

nbn Special Access Undertaking Variation 2022 – Supporting submission

Part F: Efficiency of nbn's Expenditure and Demand Forecasts

November 2022

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Structure of 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
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 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



19 Cost pass-through mechanism

19.1 Overview

As part of the Variation, **nbn** proposes an adjustment factor be included in the WAPC formula that will adjust the cap in circumstances where **nbn** incurs (or is likely to incur) a material change in costs relative to the Forecast Nominal Core Services ABBRR as the result of particular exogenous events or changes to the Benchmark Service Standards approved by the ACCC. The cost pass-through adjustment factor in the WAPC formula would be applicable during the initial phase (when forecast core services revenue is below the Forecast Nominal Core Services ABBRR and the X-Factor is zero) and also during the subsequent phase (when forecast core services revenue is above the Forecast Nominal Core Services ABBRR and the X-Factor is set each Regulatory Cycle to provide the opportunity to recover the forecast revenue requirement). The application of the individual price controls (e.g., the price control preventing Entry Level Offers from increasing by more than CPI each year) will not be affected by any cost pass-through adjustment to the WAPC.

This proposal is reflected in the SAU as an ability for **nbn** to make 'cost pass-through' applications to the ACCC for approval within 90 Business Days of the occurrence of a Positive Change Event and a requirement for **nbn** to make such applications within 90 Business Days of becoming aware of the occurrence of a Negative Change Event. The current SAU includes a similar mechanism in relation to Tax Change Events which applies in the Initial Regulatory Period.¹

After carefully considering approaches taken in other comparably regulated sectors and feedback from the ACCC on previous proposals, among other factors, **nbn** proposes a cost pass-through mechanism that has the following key elements:

- clearly-defined events that trigger **nbn**'s right to pass through material changes in costs of supply, in addition to Tax Change Events (discussed in section 19.3 below);
- mandatory, time-bound obligations on **nbn** to pass through material decreases in costs of supply which result from certain events (discussed further in section 19.4 below); and
- an oversight role for the ACCC in regard to: (a) material changes in costs of supply that are passed through into **nbn**'s WAPC in response to the relevant event; and (b) the manner in which **nbn** passes through such costs (discussed further in section 19.5 below).

19.2 A calibrated cost pass-through mechanism promotes economic efficiency

As discussed in chapter 8 of Part B of this Submission, **nbn** faces incentives under the WAPC to be cost-efficient. However, the effectiveness of these incentives in promoting the LTIE is subject to some limitations in relation to events outside **nbn**'s reasonable control and which could not have been reasonably foreseen or forecast at the time **nbn** provided its cost forecasts prior to the relevant period. Where such exogenous events occur, and to the extent they lead to a material change in costs, there may be windfall gains or losses.

¹ Current SAU, Schedule 1G. The current SAU (clauses 4.5(e) and 4.6(g)) also foreshadows that such a mechanism may be included in Replacement Modules.



nbn operates in a highly dynamic and unpredictable environment. For example, in recent years **nbn** has faced substantial cost impacts from the bushfires of late 2019/early 2020, the COVID-19 pandemic and extensive floods in eastern Australia in early 2022. Looking ahead, there will inevitably be further challenges from unexpected events.

Windfall losses, including those related to asymmetric risks such as natural disasters, are of potentially more concern than windfall gains in terms of how they may impact long-term outcomes for end-users. This is because, as recognised by the Australian Energy Regulator (**AER**) in the electricity context,² material windfall losses that are not appropriately treated within the regulatory framework may compromise **nbn**'s ability to fund efficient levels of expenditure and lead to enduring and deleterious effects on service provision.

The risk posed by material windfall losses is typically managed by regulators through various combinations of ex-ante measures, including allowances for insurance and self-insurance, and cost pass-through arrangements (that also address material windfall gains, and set out clearly defined pass-through event categories that effectively exclude costs within **nbn**'s reasonable control). The balance between these measures needs careful calibration with a view to promoting the LTIE given the practical realities of the cost and availability of insurance, the extent to which a regulated business can credibly self-insure certain risks, and the potential categories of exogenous events that may lead to material windfall losses (or gains).

It is well recognised that when there is a high degree of uncertainty about whether a significant event will eventuate in a Regulatory Cycle, it can be more efficient for customers to only pay if, and when, the event materialises, rather than pay the expected costs upfront.³ **nbn** submits that the SAU should include a calibrated cost pass-through mechanism in particular circumstances (and only to the extent that a circumstance causes a material departure from the ABBRR for that Regulatory Cycle).⁴ This is consistent with the views of other regulators, such as the Essential Services Commission of South Australia, which noted that “...*Pass-throughs create flexibility for regulated revenues to adjust for unforeseen events, which allow prices to remain cost reflective and, therefore, promotes economic efficiency*”.⁵

Although some aspects of the balance between insurance, self-insurance and cost pass-through arrangements may need to change over time (in particular, because insurance markets are dynamic), **nbn** has defined a set of pass-through events (as described in subsequent sections) that are expected to be relevant throughout the term of Module 2. This is supported by an associated process that provides certainty as to how material windfall gains or losses will be assessed and flowed through into the WAPC. Over time, it is possible that additional categories of pass-through events may be needed, and **nbn** could propose these as SAU variations as and when required.

² See further discussions regarding the regulated firm's incentives, expressed in the electricity context, in: AER, *Statement of principles for the regulation of electricity transmission revenues – Position paper*, December 2005, pp. 5 and 11:

<https://www.aer.gov.au/system/files/ac%2000505%20Pass%20Through%20and%20Re-opener%20paper.pdf>.

³ For example: IPART, *Encouraging innovation in the water sector*, Discussion Paper, August 2021, p. 37:

https://www.ipart.nsw.gov.au/sites/default/files/cm9_documents/Discussion-Paper-Encouraging-innovation-in-the-water-sector-August-2021.PDF.

⁴ The alternative means by which a regulated firm's revenues can be adjusted in response to a cost impact outside of that firm's control is to adjust the revenue allowance after the regulatory period in which the cost impact arises. The disadvantage of such an approach is that it may place the regulated firm in a position of uncertainty as to whether cost impacts would be recovered at the end of the regulatory period (which could be a number of years in duration) and in the meantime may create some issues with funding efficient levels of expenditure.

⁵ ESCOSA, *SA Water's Water and Sewerage Revenues 2013/14 – 2015/16 – Final Determination – Statement of Reasons*, May 2013, p. 174:

https://www.escosa.sa.gov.au/ArticleDocuments/488/130527-SAWater_Water_SewerageRevenu.pdf.aspx?Embed=Y



19.3 Cost pass-through events should strike a balance between long-term flexibility and appropriate recovery

The pass-through mechanism should not allow **nbn** to over-recover or derive windfall gains from exogenous events, or changes to the Benchmark Service Standards approved by the ACCC. This can be ensured through sufficiently certain and detailed criteria that prevent risk being inefficiently passed on to RSPs and end-users. At the same time, the criteria should be appropriately flexible, recognising that these rules will be in place over the long term and should therefore accommodate changes in circumstances and future events. They should also provide **nbn** with a reasonable level of certainty in regard to cost recovery in situations in which there is a need to respond quickly to exogenous events that have an immediate and adverse impact on a large number of end-users.

Taken together, these considerations mean that in **nbn**'s current context, only material changes in costs in response to particular types of events should be passed through into **nbn**'s WAPC. This is consistent with the approach taken for cost pass-through mechanisms that exist in other regulated contexts.⁶

Accordingly, **nbn** proposes seven types of cost pass-through event:

- Tax Change Events;
- Regulatory Change Events;
- Government Policy Project Notice Events;
- Natural Disaster Events;
- Terrorism Events;
- ACCC Service Standards Change Events; and
- NBN Service Standards Change Events.

These are described in Table F1 below.

Relevantly, the Variation requires that the change in costs of supply resulting from pass-through events be 'material', in the sense that the changed costs:

- are greater than or equal to 1% of the Forecast Nominal Core Services ABBRR in a Financial Year – this threshold is the same as that used in the National Electricity Rules (**NER**),⁷ and **nbn** has adopted the same threshold for all cost pass-through event categories, even though it would be reasonable to have a lower threshold for categories such as Natural Disaster Events, which are local rather than national in terms of their impact; or
- otherwise determined by the ACCC to be material – this approach to materiality has received support from Australian regulators at various times.⁸

⁶ See, for example, ESCOSA, *Price Determination – SA Water's water and sewerage retail services: 1 July 2020 – 30 June 2024*, Draft for Consultation, 1 July 2020: <https://www.escosa.sa.gov.au/ArticleDocuments/21462/20200304-Water-SAWRD20-DraftPriceDetermination.pdf.aspx?Embed=Y>, as well as the materiality thresholds set out for cost pass-through events prescribed in the National Electricity Rules.

⁷ See the definition of "materially" in the Chapter 10 Glossary of the National Electricity Rules.

⁸ This means that the SAU would contain an indicative, non-binding materiality threshold for cost-pass through events. A similar approach has been adopted by ESCOSA, which stated recently: "The Commission is concerned that a fixed materiality threshold may be inflexible and lead to inappropriate incentives for



nbn considers its proposed definition of ‘material’ provides the benefit of certainty where costs meet the numerical threshold and flexibility where this is not the case, such that the ACCC can still determine costs as material in the relevant circumstances.

Table F1. Description of cost pass-through events

Cost pass-through event	Explanation
Tax Change Event	The proposed definition of Tax Change Event is essentially unchanged from that applicable under the current SAU for the Initial Regulatory Period. The definition captures both positive and negative changes in nbn ’s costs as a result of a tax change.
Regulatory Change Event	<p>As a highly regulated firm, legal and regulatory changes can have a significant impact on nbn’s business. Whilst nbn can influence the nature and extent of regulatory change, the ultimate decision is out of its control. This is especially true given nbn’s role as an instrument of government policy and provider of critical communications infrastructure.</p> <p>As such, nbn proposes that where changes in regulatory requirements (including the introduction of new regulatory requirements) impose a material change in nbn’s costs then nbn should be permitted to apply for such cost changes to be passed through into the WAPC.</p> <p>Such an allowance is recognised in other regulatory systems and nbn submits that a comparable approach is reasonable.⁹</p>
Government Policy Project Notice Event	Given nbn ’s role as a GBE and an instrument of government policy, the Variation includes a separate cost pass-through event that will be triggered by the issuing of a new Government Policy Project Notice by the Communications Minister, or a change to, or withdrawal of, a Government Policy Project Notice by the Communications Minister. The Variation defines the required and optional elements for such notices. A key requirement is that a notice must state that the Communications Minister has determined that nbn undertaking a particular project or program is reasonably required to achieve Commonwealth Government policy, taking into account the public interest served by the project or program.
Natural Disaster Event	The proposed inclusion of a Natural Disaster Event category and the definition for such an event is consistent with regulatory precedents. ¹⁰
Terrorism Event	The proposed inclusion of a Terrorism Event category and the definition for such an event is consistent with regulatory precedents. ¹¹

cost pass-through applications to be driven by the materiality threshold, rather than efficient costs... To provide a balance between the desire for flexibility and certainty, the Commission has set an indicative, non-binding, materiality threshold for cost pass-through events’: ESCOSA, *SA Water Regulatory Determination 2020*, Final Determination: statement of reasons, June 2020. See: <https://www.escosa.sa.gov.au/ArticleDocuments/21489/20200611-Water-SAWRD20-FinalDetermination-StatementOfReasons.pdf.aspx?Embed=Y>.

⁹ See, for example: Rule 6A.7.3(a1)(1) of the National Electricity Rules (captured as a ‘regulatory change event’); ESCOSA, *Price Determination – SA Water’s water and sewerage retail services: 1 July 2020 – 30 June 2024*, Draft for Consultation, 1 July 2020, p. 3 (captured as a ‘change in a legal obligation event’): <https://www.escosa.sa.gov.au/ArticleDocuments/21462/20200304-Water-SAWRD20-DraftPriceDetermination.pdf.aspx?Embed=Y>.

¹⁰ See, for example: the definition of “Natural Disaster Event” in Jemena Gas Network’s Access arrangement for its NSW Gas Distribution Network, 1 July 2020 to 30 June 2025.

¹¹ See, for example: the definition of “Terrorism Event” in Jemena Gas Network’s Access arrangement for its NSW Gas Distribution Network, 1 July 2020 to 30 June 2025.



Cost pass-through event	Explanation
ACCC Service Standards Change Event	<p>Consistent with nbn's proposal in regard to Benchmark Service Standards, the Variation includes an ACCC Service Standards Change Event that relates to a change in service standard commitments as a result of (a) the ACCC making an ACCC Service Standard Determination, or (b) the ACCC accepting a Service Standard Response.</p> <p>nbn notes that in other regulatory regimes, in which service standards are set by regulation, changes in those service standards are a common type of cost pass-through event.¹²</p>
NBN Service Standards Change Event	<p>Closely related to the previous category, the Variation also includes an NBN Service Standard Change Event. This relates to nbn notifying the ACCC of a Benchmark Service Standards Change Proposal.</p> <p>This category of pass-through event supports the incentive for nbn to develop and offer improvements to its products and services to RSPs, which will in turn benefit end-users. The flexibility provided is important given the dynamic nature of the telecommunications industry in which nbn operates.</p>

19.4 nbn is required to pass-through certain negative cost changes

Although **nbn** anticipates that such cost pass-through events will generally have material adverse cost impacts on **nbn** that will need to be dealt with via the cost pass-through provisions included in the Variation, there is scope for such events to lead to material decreases in **nbn**'s costs. Obvious examples of such events could be a reduction in applicable tax rates (where **nbn** is in a tax-paying position), or regulatory changes that reduce obligations placed on **nbn**, but other scenarios are possible.

The Variation acknowledges this by incorporating an obligation on **nbn** to seek to pass-through material reductions in costs that result from any of the specified cost pass-through events. **nbn** must provide a Cost Pass-Through Application to the ACCC within 90 Business Days of **nbn** becoming aware of the occurrence of the Negative Change Event (unless a longer timeframe is agreed with the ACCC).

The ACCC may also notify **nbn** of a Negative Change Event if **nbn** has not submitted a Cost Pass-Through Application within the required time. In these circumstances, **nbn** is not required to make a Cost Pass-Through Application (but could still do so) and the ACCC may proceed to issue a determination.

The pass-through of Negative Change Events will be assessed by the ACCC in the same manner as Positive Change Events, and the substance of the assessment is the same regardless of whether or not the Negative Change Event in question was the subject of a notice from the ACCC to **nbn**.

These arrangements in the Variation ensure there is appropriate **nbn** response to, and ACCC oversight of, circumstances in which **nbn** may have otherwise faced the possibility of a windfall gain as the result of unforeseen changes to its operating environment.

¹² An example is the regime for service standard events applying under the National Electricity Rules.



