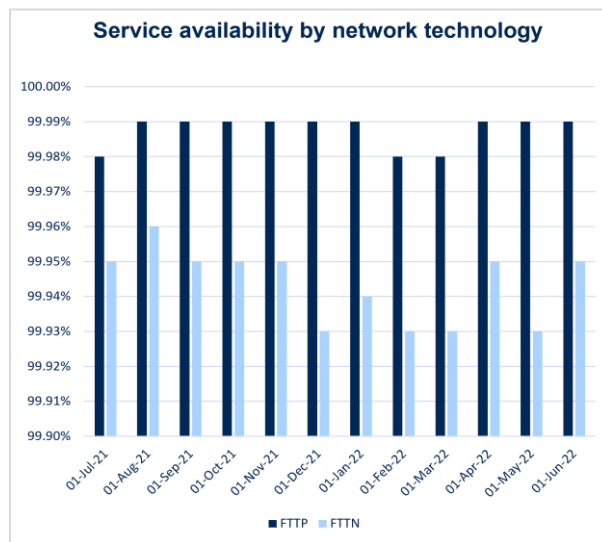


Figure A16. Service availability by network technology

5.2.2 Reduced operation and maintenance costs

Copper-based networks are more susceptible to external factors than fibre-based networks. Each copper circuit has its own transmission characteristics that change over time due to many factors (e.g., moisture and corrosion, speed variability at distance from node, susceptibility to nearby electromagnetic interference, etc.), creating a complex, unpredictable and challenging operating environment (particularly where the copper is aged). A fibre-based network is therefore less complex as well as less costly to operate and maintain.

The below figures provide further insight into some of the ways that nbn’s FTTP and FTTN networks compare from a network management perspective:

- Figure A17 and Figure A18 (Truck Rolls):** A truck roll occurs where a technician is dispatched to rectify a network fault. These figures illustrate that there are significantly lower truck roll volumes and lower rates for each truck roll on the FTTP network versus the FTTN network. This is due to the higher frequency of faults (i.e., volume of truck rolls) and the complexity of issues on the FTTN network (e.g., it is often difficult to find a fault and typically requires more civil works on the FTTN network). This equates to reduced network operation and maintenance costs (and an improved customer experience) by upgrading to more fibre over time.

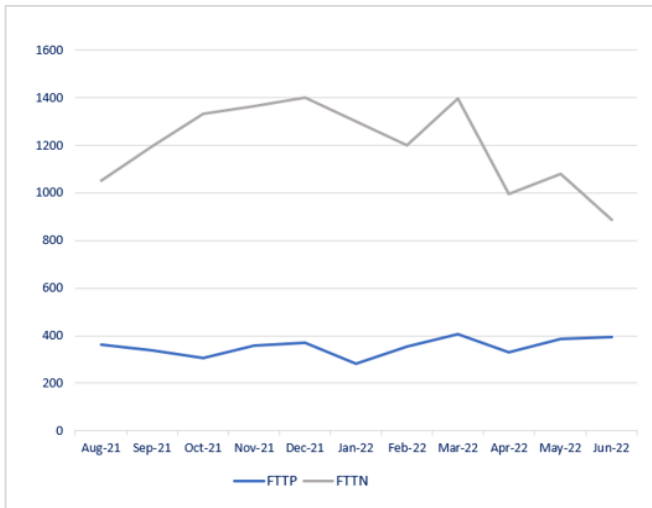


Figure A17. Network Truck Roll Volumes (FTTP vs FTTN)¹¹⁷

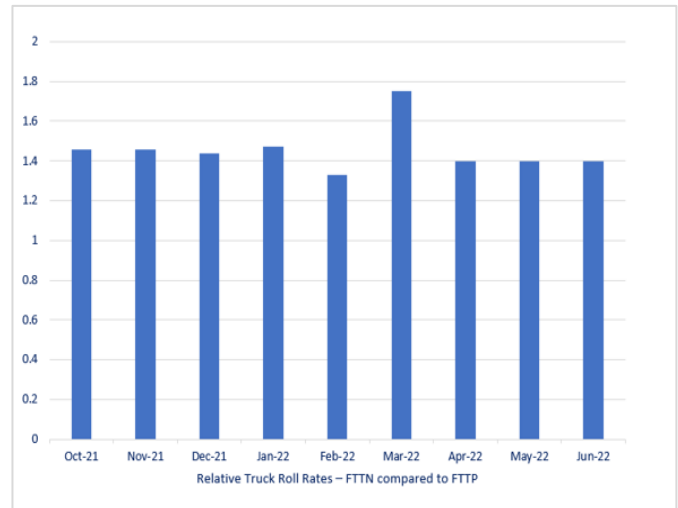


Figure A18. Comparative Network Truck Roll Rates (FTTP vs FTTN)¹¹⁸

- Figure A19 and Figure A20 (Unplanned Network Outages):** Similarly, these figures illustrate the discrepancy in network outages on nbn’s FTTP and FTTN networks. A lower number of impacted services due to planned and unplanned network outages translates to a better customer experience and reduced operation and maintenance costs on the FTTP network. Due to the different network architectures, FTTP customers also experience far fewer Planned Outages during the day, predominately due to copper rehabilitation on the FTTN network occurring during the day as a result of safety considerations. There is no equivalent need for such work on the FTTP network.

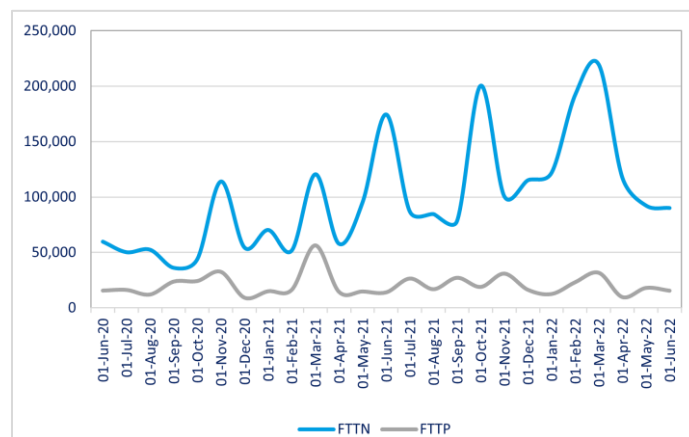


Figure A19. Impacted Services (Unplanned Network Outages)

¹¹⁷ For context, the network footprint size as at the end of May 2022 was (1) **FTTP**: Active Prems 1.625 million; and (2) **FTTN**: Active Prems 3.027 million.

¹¹⁸ Network truck roll rates are the average cost of an assurance (break-fix restoration) truck roll performed by an external delivery partner and includes both labour and materials costs. This figure shows that over a sample period network truck roll rates on the FTTN network were between 1.33 and 1.75 times higher per month than on the FTTP network over the same period. It is more difficult to find a fault location on the FTTN network, and typically requires significantly more civil works and labour to rectify, driving up the average unit rate.

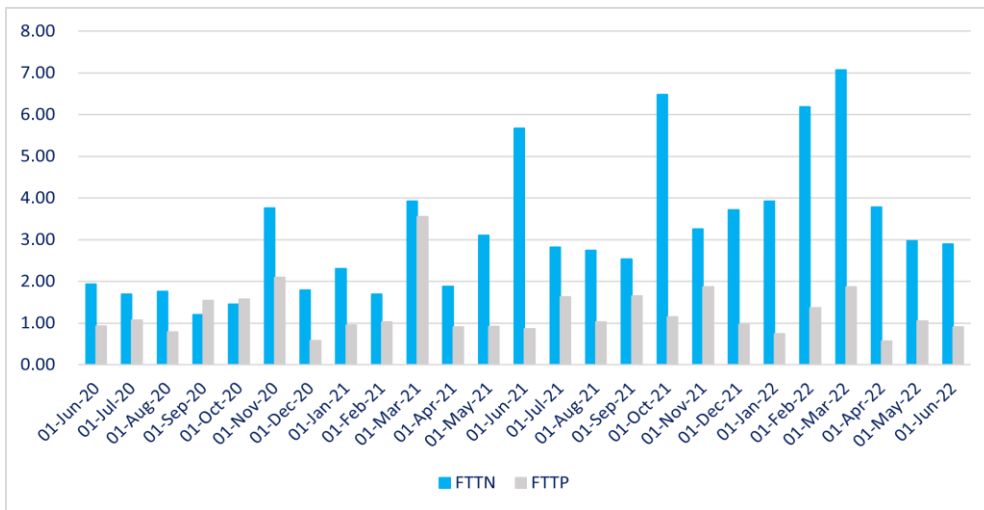


Figure A20. Fault Rate (Impacted Services per 100 Active Services)

- Figure A21 (Service Assurance – Faults):** The service assurance data in this figure further demonstrates the higher incidence of faults, and resulting impacts to end-users, on the FTTN network. FTTN fault volumes averaged approximately 27,000 in FY22 which is nearly four times higher than the average FTTP fault volumes at approximately 7,200. This also led to higher truck rolls for FTTN (1.2 truck rolls for FTTN versus 0.47 truck rolls for FTTP per 100 premises), which equates to a cost saving of approximately 0.74 truck rolls per 100 active premises on the FTTP network based on current trends in FY22. At scale, this could result in significant savings for nbn where premises in the FTTN footprint are upgraded to fibre.

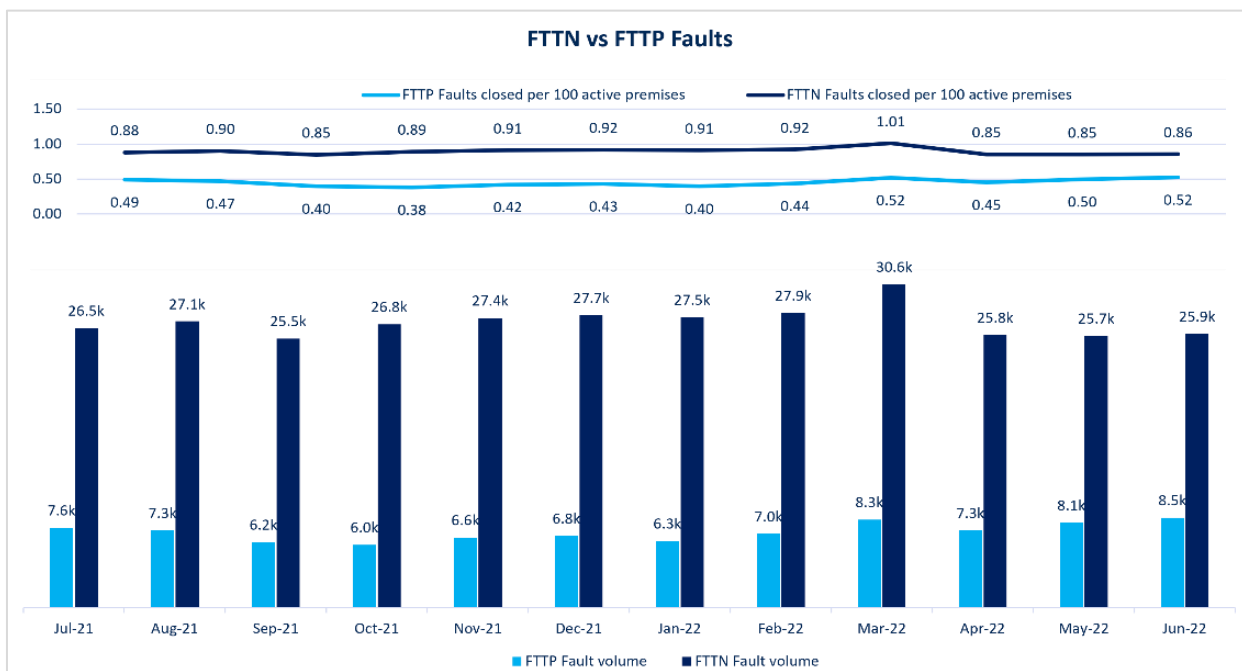


Figure A21. Service Assurance – FTTN vs FTTP Faults



5.2.3 Copper degradation and the increasing frequency and intensity of extreme weather events

To make the **nbn**® network resilient and to improve network reliability for customers, **nbn** must be allowed to invest in the network and have the opportunity to recover these investments from its regulated revenues. The differences between **nbn**’s fibre-based and copper-based access networks are likely to worsen over time due to copper degradation.¹¹⁹ This will ultimately have implications for the costs that **nbn** will need to recover from its regulated prices, as well as the service standards that **nbn** is able to offer its customers. This view was supported by an independent review conducted by Analysys Mason which acknowledged that “*FTTP networks have materially lower fault rates than copper networks*”, thereby making fibre upgrades a prudent and efficient investment from a network reliability perspective.¹²⁰

In addition, the increasing frequency and intensity of extreme weather events is disproportionately impacting **nbn**’s HFC and copper-based networks, with FTTP proving more resilient. These extreme weather events often exacerbate the underlying differences between the FTTP and FTTN networks, as discussed above.