19.5 The ACCC will have an oversight role in nbn's proposed cost pass-throughs

Consistent with established regulatory practice, **nbn** proposes an oversight role for the ACCC to determine:

- whether the relevant Cost Pass-Through Event has occurred; and, if so:
 - the Total Event Pass-Through Amount; and
 - the amount to be passed through in each Financial Year after the relevant event began.

The Variation contains a non-exhaustive list of factors which must be taken into account in making such a determination, including the efficiency of **nbn**'s decisions and actions in relation to the risk of the event (where it is a Positive Change Event), the need to ensure **nbn** only recovers any actual or likely increment in costs, whether the costs of the Pass-Through Event have already been factored into the WAPC Revenue Requirement, and the time cost of money.

The timing and process for the ACCC's assessment of cost pass-throughs provides for determinations to be made within 40 Business Days,¹³ with the ability for the ACCC to notify extensions of the decision-making period for up to two months at a time (including to collect further information as necessary).

In the event that the ACCC does not make a determination within the time period (as extended), then:

- in respect of a Positive Change Event, the Total Event Pass-Through Amount, and the amount to be passed through in each year will be as proposed by **nbn**; and
- in respect of a Negative Change Event, the Total Event Pass-Through Amount and annual pass-through amounts will be zero.

The same position applies in the energy sector, although in that context the AER's ability to extend the relevant period is limited. **nbn** has adopted such a position here for completeness and for certainty of outcomes should the ACCC not make a decision in the relevant period – but **nbn** expects that such provisions will have little role in practice, given the ACCC's ability to continue to extend the period.

In regard to an NBN Service Standards Change Event, the implementation of the pass-through outcome is subject to **nbn** giving the ACCC notice, after the ACCC has accepted a Benchmark Service Standards Change Proposal, that **nbn** wishes to proceed with the proposed changes in the relevant Benchmark Service Standards Change Proposal. This allows **nbn** the opportunity to not proceed in the event that the pass-through outcome is less than **nbn** considers necessary to meet the service standards as proposed by **nbn**.

Taken together, these provisions appropriately emphasise the need for timely assessment and determination of cost pass-throughs while also ensuring sufficient flexibility.

¹³ This timeframe is consistent with that specified in the National Electricity Rules (see, for example, cl 6.6.1(e)), although in that context, the AER's ability to extend that timeframe is limited – whereas the Variation proposes that the ACCC can continue to extend the timeframe.



20 Expenditure assessment framework

20.1 Overview

The Variation includes an expenditure assessment framework that comprises various commitments and incentives for **nbn** to incur only prudent and efficient costs. This framework supplements the prudence and efficiency incentives already faced by **nbn** as a result of infrastructure-based competition, ongoing GBE oversight arrangements, and uncertainty over whether future revenues will be sufficient to recover costs over the long term given evolving technology, applications and demand.

As described further below, **nbn** has drawn on established regulatory practice in developing the proposed expenditure assessment framework, with particular reference to the regulation of electricity distribution and transmission networks by the AER under the NER.

The key elements of the framework include the following and are discussed in subsequent sections.

- A requirement, ahead of submitting a Replacement Module Application, to consult with Access Seekers and Consumer Advocacy Groups on the relevant expenditure **nbn** proposes to undertake in a Regulatory Cycle.
- A requirement for forecast expenditure to reasonably reflect the expenditure that a prudent and efficient operator in **nbn**'s position would incur to meet a set of Expenditure Objectives. This is to be determined having regard to a set of Expenditure Factors.
 - Consistent with the approach adopted under the NER, the meaning of prudent and efficient is not defined in the Variation.
 - The Expenditure Objectives are: meeting the expected demand for products and services; complying with all Regulatory Requirements; implementing a project or program that is the subject of a Government Policy Project Notice; and maintaining and improving the quality, reliability, safety, security and integrity of any products and services, including by meeting the Benchmark Service Standards that are to apply in the relevant Regulatory Cycle.
 - The Expenditure Factors are: actual and expected relevant expenditure in previous Regulatory Cycles, and historical trends in relevant expenditure; expected end-user willingness to pay; the extent to which expenditure addresses the concerns of RSPs and consumer advocacy groups; current and reasonably anticipated future market conditions; **nbn**'s procurement and governance framework; **nbn**'s ability to finance the expenditure; the substitution possibilities between opex and capex; and any other relevant matters.
 - In relation to implementing a project or program that is the subject of a Government Policy Project Notice, the proposed expenditure will be deemed prudent (to the extent the expenditure is incurred or likely to be incurred in a manner that implements the details of the project or program as specified in the notice) but will be assessed separately as to the efficiency with which the project or program is forecast to be delivered.
- A requirement, as already provided for in the SAU, that all forecasts must include any expenditure expected to be incurred pursuant to the Telstra Arrangements and the Optus Arrangements.
- A process for the ACCC to undertake an ex-post prudence and efficiency assessment of **nbn**'s capex applying the same criteria as are applied ex-ante, and based on the circumstances existing, and information and



analysis that an operator in **nbn**'s position could reasonably have been expected to have considered or undertaken at the time the relevant capex was incurred.

20.2 Consultation ahead of submitting a Replacement Module Application

The Variation includes a requirement, ahead of submitting a Replacement Module Application, for **nbn** to consult with Access Seekers and Consumer Advocacy Groups on the relevant expenditure **nbn** proposes to undertake in a Regulatory Cycle. While **nbn** has flexibility in regard to how it conducts the consultation (to ensure that the nature and approach to consultation can evolve over time), **nbn** must provide reasonable notice and reasonable opportunity to participate. At the end of the consultation, **nbn** will publish a report on the consultation, including a summary of positions put forward and **nbn**'s response.

This consultation will be a critical input into the development of **nbn**'s expenditure forecast in future Regulatory Cycles. It will also play an important role in how those forecasts are assessed for prudence and efficiency, noting that one of the Expenditure Factors relates specifically to addressing concerns raised by Access Seekers and Consumer Advocacy Groups.

20.3 Definitions of prudent and efficient

Consistent with the NER approach, the Variation does not include definitions of prudent and efficient. This recognises the complementary nature of prudence and efficiency and allows for some flexibility in how these concepts are practically applied over time to achieve the Expenditure Objectives.

In its Expenditure Forecast Assessment Guideline for Electricity Distribution, the AER sets out working definitions of prudence and efficiency, and the outcome of applying the two concepts in combination:

Prudent expenditure is that which reflects the best course of action, considering available alternatives. Efficient expenditure results in the lowest cost to consumers over the long term. That is, prudent and efficient expenditure reflects the lowest long term cost to consumers for the most appropriate investment or activity required to achieve the expenditure objectives.¹⁴

20.4 Expenditure Objectives

In response to feedback provided on the March Variation, **nbn** has narrowed the Expenditure Objectives regarding the basis on which **nbn** will be given the opportunity to recover its prudent and efficient costs of complying with Government policy. The Variation now contemplates that, to be certain of such an opportunity in future, Government will take explicit action in the form of enacting legislation, making regulations or formally issuing a Government Policy Project Notice under the SAU. Otherwise, **nbn** will only have the opportunity to recover its costs to the extent they meet one or more of the other Expenditure Objectives.

With this change, there is a high degree of alignment between the Expenditure Objectives as set out in the Variation and those set out in the NER (see Table F2 below).

¹⁴ AER, *Expenditure Forecast Assessment Guideline for Electricity Distribution*, August 2022, p. 9.



Table F2. Comparison of Expenditure Objectives in the Variation and the NER

nbn Expenditure Objective	Comparison to NER	Comment
<p>The Variation provides that nbn's forecast expenditure for a Regulatory Cycle must reasonably reflect the expenditure that a prudent and efficient operator in nbn's position would incur in achieving the following objectives:</p> <p>(1) Meeting the expected demand for products and services</p>	<p>The NER provides that forecast expenditure for electricity distribution and transmission networks for a regulatory period must reasonably reflect the efficient costs which would be incurred by a prudent operator to achieve the following objectives:</p> <p>(1) Meeting or managing the expected demand for standard control services/prescribed transmission services over the regulatory period</p>	<p>Aligned.</p> <p>The Expenditure Objective proposed in the Variation reflects the Expenditure Objective used in the NER.</p> <p>The nbn wording does not include the NER concept of 'managing' expected demand because it is less relevant in a telco context.</p>
<p>(2) Complying with all Regulatory Requirements</p>	<p>(2) Complying with all applicable regulatory obligations or requirements associated with the provision of standard control services/prescribed transmission services</p>	<p>Aligned.</p>
<p>(3) 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</p>	<p>(3) Maintaining:</p> <ul style="list-style-type: none"> the quality, reliability and security of standard control services/prescribed transmission services; the reliability and security of the distribution/transmission system through the supply of standard control services / prescribed transmission services; and the safety of the distribution/transmission system through the supply of standard control services/prescribed transmission services. <p>(To the extent that there are not applicable regulatory obligations or requirements in relation to those objectives.)</p>	<p>The Expenditure Objective proposed in the Variation reflects the Expenditure Objective used in the NER.</p> <p>The nbn wording is wider than that in the NER in that it includes 'improving' in addition to 'maintaining'. This accounts for the need to improve many aspects of nbn's service over time, with the prudence and efficiency of expenditure in pursuit of this objective to be determined having regard to the Expenditure Factors, including expected end-user willingness to pay.</p>
<p>(4) Implementing a project or program which is the subject of a Government Policy Project Notice</p>	<p>N/A</p>	<p>This is a bespoke objective proposed by nbn, accounting for its status as a GBE and instrument of Government policy.</p>



20.5 Expenditure Factors

Consistent with the approach taken with the Expenditure Objectives, **nbn** has clarified and consolidated the list of Expenditure Factors proposed in the March Variation. In so doing, **nbn** has continued to draw on established regulatory practice, with a high degree of alignment with the factors in the NER.

As set out in Table F3 below, the list remains non-exhaustive in nature and without a set weighting between factors. This balances an appropriate level of guidance on how to determine prudence and efficiency with some flexibility to exercise appropriate discretion and judgment, evolve over time and respond to new situations.

Table F3. Comparison of Expenditure Factors in the Variation and the NER

Topic	nbn Expenditure Factor	Comparison to NER	Comment
Past expenditure and other relevant benchmarks	<p>nbn's proposed Expenditure Factors include:</p> <ul style="list-style-type: none"> actual and expected Relevant Expenditure in previous Regulatory Cycles, and historical trends in Relevant Expenditure – factor (i). 	<p>Expenditure factors in the NER include:</p> <ul style="list-style-type: none"> the actual and expected level of opex and capex in the previous regulatory cycle (e.g., NER 6.5.6(e)(5) and 6.5.7(e)(5)). 	The Expenditure Factors proposed in the Variation are aligned with those used in the NER.
Alignment with end-users, Access Seekers and Consumer Advocacy Groups, and with current and reasonably anticipated future market conditions	<p>nbn's proposed Expenditure Factors include:</p> <ul style="list-style-type: none"> expected end-user willingness to pay for products and services, including as to connections, speed requirements, data volumes, quality and reliability – factor (ii); the extent to which Relevant Expenditure includes expenditure to address the concerns of Access Seekers and Consumer Advocacy Groups as identified by nbn in the course of its engagement with such persons – factor (iii); and current and reasonably anticipated future market conditions, including the extent to which nbn must adjust product and service quality to meet competition – factor (iv). 	<p>Expenditure factors in the NER include:</p> <ul style="list-style-type: none"> the extent to which the opex/capex forecasts address concerns of end-users (e.g., NER 6.5.6(e)(5A) and 6.5.7(e)(5A)) – in practice, this involves some consideration of end-user willingness to pay. <p>The AER must also ensure that capex/opex forecasts reflect a realistic expectation of demand forecast and cost inputs required to achieve the opex/capex objectives in the NER (NER, 6.5.6(c)(iii) and 6.5.7(c)(iii)).</p>	The Expenditure Factors proposed in the Variation are aligned with those used in the NER. The nbn factors include some additional details to make clear the relevance of end-user willingness to pay information and the imperative for nbn 's services to be competitive.
Expenditure justification	<p>nbn's proposed Expenditure Factors include:</p> <ul style="list-style-type: none"> any other relevant matters – factor (viii). 	<p>Expenditure factors in the NER include:</p> <ul style="list-style-type: none"> any relevant final project assessment report (e.g., NER, 6.5.6(e)(11) and 6.5.7(e)(11)). 	There is no equivalent to the NER's concept of a final project assessment report in the Variation. Nonetheless, nbn will be incentivised to put forward business cases or cost/benefit analysis to justify its proposed expenditure. The regulatory framework for assessing prudence and efficiency will allow the ACCC to assess those business cases and cost/benefit analysis.



Topic	nbn Expenditure Factor	Comparison to NER	Comment
Procurement and governance	<p>nbn's proposed Expenditure Factors include:</p> <ul style="list-style-type: none"> nbn's procurement and governance framework, and whether nbn's asset management and planning framework reflects generally accepted industry standards and practice – factor (v). 	<p>Expenditure factors in the NER include:</p> <ul style="list-style-type: none"> the extent to which opex/capex forecasts are referable to arrangements that do not reflect arm's length terms (e.g., NER, 6.5.6(e)(9) and 6.5.7(e)(9)). <p>The AER's Expenditure Forecast Assessment Guideline for Electricity Distribution provides for governance reviews that involve a holistic assessment of a distributors internal policies compared with industry best practice.</p>	<p>The Expenditure Factors proposed in the variation are aligned with those used in the NER. For clarity, the nbn factors include some additional details consistent with the relevant AER guideline.</p>
Financing expenditure	<p>nbn's proposed Expenditure Factors include:</p> <ul style="list-style-type: none"> nbn's ability to finance Relevant Expenditure – factor (vi). 	<p>The AER has regard to financeability tests as a sense check on the rate of return (AER, Draft RORI Explanatory Statement, June 2022).</p>	<p>The Expenditure Factors proposed in the Variation do not have a direct equivalent in the NER's list of factors; however, the AER does separately have regard to financeability and including this as one of nbn's factors is useful in providing clarity.</p>
Balance between opex and capex	<p>nbn's proposed Expenditure Factors include:</p> <ul style="list-style-type: none"> the substitution possibilities between Operating Expenditure and Capital Expenditure – factor (vii). 	<p>Expenditure factors in the NER include:</p> <ul style="list-style-type: none"> the substitution possibilities between opex and capex (e.g., NER, 6.5.6(e)(7) and 6.5.7(e)(7)). 	<p>The Expenditure Factors proposed in the Variation are aligned with those used in the NER.</p>
Other matters	<p>nbn's proposed Expenditure Factors include:</p> <ul style="list-style-type: none"> any other relevant matters – factor (viii). 	<p>Expenditure factors in the NER include:</p> <ul style="list-style-type: none"> any other factor the AER considers relevant and which the AER has notified to the provider (e.g., NER, 6.5.6(e)(12) and 6.5.7(e)(12)). 	<p>The Expenditure Factors proposed in the Variation are aligned with those used in the NER.</p>



20.6 Government Policy Project Notice

As noted in section 20.3 above, **nbn** has narrowed the Expenditure Objectives regarding the basis on which prudent and efficient costs can be recovered for complying with Government policy. Consistent with this, where the Government decides to formally issue a Government Policy Project Notice under the SAU, the expenditure **nbn** incurs to implement the relevant project or program will be:

- deemed prudent for the purposes of the expenditure assessment framework, but only to the extent the expenditure is incurred or likely to be incurred in a manner that implements the details of the project or program as specified in the notice; and
- otherwise subject to prudence and efficiency assessment.