Network outage data collected during extreme weather events in 2021 showed a disproportionate impact to the FTTN network, in terms of affected network assets, impacts from power outages and costs to recover the network. The relative cost impact of weather events across **nbn**’s network technologies in 2021 is depicted in Figure A22 below.

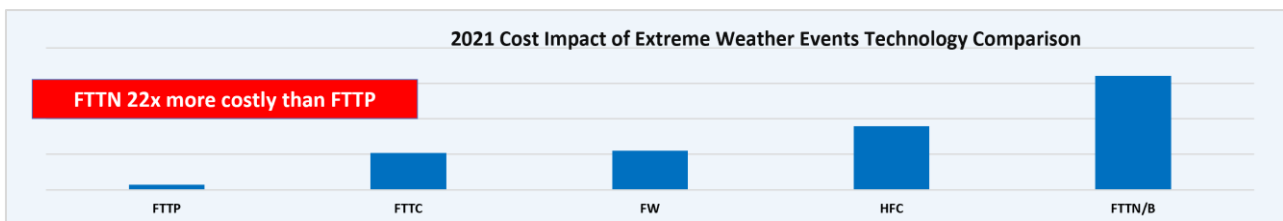


Figure A22. 2021 Cost Impact of Extreme Weather Events Technology Comparison

FTTP continues to show the best resilience. This has cost implications for **nbn**, but it is also critical for broader business continuity and emergency support during extreme weather events.

¹¹⁹ The average speed of copper-based services is estimated to degrade in the range of 2.3% per annum to 8% per annum, depending on the level of investment in copper remediation.

¹²⁰ Analysys Mason, *Prudence and efficiency review of nbn’s network selection, upgrade methodology and the design of its FTTC network*, 20 June 2022, p. 85: <https://www.accc.gov.au/system/files/Analysys%20Mason%20FTTC%20architecture%20and%20upgrade%20to%20FTTP%20-%20final%20report.pdf>.



5.3 Cost efficiencies arising from rolling out fibre at scale

Given the ultimate intention is to upgrade the **nbn**[®] fixed-line network to fibre over time, there are cost efficiencies that can be achieved by rolling out fibre at scale. The SAU must provide **nbn** with the opportunity to do this over time. **nbn** has also strategically reviewed its fibre rollout processes and procedures to identify operational efficiencies that will lead to further cost savings.

5.3.1 Upgrade costs per premises

A systematic and scaled fibre build program is more efficient and cost-effective than conducting ad hoc individual fibre upgrades, including because it enables systematic planning for greater efficiency and optimised rollout of upgrades. Operating at scale also achieves economies of scale regarding design and build activities.

For these reasons, **nbn**'s optical fibre upgrade model operates best at scale. **nbn** initially selected two million premises for its current FTTN upgrade program, which will be further expanded to cover an additional 1.5 million premises following a recent announcement by the Commonwealth Government.¹²¹ The FTTN upgrade footprint was selected at the Access Distribution Area (**ADA**) level, being approximately 150-200 premises per ADA on average. This aligns to FTTN node coverage, which will enable the future decommissioning of FTTN and related operational efficiencies over time.

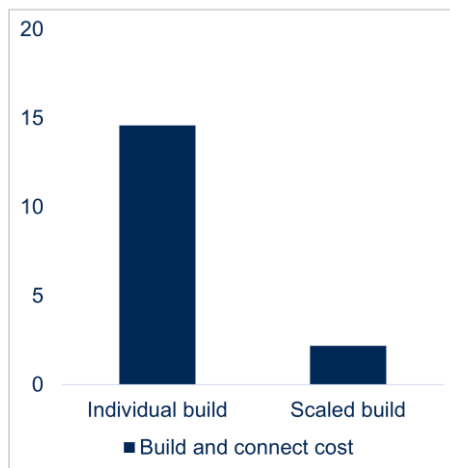


Figure A23. Build and connect costs – individual versus scaled

Figure A23 illustrates the relative difference in cost per premises when rolling out fibre at scale versus on a premises-by-premises basis. Typically, an ad hoc individual premises upgrade from FTTN to FTTP costs approximately \$15,000 (up to one third of this cost is design and project management fees) – whereas a scaled build of the street fibre for a whole ADA, in conjunction with an on-demand premises connection, reduces costs to approximately \$2,000-3,000 per premise (costs are split 50/50 between street fibre and premises lead-in). These cost efficiencies per premises are considerable, particularly when applied at scale across millions of premises.

¹²¹ **nbn**, *NBN Co welcomes 2.4 billion Government investment to enable 1.5 million more homes and businesses to upgrade to full fibre nbn*, 20 October 2022: <https://www.nbnco.com.au/corporate-information/media-centre/media-statements/nbn-co-welcomes-24billion-government-investment-to-enable-15million-more-homes-and-businesses-to-upgrade-to-full-fibre-nbn>.



5.3.2 Scope of initial build versus on-demand construction

nbn now minimises its upfront build cost and delays spend until a customer commits to a fibre service where possible. This leverages an on-demand connection approach for a more efficient roll out of fibre upgrades, which is a key learning from nbn’s initial rollout of its network.

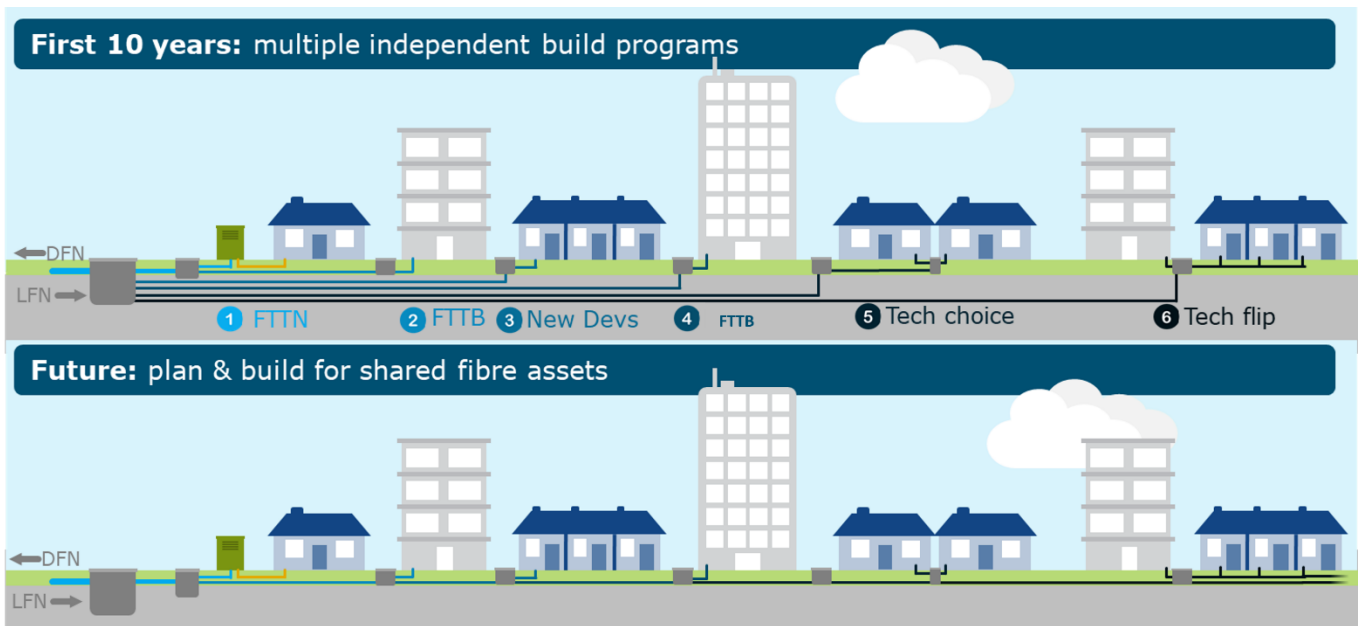


Figure A24. Overview of on-demand connection model

As illustrated in Figure A24, nbn’s optimal roll out is to have a shared local fibre network (LFN) (i.e., cables and joints) that can be accessed and employed by multiple uses and products – such as new developments, FTTB/N/C/P and any other network. This approach minimises the upfront build cost and delays spend where possible until an end-user commits to acquiring a service. It also supports the efficient re-use of fibre cable assets and minimises the need for separate build programs (FTTP, Greenfields, etc.).

Table A5 provides further insight into some of the cost optimisation measures that nbn has implemented to optimise its rollout of fibre upgrades.

Table A5. Speed tier mix, actual versus forecast 1 year prior – June 2019 to June 2021

Before	Now
Initial legacy FTTP builds undertaken by nbn were generally built to a Premises Connection Device (PCD) on the customer’s building, regardless of whether the customer ordered a service.	nbn now leverages on-demand connections, which are more capex efficient where initial demand is likely to be widely distributed nationally, and full take-up is expected to occur over multiple years (as there is no forced migration from FTTN).
The original scope of FTTN to FTTP upgrades included building to the boundary pit. However, nbn chose to reduce the build scope to the splitter multipoint (SMPT) to lower the upfront costs, reducing the build by 150m on average.	Connection from the SMPT to the boundary pit, and lead-in from the boundary pit to the customer premises, is now delayed until a customer commits to order a service from nbn.



In addition, **nbn** has also improved its selection criteria for determining where an upgrade to fibre will be most cost efficient. **nbn**'s selection criteria now prioritises fibre upgrades based on areas where:

- **nbn** anticipates strong demand for higher speeds;
- the cost per premises to upgrade is lower;
- where **nbn** can deploy with speed and agility;
- where **nbn** can provide maximum benefit to the most customers; and
- where **nbn**'s investment is most likely to stimulate economic activity.¹²²

Taken together, these measures demonstrate **nbn**'s commitment to continually review and evolve its rollout processes and procedures to find efficiencies and save costs where possible. This is in line with **nbn**'s commitment to only invest in its network where it is prudent and cost-efficient to do so.

Importantly, **nbn** notes that its methodology and process for upgrading from FTTN to FTTP under its Investment Acceleration Program (**IAP**) was independently assessed as being prudent and efficient by Analysys Mason.¹²³

5.4 The growing demand for bandwidth and higher speeds

Chapter 4 of this Submission sets out **nbn**'s forecasts and longer-term expectations for increasing demand for higher speeds in Australia over the **nbn**[®] network. In **nbn**'s view, the demand for higher access speeds will continue to grow dramatically (and at much faster rates than expressed in the ACCC's recent consultation paper¹²⁴) over the next 10 years. This is supported by observable global trends as well as by direct observations of end-user experience on the **nbn**[®] network.

nbn's ability to satisfy future demand for increased bandwidth and higher access speeds will be closely tied to the investments that are made in the short to medium term to rollout more fibre across the **nbn**[®] network (as detailed in Appendix A of Part F of this Submission). A continued reliance on legacy copper networks will diminish **nbn**'s ability to scale up network capacity over time, unless significant investments are made to remediate degrading copper assets (which **nbn** considers to be an inefficient investment over time).

5.5 Factoring in lead times

Network planning requires a long-term view to factor in lead times to roll out complex network upgrades. The Variation needs to be considered in this context and must allow **nbn** the opportunity to invest in, and recover its investment in, increased fibre in the **nbn**[®] network over time.

For example, the following are some of the key considerations that **nbn** takes into account in its future network planning:

¹²² **nbn**, *NBN Co Corporate Plan 2022*, August 2021, p. 15.

¹²³ Analysys Mason, *Prudence and efficiency review of nbn's network selection, upgrade methodology and the design of its FTTC network*, 20 June 2022, p. 84: <https://www.accc.gov.au/system/files/Analysys%20Mason%20FTTC%20architecture%20and%20upgrade%20to%20FTTP%20-%20final%20report.pdf>.