This approach appropriately recognises the role that **nbn** plays in implementing Government policy and complements this with ACCC oversight of the efficiency with which **nbn** performs that role.

20.7 Expenditure incurred pursuant to Telstra Arrangements and Optus Arrangements

Module 2 of the current SAU (clauses 2C.2.1(a)(i) and 2C.7.7(b)) provides that forecast opex/capex is to include any opex/capex to be incurred pursuant to the Telstra Arrangements or the Optus Arrangements. These provisions reflect the fundamental importance of those arrangements to the **nbn**[®] network and also their very long-term nature. Nothing has changed in these regards since the SAU was accepted by the ACCC in December 2013, and for this reason the Variation includes equivalent provisions (clauses 2G.2.1(a)(i) and 2G.5.6(a)(ii)) to those in the current SAU.

20.8 Ex-post assessment of capex prudence and efficiency

In addition to the ex-ante assessment of expenditure as described above, the Variation provides for an ex-post assessment of capex towards the end of the Regulatory Cycle. As in the March Variation, this ex-post assessment forms part of the RAB roll forward and involves the ACCC determining whether **nbn**'s capex was incurred prudently and efficiently having regard to the same Expenditure Factors as used in the ex-ante assessment of forecast capex.

Consistent with regulatory practice in other sectors, the ACCC's ex-post assessment will not be a 'hindsight' review; rather, the assessment will be based on the circumstances existing, and information and analysis that an operator in **nbn**'s position could reasonably have been expected to have considered or undertaken, at the time the relevant capex was incurred.¹⁵

The ex-post assessment of capex is a complement to the incentives **nbn** faces to incur all expenditure prudently and efficiently. These incentives include those created by the SAU (e.g., the setting of a WAPC for a Regulatory Cycle) and those that are pre-existing (e.g., due to infrastructure-based competition).

¹⁵ See, for example, S6.2.2 and S6A.2.2 of the National Electricity Rules.



21 Specific commitments in respect of the First Regulatory Cycle (FY24–FY26)

A central element of **nbn**'s Variation is its proposed settings for the First Regulatory Cycle. These include the length of the First Regulatory Cycle, the building block model (**BBM**) parameters, the Entry Level Offers and Benchmark Service Standards.

nbn is proposing that the length of the First Regulatory Cycle is three years, reflecting the specific circumstances of **nbn** at this time.

nbn's BBM parameters provide the forecast values (generally in both real and nominal terms) for key components of the BBM for the FY24 to FY26 years, including the Forecast Nominal ABBRR, the Forecast Nominal Core Services ABBRR, the forecast Real RAB and the forecast Real Core Services RAB Portion. It also provides the forecasts of the inputs to those values, including the rate of return and taxation parameters.

nbn's Entry Level Offers and the Benchmark Service Standards are set out in Module 4 of the Variation.

More details on the settings for the First Regulatory Cycle are provided in the first four sections of this chapter. The remaining sections provide further detail on key elements of **nbn**'s BBM parameters, namely:

- expenditure forecasts; and
- demand forecasts.

21.1 Proposed Regulatory Cycle of three years

nbn is proposing a three-year term for the First Regulatory Cycle (i.e., FY24 to FY26). As compared to the options of using a four-year or five-year period, **nbn** considers this approach is reasonable because:

- **nbn** faces a high level of demand and revenue uncertainty over the period FY24 to FY26;
- the First Regulatory Cycle will be the first period in which the binding WAPC will be in effect in the SAU, together with new pricing structures and constraints on discounting; and
- a three-year period aligns with **nbn**'s current Integrated Operating Plan, which has already been reviewed and approved/endorsed by **nbn**'s Executive Committee and Board, and submitted to Shareholder Departments and Shareholder Ministers, and only captures forecast expenditures to the end of FY26.

21.2 BBM parameters

Module 4 of the Variation sets out the following BBM parameters for each of the Financial Years in the First Regulatory Cycle:

- the Forecast Nominal ABBRR, Forecast Real ABBRR, Forecast Nominal Core Services ABBRR and Forecast Real Core Services ABBRR;
- the Annual Core Services Forecast Revenue; and
- inputs required for the calculation of each of the above, including the rate of return and taxation parameters.

Module 4 does not set out the values of the Annual WAPC Revenue Requirement, Annual WAPC Services Forecast Revenue and Annual Non-WAPC Core Services Forecast Revenue, given that the WAPC Factor Change Year is not forecast to occur within the First Regulatory Cycle.



The BBM parameters are set out in Table F4 below.

Table F4. nbn's BBM parameters in respect of the First Regulatory Cycle¹⁶

Item	Calculated in accordance with / for the purposes of the following clauses	Units	2023-24	2024-25	2025-26
Estimated average annual rate of inflation expectations over the Regulatory Cycle (π)	2G.1.4	Percentage	3.69%	3.69%	3.69%
Cumulative Inflation Factor	2G.1.4	Factor	1.312	1.360	1.410
Statutory company taxation rate	2G.7.2	Percentage	30%	30%	30%
Gamma	2G.7.4	Number	0.585	0.585	0.585
Forecast Nominal RAB (start period)	2G.5.8(b)	\$'000	30,847,679	31,971,331	32,190,400
Forecast Nominal RAB (end period)	2G.5.8(b)	\$'000	31,971,331	32,190,400	32,415,302
Forecast Real RAB (start period)	2G.5.6	\$'000	24,382,287	24,371,136	23,664,894
Forecast Real RAB (end period)	2G.5.6	\$'000	24,371,136	23,664,894	22,982,189
Forecast Nominal Capital Expenditure	-	\$'000	3,470,094	2,884,109	3,174,651
Forecast Real Capital Expenditure	2G.5.6	\$'000	2,645,187	2,120,264	2,250,802
Forecast Real Disposals	2G.5.6	\$'000	-	-	-
Forecast Nominal Disposals	-	\$'000	-	-	-
Forecast Real Depreciation	2G.5.6	\$'000	2,656,337	2,826,506	2,933,507
Forecast Nominal Tax Depreciation	2G.7.1	\$'000	3,032,242	3,275,928	3,436,442
Forecast nominal regulatory depreciation	2G.2.1	\$'000	2,346,443	2,665,040	2,949,749
Forecast Operating Expenditure (nominal)	2G.2.1	\$'000	2,931,865	2,949,735	3,006,680
Annual Construction in Progress Allowance (nominal)	2G.2.3(b)	\$'000	153,608	136,572	125,765
Forecast Tax Allowance (nominal)	2G.7.2	\$'000	-	-	-
Forecast Nominal ABBRR	2G.2.1	\$'000	7,800,179	8,218,201	8,587,325

¹⁶ Note: Real values included in this table are in FY14 terms, reflecting the terms of the SAU.



Item	Calculated in accordance with / for the purposes of the following clauses	Units	2023-24	2024-25	2025-26
Forecast Real ABBRR	2G.2.4(g)	\$'000	5,945,928	6,041,642	6,088,344
Nominal rate of return ($R_t^{nominal}$)	2G.2.4	Percentage	7.677%	7.716%	7.782%
Expected return on equity (Re)	2G.2.4	Percentage	9.221%	9.221%	9.221%
Expected return on debt (Rd_t)	2G.2.4	Percentage	5.019%	5.124%	5.304%
Benchmark gearing ratio (G)	2G.2.4	Factor	36.730%	36.730%	36.730%
Core Regulated Services					
Forecast Nominal Core Services RAB Portion (start period)	2G.5.9(b)	\$'000	30,444,895	31,452,607	31,563,520
Forecast Nominal Core Services RAB Portion (end period)	2G.5.9(b)	\$'000	31,452,607	31,563,520	31,681,648
Forecast Real Core Services RAB Portion (start period)	2G.5.7	\$'000	24,063,922	23,975,723	23,204,041
Forecast Real Core Services RAB Portion (end period)	2G.5.7	\$'000	23,975,723	23,204,041	22,462,034
Forecast Nominal Core Services Capital Expenditure	-	\$'000	3,341,684	2,761,851	3,052,257
Forecast Real Core Services Capital Expenditure	2G.5.7	\$'000	2,547,302	2,030,385	2,164,026
Forecast Nominal Core Services Disposals	-	\$'000	-	-	-
Forecast Real Core Services Disposals	2G.5.7	\$'000	-	-	-
Forecast Real Core Services Depreciation	2G.5.7	\$'000	2,635,502	2,802,068	2,906,033
Forecast Nominal Tax Depreciation in respect of the forecast Nominal Core Services RAB Portion	2G.7.1	\$'000	3,009,374	3,248,321	3,405,173
Forecast nominal regulatory depreciation in respect of the forecast Nominal Core Services RAB Portion	2G.2.2	\$'000	2,333,972	2,650,939	2,934,129
Forecast Nominal Core Services Operating Expenditure	2G.2.2	\$'000	2,858,360	2,860,664	2,911,605
Forecast Nominal Construction in Progress in respect of Core Regulated Services (start period)	2G.2.3(c)	\$'000	1,926,766	1,694,985	1,553,746
Forecast Annual Construction in Progress Allowance (nominal) in respect of Core Regulated Services	2G.2.3(c)	\$'000	147,923	130,782	120,916



Item	Calculated in accordance with / for the purposes of the following clauses	Units	2023-24	2024-25	2025-26
Forecast Core Services Tax Allowance (nominal)	2G.7.3	\$'000	-	-	-
Forecast Nominal Core Services ABBRR	-	\$'000	7,677,597	8,069,215	8,422,997
Forecast Real Core Services ABBRR	2G.2.4(g)	\$'000	5,852,486	5,932,114	5,971,837
Annual Core Services Forecast Revenue	5.3(a)(iv)	\$'000	5,609,886	5,792,387	6,157,162
Forecast Annual RBS Amount	2G.4.1	\$'000	29,601	32,315	41,510

21.3 Entry Level Offers

nbn's Entry Level Offer Proposal is set out in clause 4A.4 of the Variation. For the first Regulatory Cycle, the Entry Level Offers are, in respect of the NBN Co Fibre Network, NBN Co FTTN Network, NBN Co FTTB Network, NBN Co FTTC Network, NBN Co HFC Network and the NBN Co Wireless Network, the Bundled TC-4 Offer with an AVC bandwidth profile of 25 Mbps PIR (TC-4) downlink and five Mbps PIR (TC-4) uplink.

21.4 Benchmark Service Standards

The Benchmark Service Standards for the First Regulatory Cycle are set out in Attachment I to Schedule 4A of the Variation. See chapter 10 of Part C of this Submission for more information.

21.5 Expenditure forecasts

This section provides an overview of **nbn's** expenditure forecasting for the purposes of the First Regulatory Cycle (FY24 to FY26). Appendix A provides a breakdown of the capex and opex forecasts.

21.5.1 Context for **nbn's** expenditure forecasting

As discussed in **nbn's** Corporate Plan (FY22),¹⁷ the then Minister declared in December 2020 that the initial build of the **nbn**[®] network (excluding premises in future new developments and complex connections) should be treated as built and fully operational. The initial build enabled almost 12 million premises to access the network and all standard installation premises in Australia to connect to the **nbn**[®] network, in line with **nbn's** build commitment. Some additional ongoing capex is forecast to be incurred associated with completing certain aspects of the build, such as complex connections and resolving serviceability issues for first-time connects.

The initial build included additional Multi-Technology-Mix (**MTM**) technologies (FTTN, FTTB, FTTC and HFC) – leveraging existing infrastructure to enable the **nbn**[®] network to be rolled out and end-users connected to the network faster, consistent with the Commonwealth Government's objectives for **nbn** at the time.¹⁸

¹⁷ See: **nbn**, Corporate Plan, 2022, p. 13.

¹⁸ See the Statement of Expectations issued to **nbn** on 24 August 2016, which set out the change to the MTM.



The MTM approach was undertaken with the awareness that certain technology types (e.g., FTTN and HFC) were not capable of providing the same speed and reliability of service as a FTTP-based network. As such, these technologies would need to be upgraded over time to meet the future needs of end-users. This includes extending fibre deeper into the network footprint.

nbn has now embarked on this next stage to continually enhance this critical communications asset on behalf of the Commonwealth Government, for all Australians. A number of major network upgrade initiatives are either currently underway or recently completed (e.g., the HFC upgrade to make available **nbn**'s Ultrafast speed tier). The scope of these initiatives was expanded to include an upgrade of the capability and coverage of the fixed wireless network announced in March 2022 and to include an additional 1.5 million premises in the upgrade from FTTN to FTTP, announced in October 2022, in addition to 2 million premises already planned for upgrade.

nbn is also transitioning from the scale build phase to operating the **nbn**[®] network in a way that efficiently delivers required capability and performance to meet end-user needs.

nbn's previous Shareholder Ministers issued a Statement of Expectations (**SOE**) to **nbn** on 26 August 2021.¹⁹ In due course, **nbn** expects to receive an updated SOE from the current Shareholder Ministers that reflects the objectives of retaining **nbn** in public ownership for the foreseeable future, expanding full-fibre access to more homes and businesses, and ensuring **nbn** delivers for consumers and facilitates productivity.²⁰

In satisfying the SOE, **nbn** faces 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, in addition to a range of underlying commercial incentives. These incentives are complemented by several provisions within the SAU and as proposed in the variation.

- **nbn**'s intrinsic incentives arise from several sources, including: oversight from Shareholder Ministers and Parliament; capital/financing constraints; reputational impacts; and competition from alternative networks (fixed, mobile and satellite).
- There is a need for prudence in **nbn**'s investment decisions given uncertainty over whether future revenues will be sufficient to recover costs over the long term given evolving technology, applications and demand. Module 1 of the SAU includes a prudent design condition and a prudent cost condition that **nbn** satisfies by aligning its capex with a published set of Network Design Rules (as updated over time under the SAU) and undertaking all expenditure consistent with a set of Procurement Rules as provided to the ACCC (and updated over time under the SAU). These requirements are embedded within **nbn**'s expenditure governance and planning processes. For each Financial Year in Module 1, **nbn**'s Chief Financial Officer provides a signed report to the ACCC that certifies **nbn**'s compliance with its SAU expenditure conditions, and **nbn**'s EGM of Procurement provides similar certification in respect of **nbn**'s Procurement Rules.
- Module 2 of the SAU is proposed (under the Variation) to include a prudence and efficiency framework that includes an ex-ante review of all forecast expenditure and an ex-post review of actual capex.

¹⁹ Statement of Expectations issued to **nbn** on 26 August 2021.