¹²⁴ ACCC, *Proposed variation to the NBN Co Special Access Undertaking, Consultation paper*, May 2022, p. 25.



- **Delivery partners** can be required to mobilise in areas for months at a time to complete all build activities. By rolling out to larger volumes, any costs associated with establishing a physical presence, transporting machinery and resourcing/labour/process establishment/IT as well as other fixed costs can be spread across a larger footprint therefore reducing unit costs. This is especially important outside capital cities where mobilisation can be challenging and expensive.
- **Vendor supply chains** and the broader industry around FTTP-related equipment may be shut down and/or redirected elsewhere without sufficient scale. International supply chains are particularly vulnerable to delays and disruptions in the post-COVID-19 operating environment. These risks may be mitigated by rolling out at scale with long lead times.
- **Retail service providers** can benefit from longer lead times and a scaled upgrade program. For one, it allows for more effective consultation and marketing to ensure better take-up by end-users. Starting on the path to retiring FTTN also reduces the number of product options/features and complexity that **nbn** and RSPs have to support in activation and assurance (e.g., network and IT simplifications).
- **nbn's own internal capacity and resourcing** requires significant planning. The complexity of a fibre upgrade program touches most areas of the company, from customer-facing teams to build/operations teams to shared services functions (e.g., Finance, IT, etc.).
- **Environmental benefits and network resilience** can be achieved by upgrading to FTTP. There are more than 25,000 FTTN nodes around the country with each consuming power 24 hours a day, 7 days a week. Decommissioning the FTTN network will result in lower power costs and a reduced carbon footprint. There is also improved network resilience with a fibre network in that **nbn** does not rely on as many generators to operate its FTTP network as it does with its FTTN network – as long as the FAN/TFAN is powered and there is power at the customer end then the service is active, whereas with FTTN there is a requirement for power at the exchange, the cabinets and the home.
- **Network simplification.** The MTM introduced multiple new technologies which required associated network materials, operational systems and workforce skills. In the FTTN to FTTP upgrade footprint, only customers ordering higher speed tiers will be switched to FTTP. Hence, **nbn** will need to operate FTTN and FTTP in parallel over the same geography, adding to operational complexity. Until *all* customers are migrated off FTTN, many of the associated costs of operating FTTN will remain.

Further, **nbn** must also account for the development path of its network access technologies as part of its network planning. Industry is investing in increasing the capability of fibre-based access technologies, which is driven by accelerating global rollout of fibre in most other jurisdictions. On the other hand, copper is increasingly viewed as a legacy technology with little room or rationale for further innovation. This is an important consideration to make sure that the **nbn**[®] network continues to meet future demand, **nbn** is in a position to respond to competition, and ensure that Australia does not fall behind other jurisdictions.

In summary, a failure to account for global technology changes or to inadequately provision the **nbn**[®] network to account for future bandwidth and speed requirements could take years to rectify given the long lead times required to roll out fibre upgrades.



6 The Variation supports economically efficient outcomes

Economic efficiency is a key factor to be considered by the ACCC when assessing the terms and conditions of the Variation against the statutory criteria.

nbn's proposed commitments set out in the Variation will ensure that **nbn** will continue to face strong incentives to set efficient prices, to incur only prudent and efficient costs, and to invest in the network in a timely and efficient manner. These commitments are additional to **nbn**'s existing incentives to operate efficiently as a consequence of its mandate to operate as a standalone commercial entity in an increasingly competitive broadband market.

Economic efficiency is a key factor to be considered by the ACCC when assessing the terms and conditions of the Variation against the statutory criteria. It is a key element of the reasonableness criterion and a key objective to be taken into account when considering the LTIE.

The Variation promotes economic efficiency by embedding long-term incentives for **nbn** to set efficient prices, incur costs efficiently, and invest efficiently in the network. In particular, **nbn**'s proposed WAPC arrangements allow **nbn** to achieve cost reflective prices over time while providing protection against price shock and providing additional incentives on **nbn** to operate efficiently. The new commitments **nbn** has made to address ACCC and RSP feedback provide additional assurance on these matters. Additional regulatory and commercial protections also continue to apply:

- the broader regulatory framework within which **nbn** operates constrains **nbn**'s ability to operate in a manner that would be inefficient or detrimental to the objective of promoting competition (see section 6.2);
- as a wholesale-only access network provider, **nbn** is reliant on its wholesale customers and their end-users to generate the revenues **nbn** needs to achieve its commercial objectives. Migrating end-users to **nbn**'s network as soon as possible, retaining them on the **nbn**[®] network and having them take-up higher value services is integral to **nbn**'s success. If RSP and end-user expectations are not met in relation to **nbn**'s prices, **nbn** will not achieve its objectives. **nbn** does not have the same incentives as a vertically integrated incumbent, as **nbn** is a wholesale-only provider facing current and emerging infrastructure competition; and
- As discussed in chapter 3, **nbn** is constrained by competition and market forces. Australia's telecommunications industry and broadband market is characterised by low barriers to entry and market expansion. There are several fixed and fixed wireless network operators that compete directly with **nbn** in the residential and business markets, many of which are expanding their footprints and marketing their services to end-users as **nbn** substitutes. This competitive reality means that demand for **nbn**'s broadband services is price elastic and **nbn**'s ability to maximise profit is not simply a function of increasing price.

This means that the efficiency of the commitments in the Variation should be considered in tandem with the operation of the wider regulatory framework, as it applies to **nbn**, the wholesale-only context in which **nbn** has been established, and the market conditions in which **nbn** operates.



6.1 The commitments in the Variation promote economic efficiency

The Variation contains a range of commitments that promote economic efficiency, as described below.

6.1.1 Incentives to set efficient prices

The commitments set out in the Variation and discussed in chapter 7 of Part B of this Submission provide **nbn** with strong incentives to set efficient prices. In particular:

- The WAPC provides incentives for **nbn** to set efficient prices. That is because a WAPC rewards price adjustments that will coincide with improvements in economic efficiency and maximises demand. Specifically, **nbn** can improve the efficiency of prices by lowering prices where this has a relatively significant effect on quantities demanded, and raising prices where it has a relatively insignificant impact on quantities demanded. This will increase take-up and usage overall and produce revenues that are higher than those that would be produced, assuming that the pattern of pricing from the preceding period (on which the weights in the price basket are based) is maintained.
- The WAPC is initially capped at CPI – 0 (meaning the 'X' takes a zero value), reflecting commercial constraints, and this means that **nbn** will largely be reliant on future demand growth to achieve its regulatory revenue allowances and avoid any under-recovery of those revenue allowances.