²⁰ Letter to **nbn** from Shareholder Ministers, 27 July 2022, available at <https://www.infrastructure.gov.au/sites/default/files/documents/nbn-co-sau-letter-to-nbn-co.pdf>



21.5.2 nbn's overall approach

nbn has based its expenditure forecasts, in real terms, for this First Regulatory Cycle (FY24 to FY26) on the Integrated Operational Plan (**IOP**) that underpins **nbn**'s FY23 Corporate Plan. The IOP covers the years FY23 to FY26 and is the outcome of a bottom-up planning process. The IOP has already been reviewed and approved/endorsed by **nbn**'s Executive Committee and Board, and submitted to Shareholder Departments and Shareholder Ministers.

The IOP expenditure forecasts are appropriate for use within the SAU's BBM because they account for the progressive transition from building to operating the **nbn**[®] network, include only prudent costs, and factor in future efficiency gains.

From a practical perspective, the overriding context for expenditure over the period to FY26 is to achieve the transition from building to operating the **nbn**[®] network in the most efficient manner for end-users, and to implement the fixed wireless and fibre upgrades described above, both of which align with the Expectations and Objectives set out in section 20.4.

As set out in more detail in Appendix A, **nbn** is continuing to pursue productivity gains across all areas of activity, including as it transitions to operating the **nbn**[®] network, for example:

- forecast productivity gains in Service Assurance despite increases in the volume of network traffic and the number of activated premises requiring assurance;
- labour costs have been subject to top-down benchmarking and bottom-up requirements analysis, and reflect a substantial workforce redesign to position **nbn** for efficient long-term operations and delivery of high performance and value for customers; and
- capex-related productivity gains that will reduce the quantity of inputs required to deliver network outputs over time – these include the truck roll reduction program (relevant to Customer Connect), management of the triggers for capacity augmentation, and the Enterprise Simplicity Initiative.

21.5.3 nbn's forecasting methodology

The methodology for developing the IOP expenditure forecasts is summarised below:

- The governance process that surrounds the annual IOP development is rigorous and worked through over several months prior to the plan being finalised. As part of that process, **nbn**'s Executive Committee, Board, Shareholder Departments and Shareholder Ministers have formal roles in reviewing and endorsing the plan.
- The methodology is re-applied each year on a bottom-up basis to chart a detailed operational and financial course informed by recent outturns and forecasting forward four years (e.g., FY23 to FY26) in a manner that best meets **nbn**'s expenditure objectives (many of which are long-term in nature).
- Although it covers only four years, the IOP is informed by and aligned with much longer term (10-year) product and network roadmaps that are built on robust long-term demand forecasts.
- There is a strong focus within the IOP on driving efficiency improvements and on the prudence of all planned expenditure (in respect of meeting both the current and future needs of end-users).

The bottom-up operational and financial planning supported by the governance review and approval process are at the core of the methodology. As such, the methodology is well suited to accounting for changes of context such as those **nbn** is now going through with the transition from building to running the **nbn**[®] network.



21.5.4 Expenditure objectives

21.5.4.1 Statement of Expectations

As a GBE, the principal responsibility of **nbn** is to build and operate the **nbn**[®] network in accordance with the SOE and Government policy more broadly.

The current version of the SOE was issued by **nbn**'s previous Shareholder Ministers on 26 August 2021. The SOE is broadly expressed, requiring **nbn** to meet the current and future broadband demand of households and businesses while achieving certain service, competition, commercial, stakeholder and transparency objectives (within the parameters of its relevant legal and regulatory obligations). The SOE is not fixed, with **nbn** having previously received SOEs from its Shareholder Ministers in 2010, 2014 and 2016.²¹

nbn expects to receive an updated SOE in due course that reflects the objectives of retaining **nbn** in public ownership for the foreseeable future, expanding full-fibre access to more homes and businesses, and ensuring **nbn** delivers for consumers and facilitates productivity.²²

In the meantime, for the purposes of informing the IOP expenditure forecasting methodology, the SOE serves to define the outcomes sought to be achieved through **nbn**'s expenditure, as is evident in the (non-exhaustive) selection of points extracted from the current SOE below.

- **Overall objective:** **nbn** will reliably and affordably meet the current and future broadband needs of households and businesses, including in regional and remote Australia, foster productivity and innovation, and support the Government's goal for Australia to be a leading digital economy and society by 2030.
- **Minimum requirements:** **nbn** is the default Statutory Infrastructure Provider (**SIP**) for all of Australia and, where it is the SIP, it must meet legal obligations, including in relation to minimum service speed and network performance requirements.
- **Upgrades over time:** Within its capital constraints, **nbn** will continue to upgrade the network technologies to support retailers to meet demand from end-users that exceeds these minimum requirements, including implementing current plans to expand access to peak download speeds of up to one Gbps.
- **Services for businesses:** **nbn** should act pro-competitively in supplying wholesale broadband services to retailers to support business end-users' needs. **nbn** should earn commercial returns in supplying these services. In supplying business-grade services, **nbn** should aim to improve retail and infrastructure competition and access for businesses, including in less well-served areas.
- **Improving consumer experience:** **nbn** will work with retailers to enhance and integrate systems and processes to enable timely and transparent provision of information to end-users, improve service quality, efficiently and effectively resolve faults and outages and, where they do occur, proactively manage complaints. **nbn** will also deliver a reliable, resilient and secure network.
- **Regional and remote:** **nbn** will improve its wholesale services and assist in addressing access challenges in regional and remote areas.
- **Efficiency:** **nbn** will be efficient in its own operations.

²¹ An interim statement of expectations was also issued in 2013.

²² Letter to **nbn** from Shareholder Ministers, 27 July 2022, available at <https://www.infrastructure.gov.au/sites/default/files/documents/nbn-co-sau-letter-to-nbn-co.pdf>



- **Operating commercially:** Taxpayers have made a substantial investment in **nbn** and **nbn** will operate its business commercially.

In addition, **nbn** plays a key role in supporting the delivery of Government policy more broadly. This includes upgrading and expanding the **nbn**[®] network to support Government policy related to providing end-users with access to more reliable, higher speed services.

21.5.4.2 Alignment between SOE outcomes and Expenditure Objectives in the Variation

The SOE outcomes described above are well aligned with the Expenditure Objectives in the Variation (as set out in clause 2G.5.2(c)). The mapping between the two is relatively clear and direct, as set out in Table F5 below. This indicates that the IOP expenditure forecasts, which were developed to achieve the SOE outcomes, are also consistent with achieving the Expenditure Objectives set out in the Variation.

Table F5. Mapping between SOE outcomes and Expenditure Objectives

Expenditure Objectives in the Variation	SOE Outcomes
(i) meeting the expected demand for products and services	<ul style="list-style-type: none"> • Overall objective – in particular, meet the current and future broadband needs of households and businesses. • Upgrades over time – in particular, upgrade network technologies to support retailers to meet demand from end-users • Services for business – in particular, act pro-competitively in supplying wholesale broadband services to retailers to support business end-users’ needs. • Regional and remote – in particular, improve wholesale services in regional and remote areas.
(ii) complying with all Regulatory Requirements	Minimum requirements – in particular, meet legal obligations where nbn is the SIP.
(iii) implementing a project or program that is the subject of a Government Policy Project Notice	None – Government Policy Project Notices can only be issued once the Variation is accepted.
(iv) maintaining and improving the quality, reliability, safety, security and integrity of supply of any products and services, including by meeting the Benchmark Service Standards that are to apply in the relevant Regulatory Cycle	<ul style="list-style-type: none"> • Minimum requirements – in particular, meet legal obligations where nbn is the SIP. • Improving consumer experience – in particular, improve service quality and deliver a reliable, resilient and secure network.

21.5.4.3 Telstra Arrangements and Optus Arrangements

Given the significance of the Telstra Arrangements and the Optus Arrangements to the development and ongoing operation of the **nbn**[®] network and the very long-term nature of these arrangements, the SAU includes specific provisions relating to how the opex and capex associated with these arrangements should be treated within the BBM. Essentially, these provisions mean that any payments forecast to be made under the Telstra Arrangements and the Optus Arrangements for a given Regulatory Cycle should be included in the relevant forecast expenditure allowances without any prudence and efficiency assessment.

- opex – clause 2G.2.1(a)(i) in the Variation provides that the forecast opex to be included in the Annual Building Block Revenue Requirement “*is to include any Operating Expenditure to be incurred pursuant to the*



Telstra Arrangements or the Optus Arrangements". This clause was in the SAU accepted by the ACCC in 2013 (but numbered as 2C2.1(a)(i)).

- capex – clause 2G.5.6(a)(ii) of the Variation provides that the forecast capex to be included in the Forecast Real RAB for calculating Forecast Nominal ABBRR is to include *"any Capital Expenditure to be incurred pursuant to the Telstra Arrangements or the Optus Arrangements"*. This clause was in the SAU accepted by the ACCC in 2013 (but numbered as 2C.7.7(b)).

21.5.5 Product and network roadmaps

Informed by the long-term and short- to medium-term demand forecasts, **nbn** maintains linked product and network roadmaps that extend out 10 years and are an input into the IOP development process.

The product roadmap considers market and technology trends and end-user needs for various product capabilities (including bandwidth). Although the later years of the roadmap are somewhat indicative, they serve to highlight lifecycle events/opportunities and emerging capacity/capability gaps in the **nbn**[®] network and the timeframes within which decisions may be required in order to avoid issues arising from unmet demand.

The network roadmap considers how the **nbn**[®] network will need to evolve to support the product roadmap and, ongoing (business-as-usual) demand growth. In so doing, the network roadmap considers various options for how to coordinate lifecycle replacement and upgrades to newer and more capable generations of technology that may also have lower ongoing costs. The long-term view provided by the network roadmap is a key input into strategic investment decisions such as the Network Upgrade Initiative (as described in Appendix A).

21.5.6 capex and opex interactions

As part of the IOP, opex and capex are forecast on an integrated basis such that opex reductions that are expected from capex projects (such as the Enterprise Simplicity Initiative and the Network Upgrade Initiative) are factored into the forecasts. More fundamentally, expenditure planning is undertaken with a view to minimising the Total Cost of Ownership over time, having regard to both up-front capex, ongoing opex and any subsequent capex required.

21.5.7 Risk and uncertainty

The IOP expenditure forecast represents a balanced scenario and is subject to a number of risks and uncertainties including in regard to:

- demand (new developments, access speeds, busy hour traffic, high speed upgrades, business upgrades);
- the nature and extent of future competition (which will affect demand, and potentially also affect the timing of upgrade plans);
- technology change relating to the network itself and how it is used (which will affect the optimal upgrade path by changing both the supply and demand side, e.g., through advances in FTTP technology/cost, and video compression technology);
- timing and extent of projects under the Regional Co-Investment Initiative (as described in section A.2.5); and
- future Commonwealth Government requirements.



To some degree, these risks and uncertainties are addressed through the choice of a relatively short period for this First Regulatory Cycle. However, the SAU does also include a cost pass-through mechanism (see chapter 19 above, which provides for **nbn** to apply to the ACCC if certain cost pass-through events occur).

At the end of the Regulatory Cycle, **nbn**'s capex will be subject to an ex-post review of prudence and efficiency (see section 20.8). This assessment will be based on the circumstances existing, and information and analysis that an operator in **nbn**'s position could reasonably have been expected to have considered or undertaken, at the time **nbn** incurred the relevant capex. This reiterates the need to ensure **nbn** makes appropriate investment decisions given the information available at that time.

21.5.8 Expenditure governance processes

After the IOP is completed each year there is a transition from planning to implementation, and **nbn**'s expenditure governance processes are applied to all opex and capex.

- All expenditure is subject to **nbn**'s procurement and delegation of authority policies. These policies meet the requirement under Module 1 of the SAU to maintain a set of Procurement Rules and their application provides the basis for **nbn** to satisfy the Prudent Cost Condition under Module 1 of the SAU.
- For opex, **nbn**'s Executive Committee provides investment decision-making oversight, including in relation to achievement of key operational metrics, deliverability and forecast efficiency improvements.
- For capex, **nbn**'s Approval Forum provides oversight of all projects, and no purchase order commitments can be made without prior approval from the Approval Forum. IT projects are subject to annual and quarterly prioritisation exercises. The capex oversight process includes ensuring that **nbn** satisfies the Prudent Design Condition under Module 1 of the SAU.

21.6 Demand forecasts

21.6.1 Approach and methodology

nbn's key demand forecasts relate to expansion (with incremental demand from the market to service new developments), take-up (including STM) and peak usage. These forecasts feed into and are to varying degrees inter-dependent with the expenditure forecasts and the revenue and price forecasts.

nbn prepared demand forecasts as part of the IOP that underpins **nbn**'s FY23 Corporate Plan. The IOP relies on two sets of demand forecasts, as described further in Appendix B:

1. **High-level, long-term demand forecasts** that drive the product and network roadmaps and strategic decisions on the evolution of the **nbn**[®] network and condition expectations around future revenues and prices; and
2. **Detailed short- to medium-term demand forecasts** that drive opex and capex activity levels (including on projects such as the Network Upgrade Initiative) and inform pricing intentions over the IOP period.

See Appendix B for more detail.



21.6.2 Forecasts

21.6.2.1 Long-term

nbn's long-term demand forecasts over the period to FY31 are summarised below:

- the number of TC-4 active services is forecast to grow by 17.90% overall from FY22 to FY31 with a CAGR of 1.85%. Over time, growth is driven largely by new developments.
- the TC-4 AVC STM is forecast to move upwards such that the percentage on higher speed tiers (100 Mbps and above) in FY31 is 49.5%, as compared to 18% in FY22 (end of year); and
- traffic per AVC activated is forecast to grow from June 2022 to June 2031 in terms of Mean Busy Hour Throughput (**MBHT**) by 142% (CAGR 10%) downstream and 330% (CAGR 18%) upstream, and in terms of Monthly Data Volumes by 138% (CAGR 10%) downstream and 398% (CAGR 20%) upstream.

See Appendix B for more detail.

21.6.2.2 Short- to medium-term

nbn's key demand forecasts over the next four years (FY23 to FY26) are summarised below.

- **Expansion:** premises ready to connect (RTC) are forecast to grow by 5.0% overall, with a CAGR of 1.2% driven by market demand to extend the nbn® network into new developments.
- **Take-up and usage:** driven by market demand for connection, access speed and quality, and usage:
 - the number of premises activated (cumulative) is forecast to grow by 4.6% overall, with a CAGR of 1.1% but annual growth of 1.9% in FY26;
 - facilitated by the Network Upgrade Initiative, the TC-4 AVC STM is forecast to shift progressively towards higher speed tiers, with the percentage of services 100 Mbps and above increasing from 18% in FY22 to 35% in FY26;
 - take-up of business-grade (Enterprise Ethernet) services is forecast to grow [CiC begins] [REDACTED] [REDACTED] [CiC ends] in FY22 to [CiC begins] [REDACTED] [REDACTED] [CiC ends] in FY26; and
 - traffic per AVC activated is forecast to grow overall in terms of MBHT by 44% (CAGR 9%) downstream²³ and 102% (CAGR 19%) upstream and in terms of the Monthly Data Volume (GB per AVC) by 43% (CAGR 9%) downstream and 117% (CAGR 21%) upstream.