6.1.2 Incentives to incur only efficient costs

nbn will be incentivised to incur only efficient costs as:

- a firm acting commercially that is regulated under a WAPC (based on forecasts of prudent and efficient costs approved by a regulator) has the incentive to be cost-efficient since, as the Regulatory Cycle progresses, prices and revenues are likely to be delinked from actual costs, and any cost savings can be captured as higher profits for a limited period or cost overruns as reduced profits; and
- the ACCC will have the power to, ex-ante and ex-post, scrutinise **nbn**'s costs, disallowing expenditure assessed as imprudent or inefficient. Specifically, the ACCC will have the ability to review costs on an ex-ante basis for operating and capital expenditure, and once more ex-post for capital expenditure. See chapter 20 in Part F of this Submission for more detail.

Additionally, the SAU requires that **nbn**'s opex and capex reasonably reflect the expenditure that a prudent and efficient operator in **nbn**'s position, acting in accordance with good industry practice, would incur in achieving **nbn**'s Expenditure Objectives. These Expenditure Objectives which are set out in the Variation, are:

- meeting the expected demand for products and services;
- complying with all Regulatory Requirements;
- implementing a project or program which is the subject of a Government Policy Project Notice; and
- maintaining and improving the quality, reliability, safety, security and integrity of supply of any products and services, including by meeting the Benchmark Service Standards which are to apply in the relevant Regulatory Cycle.



nbn's Expenditure Objectives are informed by the expenditure objectives of relevant regulated GBE utilities and State-Owned Corporations in other sectors, including electricity¹²⁵ and water.

The Variation also sets out a range of factors to be taken into account when forecasting prudent and efficient expenditures, including historical trends in expenditure (the Expenditure Factors).

6.1.3 Incentives to invest efficiently and promote dynamic efficiency

Efficient investment is promoted by affording a service provider the opportunity to recover the costs of their prudent and efficient investments, inclusive of a normal commercial return.¹²⁶ This is the case regardless of the form of ownership,¹²⁷ and includes recovery of existing investments, noting that the treatment of past investments sends important signals to firms about the risk of new investment, affecting forward-looking investment incentives.¹²⁸

As the opportunity to recover prudently incurred sunk costs is a fundamental component of the current SAU (and many other industries regulated via a RAB framework), as accepted by the ACCC in 2013, then denying all or part of that opportunity would signal to **nbn** that the ACCC may seek to write off future investments as being inefficient or imprudent.¹²⁹ This has implications for the likelihood that efficient investments will be made in the first place, thus denying the benefits of those investments to end-users. As the Australian Competition Tribunal has recently commented, efficient investment, dynamic efficiency and regulatory risk are intrinsically linked:¹³⁰

*... precluding a return on all the assets that are part of the facility (sunk or not) would send a signal to future investors in other natural monopoly assets that they risked having their investment, once made, treated as sunk, with future returns confiscated. That unfortunate investor would still have an incentive to operate its asset as long as the returns exceeded the scrap value, but the investment climate for such assets would be fatally damaged. **In effect, price regulation would have created a new sovereign risk.*** (Emphasis added)

Indeed, as the ACCC and the Tribunal have recognised, building block model regulation naturally involves the recovery of sunk costs and in doing so meets the statutory criteria of promoting efficient investment in infrastructure and taking into account a service provider's legitimate business interests.¹³¹ Such regulation, as

¹²⁵ See: AER, *AER capital expenditure assessment outline for electricity distribution determinations*, February 2020, p. 4.

¹²⁶ *Re Telstra Corporation Limited* [2006] ACompT 4 (2 June 2006) at [103]; *Re Telstra Corporation Ltd (No 3)* [2007] ACompT 3 (17 May 2007) at 159; *Re Telstra* [2010] ACompT 1 at [244].

¹²⁷ Part XIC of the CCA does not apply differently to a regulated firm depending on the identity of its shareholders. This reflects a general principle, noted recently by the ACCC, that regulatory frameworks should provide a return on investment based on a benchmark efficient entity regardless of ownership – see: ACCC, *Summary of industry working groups report*, 22 December 2021, p. 9.

¹²⁸ The fact that a firm might be in a position where it can commercially raise finance and recover forecast costs from users may still be an insufficient dynamic to encourage efficient investment if the firm does not believe that, once the investment is sunk, the regulator will allow for all (efficiently incurred) sunk costs to be recovered.

¹²⁹ This also puts to one side that **nbn's** legitimate business interests allow it to receive a commercial return on its prudent (past) investment in the infrastructure used to supply the regulated services. *Application by Telstra Corporation Limited ABN 33 051 775 556* [2010] ACompT 1 (10 May 2010) at [210].

¹³⁰ *Application by Port of Newcastle Operations Pty Ltd* [2019] ACompT 1, at [352]-[354].

¹³¹ For example, in advocating for building block model regulation in its 2010 review of the 1997 telecommunications access pricing principles for fixed line services, the ACCC stated, "An important objective of the BBM is to allow the access provider to recover its previous costs of investing in sunk infrastructure as well as its efficient and prudent costs of investment in new network assets. The Tribunal expressed similar views, stating that the access provider's legitimate business interests would be met by access prices that allow it to receive a commercial return on its prudent (past) investment in infrastructure": ACCC, *Review of the 1997 telecommunications access pricing principles for fixed line services: Draft report*, September 2010 p. 21, citing *Re Telstra* [2010] ACompT 1 at [244]). The ACCC also highlighted that in BBM regulation, the choice of the RAB value had important consequences, since valuing "sunk assets



discussed by the ACCC, “...allows the infrastructure provider to recover the costs of past sunk infrastructure investment”, in circumstances where “not allowing an access provider to recover these costs would mean that it may be unwilling to make sunk investments in the future – which would jeopardise dynamic efficiency.”¹³²

The SAU framework that was accepted by the ACCC in 2013 was designed to provide **nbn** with the opportunity (but not the guarantee) of recovering its initial prudently incurred investments (i.e., those expenditures that might otherwise be deemed to be a sunk cost at some later date). In particular, the ICRA played the role of recognising and accounting for the initial losses incurred by **nbn** as it deployed and sought to migrate end-users to a nationwide network.