See Appendix B for more detail.

²³ These forward-looking estimates involve lower rates of growth than those observed in previous years, including during the traffic surge associated with working from home during COVID-19 lockdowns. This is because of continual improvement to video codec efficiency, the aftereffects of post lockdowns, including increased extended travel over the near to longer term, and the number of hours spent on real-time entertainment in a day reaching exhaustion.



Appendix A Expenditure forecasts

A.1 Overview of expenditure forecasting

This section provides an overview of **nbn**'s expenditure forecasting for the First Regulatory Cycle (FY24 to FY26). Subsequent sections provide a breakdown of the Capital Expenditure (**capex**) and Operating Expenditure (**opex**) forecasts.

nbn has maintained a consistent expenditure forecasting approach as used for the March Variation, but has updated its assumptions in light of Government policy²⁴ and extended the horizon of the forecasts such that the First Regulatory Cycle now covers the three years FY24 to FY26.

This section is organised as follows:

- Section A.1.1 provides an overview of **nbn**'s current context, including how **nbn** will deliver on Government policy.
- Section A.1.2 describes **nbn**'s overall approach to developing its forecasts.
- Section A.1.3 describes **nbn**'s process for developing the Integrated Operating Plan.
- Sections A.1.4 to A.1.9 set out those elements of the forecasting methodology and its application that are common across capex and opex:
 - expenditure objectives;
 - demand forecasting methodology;
 - product and network roadmaps;
 - capex and opex interactions;
 - risk and uncertainty; and
 - expenditure governance processes.
- Section A.1.10 provides a summary of the key changes in **nbn**'s forecast expenditure relative to the March Variation.

These forecasts are provided solely for the purpose of assisting the ACCC and stakeholders in understanding **nbn**'s Building Block Model parameters the First Regulatory Cycle. They should not be relied upon for any purpose not related to this regulatory process. Forecasts in this document reflect **nbn**'s current views and assumptions (as at November 2022), including a considered assessment of present economic and operating conditions, and are subject to risk and uncertainties. For the reasons set out below, the forecasts are considered to be prudent and efficient under the Expenditure Assessment Framework discussed in chapter 20 above.

A.1.1 Context

The **nbn**[®] network and **nbn** as an organisation has been evolving through progressive development stages. **nbn** has moved from the initial build, to upgrading the capability of the **nbn**[®] network, and a focus on operating the

²⁴ The main change relates to extension of the Network Upgrade Initiative (FTTN to FTTP Upgrade Program) and the Fixed Wireless Upgrade Program.



nbn[®] network. As **nbn** progresses through these stages, increasing emphasis is being placed on network asset management. The main phases in this transition are explained further below.

As discussed in **nbn**'s Corporate Plan (FY22),²⁵ the then Minister declared in December 2020 that the initial build of the **nbn**[®] network (excluding premises in future new developments and complex connections) should be treated as built and fully operational. The initial build enabled almost 12 million premises to access the network and all standard installation premises in Australia to connect to the **nbn**[®] network in line with **nbn**'s build commitment. Some additional ongoing capex is forecasted to be incurred associated with completing certain aspects of the build, such as complex connections and resolving serviceability issues for first-time connects.

The initial build included additional Multi-Technology-Mix (**MTM**) technologies (FTTN, FTTB, FTTC and HFC) – leveraging existing infrastructure to enable the **nbn**[®] network to be rolled out and connect end-users to the network faster, consistent with the Commonwealth Government's objectives for the **nbn** at the time.²⁶

The MTM approach was undertaken with the awareness that certain technology types (e.g., FTTN and HFC) were not capable of providing the same speed and reliability of service as a FTTP-based network. As such, these technologies would need to be upgraded over time to meet the future needs of end-users. This includes extending fibre deeper into the network footprint.

nbn has now embarked on this next stage to continually enhance this critical communications asset on behalf of the Commonwealth Government for all Australians. A number of major network upgrade initiatives are either currently underway or recently completed (e.g., the HFC upgrade to make available **nbn**'s Ultrafast speed tier). The scope of these initiatives was expanded to include an upgrade of the capability and coverage of the fixed wireless network, announced in March 2022, and to include an additional 1.5 million premises in the upgrade from FTTN to FTTP, announced in October 2022, in addition to 2 million premises already planned for upgrade.

nbn is also transitioning from the scale build phase to operating the **nbn**[®] network in a way that efficiently delivers required capability and performance to meet end-user needs. This transition and the changing emphasis in **nbn**'s activities have been reflected in the forecast expenditure presented in this appendix. This will see a change in the structure of the organisation as **nbn** shifts focus towards efficiently managing the network to deliver service excellence to approximately 8.5 million active premises and to future users as they connect to the network. This transition from building to operating the **nbn**[®] network will take place while upgrade works continue to be delivered efficiently and effectively.

For further details on **nbn**'s rationale for these upgrade works, refer to chapter 5 of Part A of this Submission.

Statement of Expectations

nbn's previous Shareholder Ministers issued a Statement of Expectations (**SOE**) to **nbn** on 26 August 2021.²⁷ In due course, **nbn** expects to receive an updated SOE from the current Shareholder Ministers that reflects the objectives of retaining **nbn** in public ownership for the foreseeable future, expanding full-fibre access to more homes and businesses, and ensuring **nbn** delivers for consumers and facilitates productivity.²⁸

²⁵ **nbn**, 2022 Corporate Plan, 2022: <https://www.nbnco.com.au/content/dam/nbn/documents/about-nbn/reports/corporate-plan/nbn-co-corporate-plan-2022.pdf>.

²⁶ Statement of Expectations issued to **nbn** on 24 August 2016, which set out the changes to the MTM.

²⁷ Statement of Expectations issued to **nbn** on 26 August 2021.

²⁸ Letter to **nbn** from Shareholder Ministers, 27 July 2022: <https://www.infrastructure.gov.au/sites/default/files/documents/nbn-co-sau-letter-to-nbn-co.pdf>.



In satisfying the SOE, **nbn** faces 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, in addition to a range of underlying commercial incentives. These incentives are complemented by several provisions within the SAU and as proposed in the Variation.

- **nbn**'s intrinsic incentives arise from several sources including: oversight from Shareholder Ministers and Parliament; capital constraints; reputational impacts; and competition from alternative networks (fixed, mobile and satellite).
- There is a need for prudence in **nbn**'s investment decisions given uncertainty over whether future revenues will be sufficient to recover costs over the long term given evolving technology, applications and demand. Module 1 of the SAU includes a prudent design condition and a prudent cost condition that **nbn** satisfies by aligning its capex with a published set of Network Design Rules (as updated over time under the SAU) and undertaking all expenditure consistent with a set of Procurement Rules as provided to the ACCC (and updated over time under the SAU). These requirements are embedded within **nbn**'s expenditure governance and planning processes. For each Financial Year in Module 1, **nbn**'s Chief Financial Officer provides a signed report to the ACCC that certifies **nbn**'s compliance with its SAU expenditure conditions, and **nbn**'s EGM of Procurement provides similar certification in respect of **nbn**'s Procurement Rules.
- Module 2 of the SAU is proposed (under the Variation) to include a prudence and efficiency framework that includes an ex-ante review of all forecast expenditure and an ex-post review of actual capex.

A.1.2 Overall approach

nbn has based its expenditure forecasts, in real terms, for this First Regulatory Cycle (FY24 to FY26) on the Integrated Operational Plan (**IOP**) that underpins **nbn**'s FY23 Corporate Plan. The IOP covers the years FY23 to FY26 and is the outcome of a bottom-up planning process. The IOP has already been reviewed and approved/endorsed by **nbn**'s Executive Committee and Board, and submitted to Shareholder Departments and Shareholder Ministers.

The IOP expenditure forecasts are appropriate for use within the SAU's Building Block Model (**BBM**) because they account for the progressive transition from building to upgrading and operating the **nbn**[®] network, include only prudent costs and factor in future efficiency gains.

From a practical perspective, the overriding context for expenditure over the period to FY26 is to achieve the transition from building to operating the **nbn**[®] network in the most efficient manner for end-users, which aligns with the Expectations and Objectives set out in section A.1.4 below.

As set out in more detail in sections A.2 and A.3, **nbn** is continuing to pursue productivity gains across all areas of activity, including as it transitions to operating the **nbn**[®] network, for example:

- forecast productivity gains in Service Assurance despite increases in the volume of network traffic and the number of activated premises requiring assurance;
- labour costs have been subject to top-down benchmarking and bottom-up requirements analysis, and reflect a substantial workforce redesign to position **nbn** for efficient long-term operations and delivery of high performance and value for customers; and
- capex-related productivity gains that will reduce the quantity of inputs required to deliver network outputs over time – these include the truck roll reduction program (relevant to Customer Connect), management of the triggers for capacity augmentation, and the Enterprise Simplicity Initiative.



A.1.3 IOP Development Process

The methodology for developing the IOP expenditure forecasts is depicted at a high level in Figure F1. Key points to note include:

- The governance process that surrounds the annual IOP development is rigorous and worked through over several months prior to the plan being finalised. As part of that process, **nbn**'s Executive Committee, Board, Shareholder Departments and Shareholder Ministers have formal roles to play in reviewing and endorsing the plan.
- The methodology is re-applied each year on a bottom-up basis to chart a detailed operational and financial course informed by recent outturns and forecasting forward four years (e.g., FY23 to FY26) in a manner that best meets **nbn**'s expenditure objectives (many of which are long-term in nature).
- Although it covers only four years, the IOP is informed by and aligned with much longer term (10-year) product and network roadmaps that are built on robust long-term demand forecasts.
- There is a strong focus within the IOP on driving efficiency improvements and on the prudence of all planned expenditure (in respect of meeting both the current and future needs of end-users).

The bottom-up operational and financial planning supported by the governance review and approval process is at the core of the methodology, making it highly flexible. As such it can better account for changes of context such as those **nbn** is now going through with the transition from building to running the **nbn**[®] network.

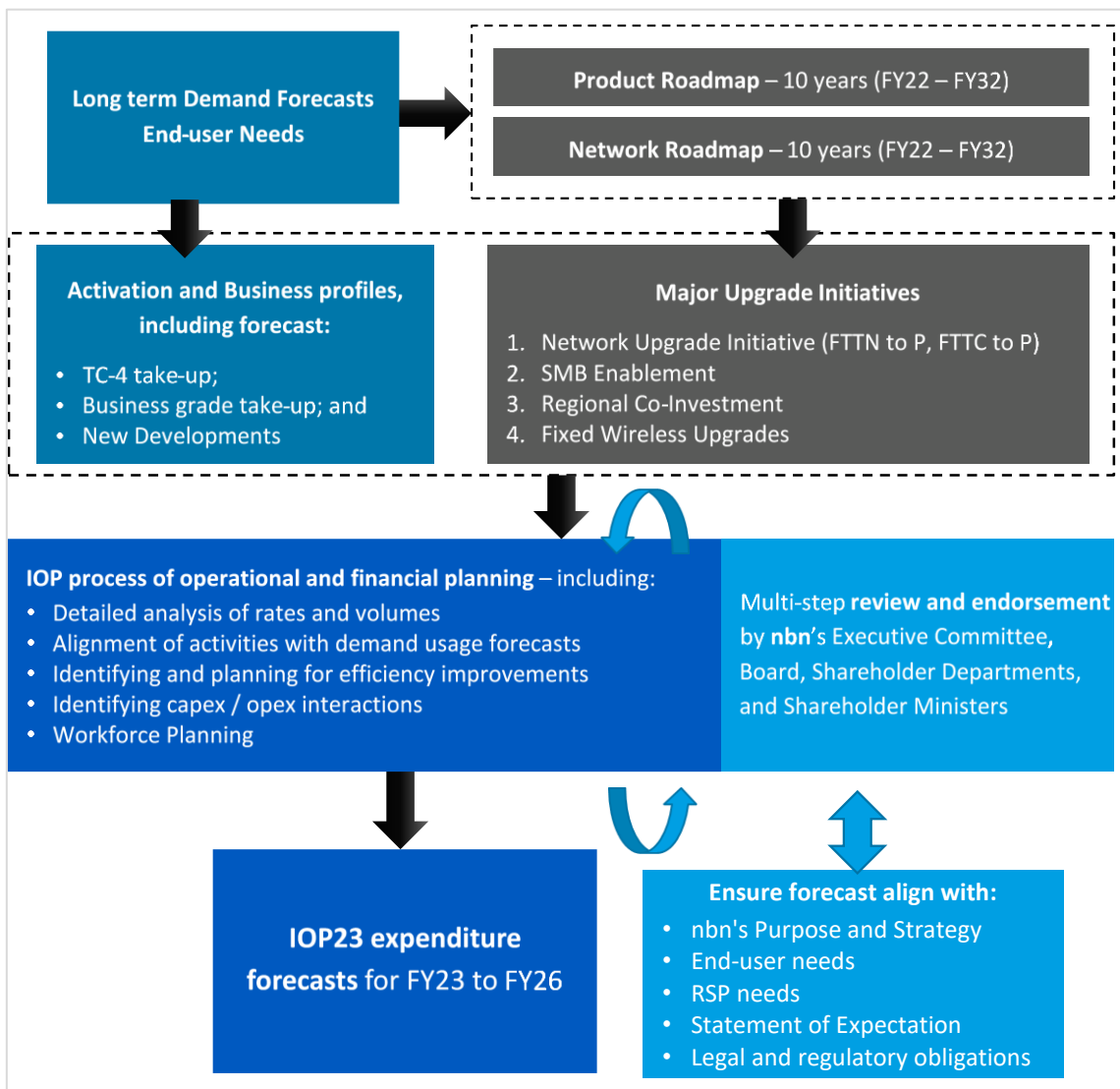


Figure F1. High-level process for development of IOP expenditure forecasts

A.1.4 Expenditure objectives

Statement of Expectations and Government policy

As a GBE, the principal responsibility of **nbn** is to build and operate the **nbn**[®] network in accordance with the SOE and Government policy more broadly.

The current version of the SOE was issued by **nbn**'s previous Shareholder Ministers on 26 August 2021. The SOE is broadly expressed, requiring **nbn** to meet the current and future broadband demand of households and businesses while achieving certain service, competition, commercial, stakeholder and transparency objectives (within the parameters of its relevant legal and regulatory obligations). The SOE is not fixed, with **nbn** having previously received SOEs from its Shareholder Ministers in 2010, 2014 and 2016.²⁹

²⁹ An interim statement of expectations was also issued in 2013.



nbn expects to receive an updated SOE in due course that reflects the objectives of retaining **nbn** in public ownership for the foreseeable future, expanding full-fibre access to more homes and businesses, and ensuring **nbn** delivers for consumers and facilitates productivity.³⁰

In the meantime, for the purposes of informing the IOP expenditure forecasting methodology, the SOE serves to define the required outcomes to be achieved through **nbn**'s investments, as is evident in the (non-exhaustive) selection of points extracted from the current SOE below.

- **Overall objective:** **nbn** will reliably and affordably meet the current and future broadband needs of households and businesses, including in regional and remote Australia, foster productivity and innovation, and support the Government's goal for Australia to be a leading digital economy and society by 2030.
- **Minimum requirements:** **nbn** is the default Statutory Infrastructure Provider (**SIP**) for all of Australia and, where it is the SIP, it must meet legal obligations, including in relation to minimum service speed and network performance requirements.
- **Upgrades over time:** Within its capital constraints, **nbn** 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 one Gbps.
- **Services for businesses:** **nbn** should act pro-competitively in supplying wholesale broadband services to retailers to support business end-users' needs. **nbn** should earn commercial returns in supplying these services. In supplying business-grade services, **nbn** should aim to improve retail and infrastructure competition and access for businesses, including in less well served areas.
- **Improving consumer experience:** **nbn** will work with retailers to enhance and integrate systems and processes to enable timely and transparent provision of information to end-users, improve service quality, efficiently and effectively resolve faults and outages and, where they do occur, proactively manage complaints. **nbn** will also deliver a reliable, resilient and secure network.
- **Regional and remote:** **nbn** will improve its wholesale services and assist in addressing access challenges in regional and remote areas.
- **Efficiency:** **nbn** will be efficient in its own operations.
- **Operating commercially:** Taxpayers have made a substantial investment in **nbn** and **nbn** will operate its business commercially.

In addition, **nbn** plays a key role in supporting the delivery of Government policy more broadly. This includes upgrading and expanding the **nbn**[®] network to support Government policy related to providing end-users with access to more reliable, higher speed services.

Alignment between SOE outcomes and Expenditure Objective in the Variation

The SOE outcomes are well aligned with the Expenditure Objectives in the Variation (as set out in clause 2G.5.2(c)). The mapping between the two is relatively clear and direct, as set out in Table F6 below. This indicates that the IOP expenditure forecasts, which were developed to achieve the SOE outcomes, are also consistent with achieving the Expenditure Objectives set out in the Variation.

³⁰ Letter to **nbn** from Shareholder Ministers, 27 July 2022: <https://www.infrastructure.gov.au/sites/default/files/documents/nbn-co-sau-letter-to-nbn-co.pdf>.



Table F6. Mapping between SOE outcomes and Expenditure Objectives

Expenditure Objectives in the Variation	SOE Outcomes
(i) meeting the expected demand for products and services	<ul style="list-style-type: none"> Overall objective – in particular, meet the current and future broadband needs of households and businesses. Upgrades over time – in particular, upgrade network technologies to support retailers to meet demand from end-users Services for business – in particular, act pro-competitively in supplying wholesale broadband services to retailers to support business end-users’ needs. Regional and remote – in particular, improve wholesale services in regional and remote areas.
(ii) complying with all Regulatory Requirements	Minimum requirements – in particular, meet legal obligations where nbn is the SIP.
(iii) implementing a project or program that is the subject of a Government Policy Project Notice	None – Government Policy Project Notices can only be issued once the Variation is accepted.
(iv) maintaining and improving the quality, reliability, safety, security and integrity of supply of any products and services, including by meeting the Benchmark Service Standards that are to apply in the relevant Regulatory Cycle	<ul style="list-style-type: none"> Minimum requirements – in particular, meet legal obligations where nbn is the SIP. Improving consumer experience – in particular, improve service quality and deliver a reliable, resilient and secure network.

Telstra Arrangements and Optus Arrangements

Given the significance of the Telstra Arrangements and the Optus Arrangements to the development and ongoing operation of the **nbn**[®] network and the very long-term nature of these arrangements, the SAU includes specific provisions relating to how the opex and capex associated with these arrangements should be treated within the BBM. Essentially, these provisions mean that any payments forecast to be made under the Telstra Arrangements and the Optus Arrangements for a given regulatory period should be included in the relevant forecast expenditure allowances without any prudence and efficiency assessment.

- opex - clause 2G.2.1(a)(i) in the Variation provides that the forecast opex to be included in the Annual Building Block Revenue Requirement “*is to include any Operating Expenditure to be incurred pursuant to the Telstra Arrangements or the Optus Arrangements*”. This clause was in the SAU accepted by the ACCC in 2013 (but numbered as clause 2C.2.1(a)(i)).
- capex - clause 2G.5.6(a)(ii) of the Variation provides that the forecast capex to be included in the Forecast Real RAB for calculating Forecast Nominal ABBRR is to include “*any Capital Expenditure to be incurred pursuant to the Telstra Arrangements or the Optus Arrangements*”. This clause was in the SAU accepted by the ACCC in 2013 (but numbered as clause 2C.7.7(b)).

A.1.5 Demand forecasting methodology

The IOP expenditure forecasts rely on two sets of demand forecasts:

- high-level, long-term demand forecasts that drive the product and network roadmaps and strategic decisions on the evolution of the **nbn**[®] network; and



- detailed short- to medium-term demand forecasts that drive the business-as-usual opex and capex activity levels, including in relation to new initiatives (such as the Network Upgrade Initiative) once implemented.

The development of each of these, together with the forecasts themselves, is discussed separately in Appendix B.

A.1.6 Product and network roadmaps

Informed by the long-term and short- to medium-term demand forecasts, **nbn** maintains linked product and network roadmaps that extend out 10 years and are an input into the IOP development process.

The product roadmap considers market and technology trends and end-user needs for various product capabilities (including bandwidth). Although the later years of the roadmap are somewhat indicative, they serve to highlight lifecycle events/opportunities and emerging capacity/capability gaps in the **nbn**[®] network and the timeframes within which decisions may be required in order to avoid issues arising from unmet demand.

The network roadmap considers how the **nbn**[®] network will need to evolve to support the product roadmap and, ongoing (business-as-usual) demand growth. In so doing, the network roadmap considers various options for how to coordinate lifecycle replacement and upgrades to newer and more capable generations of technology that may also have lower ongoing costs. The long-term view provided by the network roadmap is a key input into strategic investment decisions such as the Network Upgrade Initiative (as described in section A.2.5).

A.1.7 Capex and Opex interactions

As part of the IOP, opex and capex are forecast on an integrated basis such that opex reductions that are expected from capex projects (such as the Enterprise Simplicity Initiative and the Network Upgrade Initiative) are factored into the forecasts. More fundamentally, expenditure planning is undertaken with a view to minimising the Total Cost of Ownership over time, having regard to both up-front capex, ongoing opex and any subsequent capex required.

A.1.8 Risk and uncertainty

The IOP expenditure forecast represents a balanced scenario and is subject to a number of risks and uncertainties including in regard to:

- demand (new developments, access speeds, busy hour traffic, high speed upgrades, business upgrades);
- the nature and extent of future competition and the uptake of alternative networks and services (which will affect demand, and potentially also the timing of upgrade plans);
- technology change relating to the network itself and how it is used (which will affect the optimal upgrade path by changing both the supply and demand side, e.g., through advances in FTTP technology/cost, and video compression technology);
- timing and extent of projects under the Regional Co-Investment Initiative (as described in section A.2.5); and
- future Commonwealth Government requirements.

To some degree, these risks and uncertainties are addressed through the choice of a relatively short period for this First Regulatory Cycle. However, the SAU does also include a cost pass-through mechanism (see chapter 19 above), which provides for **nbn** to apply to the ACCC if certain cost pass-through events occur.

At the end of the Regulatory Cycle, **nbn**'s capex will be subject to an ex-post review of prudence and efficiency (see section 20.8 above). This assessment will be based on the circumstances existing, and information and



analysis that an operator in **nbn**'s position could reasonably have been expected to have considered or undertaken, at the time **nbn** incurred the relevant capex. This reiterates the need to ensure **nbn** continues to make appropriate investment decisions given the information available at that time.

A.1.9 Expenditure governance processes

After the IOP is completed each year there is a transition from planning to implementation, and **nbn**'s expenditure governance processes are applied to all opex and capex.

- All expenditure is subject to **nbn**'s procurement and delegation of authority policies. These policies meet the requirement under Module 1 of the SAU to maintain a set of Procurement Rules and their application provides the basis for **nbn** to satisfy the Prudent Cost Condition under Module 1 of the SAU.
- For opex, **nbn**'s Executive Committee provides investment decision-making oversight, including in relation to achievement of key operational metrics, deliverability and forecast efficiency improvements.
- For capex, **nbn**'s Approval Forum provides oversight of all projects. IT projects are subject to annual and quarterly prioritisation exercises. The capex oversight process includes ensuring that **nbn** satisfies the Prudent Design Condition under Module 1 of the SAU.

A.1.10 Key changes from the March Variation supporting submission

As set out in section A.1.3, **nbn** develops bottom-up operational and expenditure plans through the annual IOP process. In developing the IOP each year, **nbn** re-applies its forecasting methodology, informed by actual outturns and forecasting forward four years.

Undertaking this process on an annual, cyclical basis allows **nbn** to ensure that forecasts for the four-year period best reflect the expenditure implications of:

- current expectations and market conditions;
- new or revised Government policy directions; and
- lessons learned from the actual expenditure undertaken in the previous year – including any additional efficiencies identified that may be realised in the next IOP period.

For the purposes of the Variation and this Submission, expenditure forecasts are based on IOP23 – reflecting **nbn**'s latest expectations and demand forecasts. To provide context, an additional year of actual expenditure (FY22) is included in this supporting Submission, and the First Regulatory Cycle will reflect the three-year period from FY24 to FY26.

The key changes to **nbn**'s forecast expenditure included in IOP23 (and this Variation) relative to that included in IOP22 (and the March Variation) are as follows:

- **Expanding the scope of the Network Upgrade Initiative** – enabled by the Commonwealth Government's commitment to invest a further \$2.4 billion (as announced in October 2022), the scope of the FTTN to FTTP upgrade will be expanded to include an additional 1.5 million premises.
- **New investment in fixed wireless upgrades** – **nbn** will undertake additional capex to upgrade the fixed wireless network. This will enable the fixed wireless network to achieve 'typical wholesale busy hour speeds' of at least 50 Mbps (download), enable 85% of fixed wireless premises to order up to 250 Mbps (downstream)/20 Mbps (upstream) services and enable all fixed wireless premises to order up to 100 Mbps (downstream)/20 Mbps (upstream) services. Additionally, the coverage of the fixed wireless footprint will be



expanded to enable approximately 120,000 formerly satellite-only premises to access **nbn**'s fixed wireless network. **nbn**'s investment in these upgrades will be supported in part by a Commonwealth Government grant of \$480 million.

- **Changed profile of internal workforce transformation** – to support the delivery of the incremental upgrade activity described above, as well as to enable the delivery of improved service standards (particularly in regional areas), **nbn** will retain additional headcount relative to that included in IOP22. IOP23 does factor in material reductions in headcount associated with the transition from building to operating the **nbn**[®] network; however, the pace of this reduction is reduced.
- **Increased focus on Assurance to deliver service excellence** – expenditure on assurance activities has increased, associated with the following key drivers:
 - improving service performance; and
 - undertaking additional pro-active assurance to remediate identified faults before an actual incident is raised by an RSP on behalf of an end-user.
- **Impact of changed market conditions** – reflecting a higher interest rate environment and increased levels of cost inflation, forecast costs in a number of items have increased, for example increasing the rates paid to Delivery Partners to better reflect prevailing market conditions.

A.2 Capital Expenditure

A.2.1 Overview

This section provides a breakdown of **nbn**'s forecast capex for the First Regulatory Cycle (FY24 to FY26), including the rationale for the forecast. The forecast is based on **nbn**'s IOP for FY23 to FY26, which was developed using the process described in section A.1. The IOP includes only prudent and efficient costs, factoring in future efficiency gains.

For context, FY21 and FY22 actuals and FY23 forecasts are presented throughout this section in addition to the FY24 to FY26 forecasts that are within the First Regulatory Cycle.

Forecast capex has been summarised into five categories relating to the purpose of the expenditure:

- **Expansion:** capex required to expand the coverage of the **nbn**[®] network³¹ as the population of Australia continues to expand into new developments;
- **Take-up & Usage:** capex required to connect individual premises on demand (in brownfield and greenfield areas) to the **nbn**[®] network and to provide incremental capacity as usage per end-user grows;
- **Maintaining:** capex required to maintain the existing capability of the **nbn**[®] network;
- **Capability:** capex required to increase the capability of the **nbn**[®] network through the Network Upgrade Initiative, Fixed Wireless Upgrade Program, SMB Enablement Initiative and Regional Co-Investment Initiative; and
- **Other:** capex required across several other categories, including IT (Software Engineering).

³¹ This category does also include some capex required to complete the initial build, but this is at very low levels for the FY24 to FY26 RMA.



Table F7 sets out the categories together with an overview of their scope, investment drivers and expected outcomes.

Table F7. Capex category descriptions

Category	Scope	Driver	Forecast outcomes over First Regulatory Cycle (FY24-FY26)
Expansion	Expanding the coverage of the nbn [®] network.	From FY24, Expansion capex will be associated with servicing new developments – which is driven by nbn 's forecasts of construction commenced. Capex for connecting individual premises to the network in the street is captured as part of Take-up & Usage below.	Approximately 12.7 million premises are forecast to be ready to connect to the nbn [®] network by FY26. The incremental change is largely represented by an additional approximately 500,000 greenfield FTTP sites.
Take-up & Usage	Connection of individual premises on demand to the existing nbn [®] network, and to augment shared capacity to accommodate increasing usage of the nbn [®] network over time.	Forecast connections (by technology type), including new developments and take-up of nbn services on-demand. Forecast demand – in terms of upstream and downstream usage and traffic.	Over the First Regulatory Cycle, nbn will connect approximately 688,000 premises to the nbn [®] network across all technology types, increasing total activations to 8.9 million by FY26.
Maintaining	Capex required to remediate or replace ageing or degrading assets.	Need for copper remediation on the FTTN network – driven by expected degradation, interacting with forecast migrations from the FTTN to FTTP network.	nbn will continue to maintain quality for premises served by all access technologies, including the FTTN network. This is further supported by the Benchmark Service Standards incorporated in the SAU.
Capability	Upgrading the capability of the Fixed-Line and non-Fixed Line networks. With respect to Fixed Line upgrades, Capability capex includes both the build capex (to roll out the Local Fibre Network in the selected footprint) and the connect capex (to build the fibre lead-in on demand).	SOE and Government policy. Forecast end-user demand and need for access to higher speeds.	nbn will enable 3.5 million premises to migrate from the FTTN to FTTP network by FY26, reflecting the initial 2 million premises and additional 1.5 million premises to be upgraded. In combination with upgrades on the FTTC network, 89% of Fixed Line premises will be able to order 1 Gbps services by December 2025. nbn will upgrade the fixed wireless network to enable access to 'typical busy hour speeds' of 50 Mbps (download) and download speeds of 250 Mbps for 85% of premises and 100 Mbps for the remaining footprint.
Other	Ongoing operation of nbn and the nbn [®] network – including IT, Systems Engineering, Network Engineering & Security.	Lifecycle management of supporting systems. Addition of new capabilities.	nbn will complete a major Enterprise Simplicity initiative to rationalise the number of systems, products and applications required to efficiently deliver services to end-users.