However, **nbn** recognises that it is unlikely to be able to recover all of the ICRA by 2040 and has proposed in the Variation that it will only have the opportunity to recover a lesser amount over the remaining term of the SAU once its expected revenues exceed its Core Services ABBRR. This new approach affords **nbn** a meaningful opportunity (but still not the guarantee) of recovering an appropriate amount of its initial investment such that **nbn**, if successful, will be able to fulfil government policy goals including generating sufficient cashflows to achieve and sustain a standalone investment-grade credit rating.

To achieve such a credit rating (which will only occur over the medium-term, not during the First Regulatory Cycle), **nbn** will need to be able to generate revenues sufficient to reduce its levels of debt in order to achieve and maintain targeted financial metrics. Such outcomes are not dependent on just the revenue that **nbn** is able to generate, but also on: (i) **nbn**'s management of costs, and (ii) ongoing network investment to reduce operational expenditure, lift network capabilities and service standards to remain competitive and grow revenues longer term.

As **nbn** moves from a prolonged period of intense capital investment required to deploy a national network, its focus shifts to the efficient operation of a network for the benefit of RSPs and end-users. **nbn**'s forecast level of costs over the period to FY25 is significantly reduced relative to previous years (as discussed further in Appendix A of Part F of this Submission), reflecting this shift in organisational priorities. **nbn**'s focus on cost reduction and efficiency was articulated in its most recent set of full-year results:

Total employee expenses decreased by 22 per cent to \$647 million due to the decline in the number of Company employees. Following the completion of the initial build in June 2020, both the size and shape of the organisation was restructured as NBN Co transitioned from being predominantly an infrastructure build company to a wholesale operating company. Coupled with the Company's continued focus on maximising cost efficiencies through simplification and digitisation of internal operations, the number of full-time equivalent staff has fallen from approximately 5,900 at the beginning of FY21 to 4,590 as at 30 June 2022.

*Other operating expenses of \$480 million have decreased 13 per cent year-on-year and have continued to reduce as a result of the Company's ongoing focus on cost efficiency.*¹³³

Additionally, **nbn** continues to face the revenue sufficiency risks previously recognised by the ACCC, as a result of ongoing competition from alternative networks (fixed-line, wireless and satellite). **nbn** therefore continues to

at less than their actual costs could prevent an access provider from recovering the full costs of any future investments in sunk assets. This risk, which is often termed the risk of regulatory opportunism, could deter the access provider (and other market participants) from undertaking future investments in sunk assets, because they would lack confidence that the regulatory arrangements will permit them to recover the costs of those investments.” (p. 26).

¹³² ACCC, 'National Broadband Network: Regulatory Reform for 21st Century Broadband', submission to the Department of Broadband, Communications and the Digital Economy, June 2009, p. 111. In that context, the ACCC noted that such regulation can therefore involve a trade-off between productive and allocative efficiency, and dynamic efficiency.

¹³³ **nbn** Full-Year Report 2022 – For the twelve months ended 30 June 2022: <https://www.nbnco.com.au/content/dam/nbn/documents/about-nbn/reports/financial-reports/nbn-co-annual-report-2022.pdf>.



have strong incentives to innovate its products and pricing to drive demand for end-users to connect to and stay on its network, as well as to increasingly use more of the capabilities of the network (e.g., by taking up higher speed tiers). While these challenges are primarily commercial ones for **nbn** to address and respond to, if the regulatory regime does not afford it even the *opportunity* to generate the revenues necessary to achieve its efficient financial objectives (including a stand-alone investment-grade credit rating and the financial ability to deliver on existing and future Government policy objectives) then **nbn**'s investment incentives will be distorted. This will compromise **nbn**'s ability to meet the future needs of RSPs and end-users; such a compromise will not be at the hands of the market, but of the ACCC.

The compromise offered by **nbn** in the Variation is to move away from the position accepted by the ACCC as a fixed SAU principle in 2013 (i.e., that **nbn** be afforded the opportunity to recover all of its initial prudently incurred costs) and instead provides meaningful transparency, predictability and regulatory oversight in respect of the profile of **nbn**'s recovery of the ICRA. The approach strikes an appropriate balance between **nbn**'s legitimate business interests, providing incentives for ongoing efficient investment and providing certainty to RSPs and consumers that **nbn** will face binding regulatory and pricing constraints over the remaining term of the SAU.

6.2 Broader regulatory framework supports competition and efficiency

Absent effective competition, access regulation seeks to constrain and incentivise the behaviour of a monopoly access provider such that it acts as though it faced effective competition. Prices and costs should be consistent with the levels that would occur if the access provider faced the threat of being displaced by competitive suppliers.

The broader regulatory framework (which includes the current SAU) applying to the supply of **nbn**'s layer 2 wholesale services achieves outcomes consistent with competitive market outcomes. In particular:

- **nbn cannot achieve NPV>0 outcomes:** while **nbn**'s current SAU provides **nbn** with the opportunity, but not the guarantee, that it may be able to recover its prudently incurred costs (up to the level where its total NPV is equal to zero, but no more), the Variation includes significant cost recovery concessions. **nbn** will no longer have the opportunity to earn an NPV=0 outcome, reflecting a compromise between competing interests. Moreover, given the market and policy constraints imposed on **nbn** to date, **nbn**'s prices are not presently sufficient to recover its allowable costs and while they will be set to recover **nbn**'s prudent and efficient costs over time, **nbn**'s prices will be below cost recovery levels for several years to come. There is no opportunity for **nbn** to earn monopoly returns that would diminish economic efficiency.
- **Part XIC imposes on nbn an almost blanket prohibition on discrimination:** Specifically, **nbn** must not discriminate between access seekers in the supply of an eligible service or when carrying out a broad range of activities related to the supply of an eligible service (see sections 152AXC and 152AXC of the CCA). This prohibition ensures that **nbn**'s wholesale access prices do not have the effect of reducing competition and that **nbn** cannot engage in either price or non-price discrimination.
- **nbn has no commercial incentive to reduce competition in related or dependent markets:** **nbn**'s wholesale-only mandate along with the lines of business restrictions set out in the NBN Companies Act¹³⁴ mean that **nbn**

¹³⁴ NBN Companies Act, Part 2.



has no commercial incentive to reduce competition in related or dependent markets. On the contrary, given that **nbn** can only supply eligible services to RSPs, **nbn** has strong incentives to ensure that there is dynamic and healthy competition in dependent markets to ensure that end-users have available **nbn** services that are high quality and affordable.