In this section, capex is presented on an 'as incurred' basis, which is more meaningful for explaining the profile of spending over time. For use in nbn's BBM, forecast capex is converted separately to an 'as commissioned' basis and broken into asset categories for depreciation purposes together with a start-of-year and end-of-year construction in progress balance.³²

As depicted in Figure F2 and set out in Table F8 below, nbn's total capex decreased in real terms in FY22 and is forecast to increase in FY23 and then to decrease each year from FY24 to FY26. The dotted trend-lines in the chart represent the average total capex for each three-year period (FY21-FY23 and FY24-FY26).

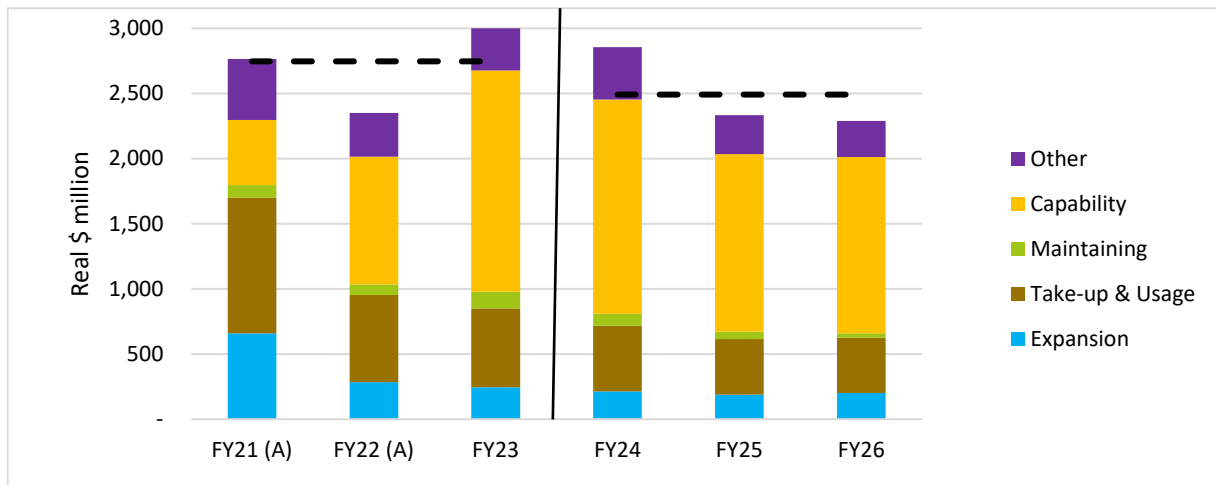


Figure F2. Capex by category, Real \$million (June 2021)

Table F8. Capex by category, Real \$million (June 2021)^{33, 34}

Capex by category	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Expansion	660	286	245	215	191	201
Take-up & Usage	1,041	669	606	503	426	424
Maintaining	95	80	126	92	55	33
Capability	501	981	1,698	1,643	1,364	1,353
Other	468	334	450	402	300	276
Total Capex	2,764	2,351	3,127	2,855	2,335	2,289

³² Construction in progress includes working inventory, which comprises equipment held by nbn before being released into particular construction projects. As commissioned capex includes a separate amount for net increases or net increases in spares inventory, which comprises equipment held for network maintenance purposes.

³³ Real values presented in this Appendix A are on a June 2021 basis, consistent with the presentation in the March Variation. The SAU refers to FY14 Real values, as that was the Financial Year in which the SAU was accepted.

³⁴ As discussed in section A.1, a number of nbn's forecast capex activities are supported by Government grants. These grants are separately accounted for in the BBM and, consistent with this, all forecasts of capex reflect the 'gross' amount of capex nbn will incur in the First Regulatory Cycle (rather than 'net' amount after accounting for the grants).



Average capex between FY24 and FY26 is forecast to be 9.3% lower in real terms than average capex between FY21 and FY23, comprising:

- **Expansion** capex – after the last remaining parts of the initial build are completed, **nbn** will continue to invest capex to enable ongoing growth in the coverage of the **nbn**[®] network to ensure premises in new developments are ready to connect;
- **Take-up & Usage** capex – following the end of the initial rollout, capex required to connect premises migrating from legacy networks to the **nbn**[®] network is forecast to taper off, but there will still be substantial ongoing capex required to connect individual premises in new developments (on-demand), undertake other continuing activities in relation to connection and service assurance, and increase capacity in various parts of the **nbn**[®] network to avoid local congestion and to accommodate overall traffic growth;
- **Maintaining** capex – given that the initial rollout of the **nbn**[®] network has been completed, **nbn** does not face any major lifecycle replacements across the majority of the network over this forecast period. Maintaining capex largely relates to ongoing Copper Remediation for the FTTN network to offset asset degradation due to time and weather events (see section 5.2.3 of Part A of this Submission). The forecast accounts for the effect of the Network Upgrade without which there would be a greater need for Copper Remediation over time;
- **Capability** capex – the Network Upgrade Initiative and SMB Enablement Initiative involve ongoing capex for on-demand FTTP and direct fibre connections. These initiatives, together with the Fixed Wireless Upgrade Program and Regional Co-Investment Initiative, will meet growing demand from end-users for access to higher speed TC-4 services and business-grade services over the period to FY26 and beyond; and
- **Other** capex – this reflects the completion of several projects relating to Network Management and IT (including the Enterprise Simplicity Initiative and projects that support the Network Upgrade Initiative and the SMB Enablement Initiative).

Subsequent sub-sections provide more detail and breakdown of each of the capex categories including the rationale for the expenditure and the efficiencies that **nbn** is achieving across the categories.

A key focus for **nbn** over the forecast period is the progression and completion of the following five major initiatives (see section A.2.5 below).

- Network Upgrade Initiative.
- Fixed Wireless Upgrade Program.
- SMB Enablement.
- Regional Co-Investment.
- Enterprise Simplicity.

These will deliver increased network capability to meet growing end-user demand, better quality of service, and ongoing efficiency gains. Each initiative is summarised in the relevant sub-section below.



A.2.2 Expansion

Expansion capex is required to increase the coverage of the **nbn**[®] network, making premises in new developments ready to connect.³⁵ Over the period from FY22 to FY26, Expansion capex is forecast to decrease 30% in real terms (see Table F9 below).

For FY24 to FY26, although the then Minister declared in December 2020 that the initial build of the **nbn**[®] network (excluding premises in future new developments and complex connections) should be treated as built and fully operational, a low level of expansion capex is forecast as Initial Build. This relates to:

- expenditure under the Telstra Arrangements for data and support requirements in relation to access and ownership transfer of relevant Telstra legacy assets (e.g., lead-in conduits); and
- resolution of serviceability issues for the small remaining group of first-time connects to the **nbn**[®] network that became held orders because of civil works needed to facilitate connection.

Table F9. Expansion capex, Real \$million (June 2021)

Capex category	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Initial Build	390	55	52	21	17	14
New Developments – Build	271	231	193	194	173	188
Total – Expansion	660	286	245	215	191	201

In parallel with the winding down of the initial build, there is ongoing growth in the coverage of the **nbn**[®] network from New Developments – Build. This is linked to **nbn**'s forecast of growth in premises ready to connect (see section B.3.2).

nbn competes with other network providers to service new developments consistent with the requirements of the TiND policy, with those providers becoming the SIP in certain areas. As discussed in chapter 25 of Part H of this Submission, **nbn** is subject to SIP obligations in all other areas, including those that may be commercially unattractive for other network providers to service (including SDU redevelopments in brownfield areas). **nbn**'s forecasts account for these different situations and include an assumption of expected market share in competitive areas.

Over time, the forecast of New Developments capex is related to two key metrics: Construction Commenced – the number of premises for which **nbn** will commence new development construction in a given year; and Cost per Premises – the cost per premises of construction in that year. Between FY22 and FY26, Construction Commenced is forecast to increase while Cost per Premises is forecast to decrease significantly in real terms. The reductions in Cost per Premises reflect targeted savings in Internal Labour and Fixed contract (On Demand Model) Overheads.

A.2.3 Take-up & Usage

Take-up & Usage capex is required to connect individual premises on demand (in brownfield and greenfield areas) to the **nbn**[®] network based on the network type as currently deployed in the street, and to augment shared capacity to accommodate increasing usage of the **nbn**[®] network over time.

³⁵ The capex for connecting individual premises to the network in the street is captured as part of the Take-up & Usage category.



Following the end of the initial rollout, capex required to connect premises migrating from legacy networks to the nbn® network is forecast to taper off (see Table F10 below), with annual capex on Customer Connect and Customer Service and Assurance forecast to decrease in real terms between FY22 and FY26.

Table F10. Take-up & Usage capex, Real \$million (June 2021)

Capex	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Connect & Assure	825	542	419	295	248	225
Customer Connect	656	387	235	156	145	120
Reconnection costs	39	38	55	44	35	33
Customer Service, Assurance & Other	130	117	129	95	68	71
Capacity	216	127	187	208	178	200
FTTx – Capacity and Proactive Distribution Fibre Network	17	14	14	13	11	10
HFC – Capacity	69	25	59	85	78	114
Transit – Capacity	130	88	114	110	89	76
Total – Take-up & Usage	1,041	669	606	503	426	424

In parallel, there will still be substantial ongoing capex required to connect individual premises on demand in new developments, undertake other continuing activities in relation to connection and service assurance, and increase capacity in various parts of the nbn® network to avoid local congestion issues and to accommodate overall traffic growth (see Figure F3 below, which is reproduced from the discussion of nbn’s demand forecasts in section B.4.1).

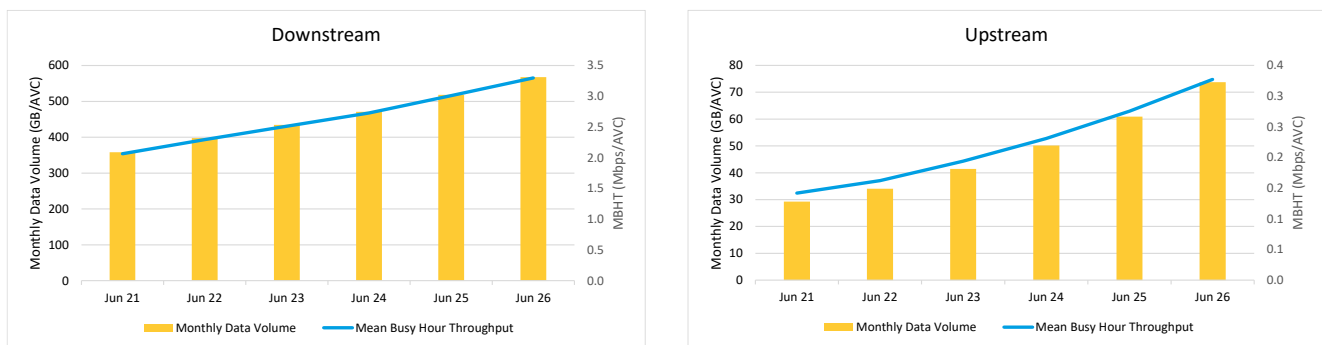


Figure F3. Traffic forecasts, FY21 to FY26

The forecast capex is based on contracted rates with delivery partners for the relevant work and reflects the following efficiencies:

- Customer Connect
 - There are forecast savings from the truck roll reduction program including reductions in the incidence of the end-user not being in attendance and repeat truck rolls more generally.



- Reconnection³⁶ Costs
 - As with Customer Connect, there are savings from the truck roll reduction program. The average cost per Reconnection is forecast to decrease over time in real terms.
- FTTX Capacity
 - Additional end-user port capacity will only be added to FTTX networks in line with demand. This covers **nbn**'s FTTN, FTTB, FTTC and FTTP networks and involves augmentation of FTTX Nodes and DFN Cables to correctly dimension for incremental end-user volumes.
- HFC Capacity
 - Delivery partner contracts have been renegotiated to drive savings in the cost of ongoing capacity upgrades on the HFC network.
- Transit capacity
 - Capacity upgrades will be undertaken via a just-in-time delivery model, with work triggered only where required to meet forecast traffic growth.
 - This is facilitated by **nbn**'s Aggregation Evolution Program, which will deliver additional capacity and lifecycle upgrades to drive scalability and flexibility in the transit network.

A.2.4 Maintaining

Maintaining capex is required to maintain the existing capability of the **nbn**[®] network, to ensure that service standards can be maintained for all end-users, on all technology types. Given that the initial rollout of the **nbn**[®] network has only just been completed, **nbn** does not face any major lifecycle replacements across the majority of the network over the forecast period. Consequently, the forecast of Maintaining capex comprising expenditure relates to only a relatively small number of areas (see Table F11 below):

- Copper Remediation on the FTTN network;
- Pole Replacement in those limited parts of the network deployed aerially on **nbn**-owned poles;³⁷ and
- a mixture of minor upgrades (e.g., security patches), minor lifecycle replacements (from FY23) and ongoing capex on the Long-Term Satellite Service (**LTSS**) network.

In FY24 to FY26, the majority of Maintaining capex relates to ongoing Copper Remediation for the FTTN network to keep up with time-based degradation. This is aimed at ensuring appropriate levels of service for customers and reducing repeat Service Assurance incidents, which results in lower opex.

The forecast accounts for the reduction in Copper Remediation expected as a result of the Network Upgrade Initiative. Relative to IOP22, forecast Copper Remediation expenditure has decreased, reflecting the impact of making fibre upgrades available to an additional 1.5 million premises as part of the Network Upgrade Initiative.

³⁶ Reconnections are required when the service to a premises is not active for a period of time, such as when an end-user moves premises.

³⁷ Where the **nbn**[®] network is aerial, the much more common practice is to use poles owned by the local electricity distribution network. **nbn** pays pole rental for that access, and this forms part of the Direct Operating Costs category within the opex forecast.

**Table F11. Maintaining capex, Real \$million (June 2021)**

Capex	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Copper Remediation	73	59	85	80	44	24
Pole Replacement	1	1	1	1	1	1
LTSS	21	20	41	10	10	8
Total – Maintaining	95	80	126	92	55	33

A.2.5 Capability

Over the period to FY26, almost all Capability capex (see Table F12 below) is accounted for by the combination of four main projects: the Network Upgrade Initiative, Fixed Wireless Upgrade Program, SMB Enablement Initiative and Regional Co-Investment Initiative, each of which is explained further below.