- **nbn is a Government Business Enterprise, subject to ongoing oversight:** As a GBE, **nbn** has existing intrinsic incentives to plan and undertake expenditure only where it is both prudent and efficient. These incentives derive from the level of accountability and oversight **nbn** faces as a GBE, subject to the Public Governance, Performance and Accountability Act 2013 (Cth). **nbn** faces a very high degree of public scrutiny both generally and through Parliamentary committees.

These constraints on **nbn** that promote competition should also promote economic efficiency, as recognised by the Australian Competition Tribunal: *"...efficiency is the product of competition and if a thing is, or is likely, to result in the achievement of the objective of promoting competition that thing will, or is likely to, encourage efficiencies."*¹³⁵

6.3 Market incentives to set efficient prices

In addition to the Variation and the broader regulatory framework, **nbn** has faced, and will continue to face, a high degree of demand-side risks and revenue sufficiency risk.¹³⁶ In particular, **nbn** understands it to be uncontested that **nbn** faces significant fixed-line competition in the markets in which business, enterprise and new developments services are supplied, along with increasing competition from 4G, 5G, fixed wireless network and low-earth orbit satellite operators in those markets in which residential services are supplied. This competition does, and will, continue to incentivise **nbn**'s efficient pricing setting.

These complex competitive pressures and differences in end-user demands mean that it is not possible for **nbn** to price by simply dividing its revenue requirement by forecast access volumes to set prices. Any such simplistic and unnuanced pricing strategy would price out some customers with lower willingness-to-pay and cause others to substitute to inferior services with lower fixed charges. Rather, **nbn** must pursue sophisticated pricing strategies, accounting for variations in demand and willingness and ability to pay. This allows **nbn** to promote the efficient use of the network and allocative efficiency while also maximising its chances of recovering its efficiently incurred costs over time.

¹³⁵ *Application by Chime Communications Pty Ltd (No 2)* [2009] ACompT 2, at [56].

¹³⁶ Revenue sufficiency risk refers to the risk that a firm may face that its revenues are insufficient to cover the efficient costs it incurs to supply the relevant product or service.



Abbreviations and acronyms

Throughout this Submission, unless the context provides otherwise, capitalised terms have the same meaning as in the Dictionary set out in Attachment C to the main body of the Variation.

Term	Description
ABBRR	Annual Building Block Revenue Requirement
ABS	Australian Bureau of Statistics
ACCAN	Australian Communications Consumer Action Network
ACCC	Australian Competition and Consumer Commission
AD	Access determination
ADSL	Asymmetric Digital Subscriber Line
AER	Australian Energy Regulator
API	Application Programming Interface
ARPU	Average Revenue Per User
ARTC	Australian Rail Track Corporation
AVC	Access Virtual Circuit
BBM	Building block model
BCAR	Bureau of Communications, Arts and Regional Research
BRoC	Binding rule of conduct
BSS	Business Satellite Services
B2B	Business-to-Business
CAGR	Compound annual growth rate
CAM	Cost allocation manual
capex	Capital expenditure
CAPM	Capital asset pricing model
CCA	<i>Competition and Consumer Act 2010 (Cth)</i>
CIF	Cumulative Inflation Factor
CIR	Committed Information Rate
CPI	Consumer Price Index
CSA	Connectivity Serving Area
CVC	Connectivity Virtual Circuit
DFN	Distribution Fibre Network
DPU	Distribution Point Unit
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
DSQ	Dynamic Site Qualification
EE	nbn [®] Enterprise Ethernet



Term	Description
ELB	Entry Level Bundle
ESCOSA	Essential Services Commission of South Australia
FTE	Full Time Equivalent
FTTB	Fibre-to-the-Building
FTTC	Fibre-to-the-Curb
FTTN	Fibre-to-the-Node
FTTP	Fibre-to-the-Premises
GBE	Government Business Enterprise
Gbps	Gigabits per second
HFC	Hybrid Fibre Coaxial
HST	Higher speed tier
ICRA	Initial Cost Recovery Account
IOP	Integrated Operating Plan
IPART	Independent Pricing and Regulatory Tribunal
LFN	Local Fibre Network
LTIE	Long-term interests of end-users
LTRCM	Long Term Revenue Constraint Methodology
LTSS	Long Term Satellite Service
MBHT	Mean busy hour throughput
MBIE	Ministry of Business, Innovation and Employment
Mbps	Megabits per second
MRP	Market Risk Premium
MTM	Multi-technology mix
NBN	National Broadband Network
NBN Co	National Broadband Network Company Pty Ltd
NBN Companies Act	<i>National Broadband Network Companies Act 2011</i>
NDOs	Non-discrimination obligations
NNI	Network-Network Interface
NPV	Net Present Value
NZCC	Commerce Commission New Zealand
opex	Operating expense
PDF	Product Development Forum
PIR	Peak Information Rate
PMP	Previous measurement period
POI	Point of interconnect
QCA	Queensland Competition Authority



Term	Description
RAB	Regulatory Asset Base
RBA	Reserve Bank of Australia
RMA	Replacement Module Application
RMD	Replacement Module Determination
RSP	Retail Service Provider
RTC	Ready-to-connect
SAO	Standard access obligation
SAU	Special Access Undertaking
SFAA	Standard form of access agreement
SIO	Services in operation
SIP	Statutory Infrastructure Provider
SMB	Small and Medium-sized Businesses
SOE	Statement of Expectations
SQ	Site Qualification
STM	Speed Tier Mix
TC	Traffic Class
Telecommunications Act	<i>Telecommunications Act 1997 (Cth)</i>
TiND	Telecommunications in New Developments Policy
Tribunal	Australian Competition Tribunal
TSA	Temporary Staff Arrangement
TUSMA	Telecommunications Universal Service Management Agency
ULLS	Unconditioned Local Loop Service
WACC	Weighted Average Cost of Capital
WAPC	Weighted Average Price Control
WBA	Wholesale Broadband Agreement