Although some of this capex will be incurred up-front to build/upgrade the street infrastructure (for the FTTN to FTTP upgrade) and to proactively migrate selected premises, some will be incurred only when customers make the request. Construction of most new FTTP lead-ins (for the FTTN to FTTP upgrade and the FTTC to FTTP upgrade) and all direct fibre connections (for the SMB Enablement Initiative) will be triggered by orders placed by end-users, via their RSPs, for the relevant upgraded services. The on-demand component of the capex forecasts is linked to **nbn**'s forecast of demand for higher speed tier services and business-grade services (see section B.4.2).

Capability capex will increase the capability of the **nbn**[®] network to align with growing demand from end-users for access to higher speed TC-4 services and business-grade services.

The on-demand capex will continue beyond FY26 as additional end-users place orders that trigger new FTTP lead-ins and direct fibre connections.

The forecast also includes some relatively small amounts of capex for:

- the ongoing Tech Choice program – this capex is to upgrade specific premises to the next most capable technology and is funded via an up-front contribution from the relevant end-user(s). The program is expected to have lower demand over time due to the Network Upgrade Initiative; and
- the Business Satellite Service (**BSS**) – this capex is to enable the BSS product via beam expansion, Telemetry Tracking and Control, platform and network build, and transit readiness.³⁸

³⁸ BSS is classed as a Competitive Service in the Variation. As such, consistent with the cost allocation principles in clause 2G.6.2, costs (capex or opex) that are directly attributable to BSS are allocated to Competitive Services and will therefore be excluded from the Core Services ABBRR and the Core Services RAB Portion. Essentially, this means that the directly attributable costs incurred in relation to BSS will not form part of the cost base relevant to the application of the SAU's price controls over time.



Table F12. Capability capex, Real \$million (June 2021)

Capex category	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Network Upgrade Initiative – FTTN – FTTP Build	95	607	1,004	893	706	696
Network Upgrade Initiative – HFC	58	29	-	-	-	-
Network Upgrade Initiative - Connect (on-demand, and selected proactive migration) – FTTC/FTTN – FTTP	-	1	200	276	296	378
Fixed Wireless Upgrade ^a	196	155	319	342	235	170
SMB Enablement Initiative (on-demand)	[CiC begins]					[CiC ends]
Regional Co-Investment Initiative	1	6	54	27	25	20
Other – Capability	[CiC begins]					[CiC ends]
Total – Capability capex	501	981	1,698	1,643	1,364	1,353

^a These amounts for the Fixed Wireless Upgrade category represent the forecast capex for each year without any adjustment for grants received. The Commonwealth Government grant of \$480 million is separately accounted for within the Building Block Model.

The forecast capex is based on contracted rates with delivery partners for the relevant work and reflects efficiencies in the following areas.

- FTTN to FTTP Build – The scope of the Local Fibre Network (**LFN**) works is optimised to delay some lead-in specific costs until there is an upgrade order.
- FTTC/FTTN to FTTP Connect – IOP23 includes a forecast rate reduction of 5% on FTTP lead-in costs. In combination with other efficiencies to be realised, the Cost per Lead-in is 9% lower than that included in IOP22. This reflects scale economies from the large number of lead-ins expected to be constructed on demand once FTTP becomes available in an area.
- Fixed wireless upgrades – The incremental cost of fixed wireless capacity on a capex \$ per Mbps of capacity upgraded basis is forecast to decrease over the forecast period. This is a result of scale economies from larger cell upgrades, insourcing of network capacity planning, and direct engagement with field delivery partners.
- SMB Enablement – Cost per site is forecast to reduce over time due to changes in the expected mix of small-, medium- and large-size upgrades and a cost optimisation initiative to drive cost per site savings of [CiC begins] [CiC ends] in real terms between FY24 and FY26.

Network Upgrade Initiative

The Network Upgrade Initiative announced on 23 September 2020 (and subsequently expanded in October 2022), involves a combination of up-front Build capex, and (generally) on-demand Connect capex that will meet current and future demand for higher AVC speeds by increasing the percentage of ready to connect premises that are up to one Gbps capable (peak download speed) from 20% in FY20 to 77% in FY24 and 89% in FY26.

The initiative is being achieved through:



- building fibre deeper into parts of the FTTN and FTTC footprints, enabling premises to move to an FTTP service when they order a higher speed plan. Construction of fibre into a premises will be linked to demonstrated demand from the relevant residential or business end-user, with selected proactive migration (as discussed further below); and
- upgrading capacity on the HFC network to enable access by more customers on this network to **nbn**'s higher wholesale speed plans – the program was completed in June 2022 (so no expenditure related to this element is included in this forecast) providing access to **nbn**'s higher wholesale speed plan, **nbn**[®] Home Ultrafast, across the entire HFC footprint of 2.5 million premises.

The Network Upgrade Initiative will lift the digital capability of Australia consistent with comparable international economies. The forecast expenditure is prudent and efficient expenditure:

- to achieve the Expenditure Objectives – in particular (i) meeting expected demand for products and services, and (iv) maintaining and improving the quality, reliability, safety, security and integrity of supply of any products and services, including by meeting the Benchmark Service Standards that are to apply in the relevant Regulatory Cycle; and
- having regard to the Expenditure Factors – in particular (ii) expected end-user willingness to pay for **nbn**'s products and services, including as to connections, speed requirements, data volumes, quality and reliability, and (iv) current and reasonably anticipated future market conditions, including the extent to which **nbn** must adjust product and service quality to meet competition.

The forecast net incremental revenues of the initiative are greater than or equal to the forecast net incremental costs (including a commercial cost of capital).

As discussed in chapter 4 of Part A of this Submission, supported by an independent review,³⁹ and reflected in the forecasts presented in Appendix B, the demand for higher speeds will continue to grow over time and ongoing investment to upgrade the network is required to meet this demand, noting the significant lead times in building physical infrastructure. The rationale for investing in fibre to meet this demand, as discussed in chapter 5 of Part A of this Submission and supported by a separate independent review,⁴⁰ includes operational efficiencies (improved network reliability, reduced operation and maintenance costs, and greater resilience to extreme weather events) and cost efficiencies from rolling out fibre at scale, factoring in lead times and a range of other considerations (such as mobilising delivery partners, vendor supply chains, lead times for RSPs, **nbn**'s own internal capacity and resourcing, environmental benefits and network simplification).

The Initiative is also aligned with the August 2021 SOE, which provides as follows in relation to Service Expectation (p. 1):

Wholesale broadband services: *The NBN will continue to be a wholesale only access network that is available to all access seekers. NBN Co will support retailers to affordably and innovatively meet end user needs and offer products that promote the take up and use of the NBN. NBN Co is the default Statutory Infrastructure Provider (SIP) for all of Australia and, where it is the SIP, it must meet legal obligations, including in relation to minimum service speed and network performance requirements. **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.*** (Emphasis added)

³⁹ Roberson and Associates LLC, *Future Bandwidth Requirements in Australia – Independent Expert Report*, 2 November 2022.

⁴⁰ 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>.



FTTN upgrades

The FTTN to FTTP network upgrade program has been designed to enable up to 3.5 million premises to access the wholesale download speed tier of up to one Gbps (**nbn**[®] Home Ultrafast) on demand.

Since the FTTN to FTTP network upgrade program was first announced in September 2020 with a scope of two million premises to be upgraded, the scope of the initiative has been expanded to include an additional 1.5 million premises.

This fibre-deepening program re-uses the Distribution Fibre Network (**DFN**) that was deployed as part of the original FTTN build, which means **nbn** builds the LFN within the selected footprint and generally completes the lead-in to premises only when an order is placed for a higher speed tier. This allows **nbn** to prioritise investment to meet customer demand. **nbn** will also undertake selected proactive migration within the footprint where this is prudent as compared to the alternative of undertaking remediation of existing facilities.

nbn's selection criteria for the FTTN to FTTP upgrade program is based on areas where:

- **nbn** anticipates strong demand for higher speeds;
- the cost per premises to upgrade is lower;
- it can deploy with speed and agility;
- it can provide maximum benefit to the most customers; and
- where its investment is most likely to spread and multiply economic activity across the nation.

A governance process is in place to review and approve footprint selection consistent with these criteria.

The selection criteria recognise that costs to undertake an FTTN to FTTP upgrade vary substantially from area to area. If **nbn** were instead to focus on the areas of the network with the lowest speed performance,⁴¹ the average build distance and cost per premises would increase, as would the time taken to complete the overbuild. Given **nbn**'s capital constraints, this would lead to fewer premises being upgraded over the forecast period.

For this reason, the cost per premises to deliver the upgrade to the first tranche of two million premises will be lower and revenue potential will be higher relative to the subsequent tranche of 1.5 million premises – given the second tranche will include a higher number of regional and complex premises, with higher build distances. In practice, combining the two tranches provides an opportunity for **nbn** to achieve efficiencies in delivering the upgrades by mobilising resources more effectively across regions and scopes of work.

The next 1.5 million premises will be selected through an optimisation process, which balances customer demand and revenue potential, capital and operating costs as well as relevant build considerations, including build complexity, exchange availability and the mobilisation of **nbn**'s delivery partners across work fronts. This optimisation process will ensure **nbn** maximises benefits to customers and ensures available capital is put to the best possible use.

In regard to ordering higher speed services, the relevant eligibility criteria are:

- Premises served by FTTN in eligible areas will need to order a plan based on wholesale speed tiers of 100/20 Mbps or higher to qualify for a full fibre upgrade.
- Customers have been progressively able to order higher speed tier services across selected parts of the FTTN footprint since FY22.

⁴¹ In any event, **nbn** is obliged to remediate services where the peak download speed falls below 25 Mbps.



As the upgrade of the FTTN network progresses, capturing a larger footprint of premises, a high proportion of premises are expected to voluntarily upgrade from FTTN to FTTP. Forced migration of the relatively small number of remaining premises is planned to occur from FY30 – at which point it will be more cost-effective to incur the capex to build fibre lead-ins to the remaining FTTN premises, and progressively decommission the FTTN network, rather than continue to operate and maintain the FTTN network in parallel with the FTTP network. Premises will also be proactively migrated to FTTP if they experience service degradation issues on the FTTN network.

FTTC upgrades

nbn has implemented new plans to deliver its highest wholesale speed tiers in the FTTC footprint to ensure more homes and businesses can access the speed and capability achieved through deeper fibre deployment.

The FTTC to FTTP upgrade program will now deliver on-demand, full fibre upgrades to single-dwelling units and multi-dwelling units (up to 16 premises) in the FTTC footprint, which aims to improve customer experience.

Using FTTP as the upgrade path for higher speeds in the FTTC footprint provides a range of advantages when considering capability provided to customers, long-term costs, operational cost savings through IT simplification, and consistency with **nbn**'s intention to deepen fibre deployment across its network.

The relevant eligibility criteria are:

- Premises served by FTTC will need to order a plan based on wholesale speed tiers of 250 Mbps or higher to qualify for a full fibre upgrade.
- Customers will be able to order higher speed tier services across selected FTTC footprint in 2022. The entire 1.5 million premises currently served by FTTC will be available for the on-demand upgrades by the end of 2023.

Fixed wireless upgrades

nbn has an ongoing program of fixed wireless capacity upgrades that are required to keep up with forecast traffic growth for each cell and provide for a minimum average download speed per end-user of six Mbps in the busy hour period. The upgrade program is prioritised on a cell-by-cell basis to ensure that supply keeps up with demand.

Announced in March 2022, **nbn** will now undertake a major upgrade of the fixed wireless network that will allow the fixed wireless network to achieve 'typical wholesale busy hour speeds' of at least 50 Mbps (download), enable 85% of fixed wireless premises to order up to 250 Mbps (downstream)/20 Mbps (upstream) services and enable all fixed wireless premises to order up to 100 Mbps (downstream)/20 Mbps (upstream) services. Additionally, the coverage of the fixed wireless footprint will be expanded to enable approximately 120,000 formerly satellite-only premises to access **nbn**'s fixed wireless network. The program of upgrades and ongoing orders will be undertaken between FY23 and FY34. **nbn**'s investment in these upgrades will be supported in part by a Commonwealth Government grant of \$480 million.

Consistent with the Network Upgrade Initiative, the fixed wireless upgrade will lift the digital capability of Australia. The forecast expenditure is prudent and efficient expenditure:

- to achieve the Expenditure Objectives – in particular (i) meeting expected demand for products and services, and (iv) maintaining and improving the quality, reliability, safety, security and integrity of supply of any products and services, including by meeting the Benchmark Service Standards that are to apply in the relevant Regulatory Cycle; and



- having regard to the Expenditure Factors – in particular (ii) expected end-user willingness to pay for **nbn**'s products and services, including as to connections, speed requirements, data volumes, quality and reliability, and (iv) current and reasonably anticipated future market conditions, including the extent to which **nbn** must adjust product and service quality to meet competition.

After accounting for the Government grant, the forecast net incremental revenues of the initiative are greater than or equal to the forecast net incremental costs (including a commercial cost of capital).

As discussed in chapter 4 of Part A of this Submission, and supported by an independent review,⁴² the demand for higher speeds will continue to grow over time and ongoing investment to upgrade the network is required to meet this demand, noting the significant lead times in building physical infrastructure. Given that the fixed wireless network is already subsidised via the RBS, the Commonwealth Government's grant is critical to the upgrade project.

SMB Enablement Initiative

First announced on 22 September 2020, the SMB Enablement Initiative is ongoing in nature and involves building direct fibre connections to business premises on demand once an order is placed for **nbn**[®] Enterprise Ethernet.

Under this Initiative, **nbn** has defined 321 Business Fibre Zones as at November 2022⁴³ (179 metro and 142 regional, covering 90% of all business locations in Australia) within which one Gbps symmetrical business-grade broadband (**nbn**[®] Enterprise Ethernet) will be available via RSPs. **nbn**'s CBD zone pricing will apply and **nbn** will not charge RSPs any up-front costs for orders involving a three-year commitment.

There is some upfront capex associated with IT, proactive DFN and transit, but the bulk of the capex is to be incurred over time, and only in response to orders.

The SMB Enablement Initiative will help to meet business demand for better services and will aid the competitive position of Australian businesses. The forecast expenditure is prudent and efficient expenditure:

- to achieve the Expenditure Objectives – in particular (i) meeting expected demand for products and services, and (iv) maintaining and improving the quality, reliability, safety, security and integrity of supply of any products and services, including by meeting the Benchmark Service Standards that are to apply in the relevant Regulatory Cycle; and
- having regard to the Expenditure Factors – in particular (ii) expected end-user willingness to pay for **nbn**'s products and services, including as to connections, speed requirements, data volumes, quality and reliability, and (iv) current and reasonably anticipated future market conditions, including the extent to which **nbn** must adjust product and service quality to meet competition.

The forecast net incremental revenues of the Initiative are greater than or equal to the forecast net incremental costs (including a commercial cost of capital).

In this context, it is important to note that **nbn**[®] Enterprise Ethernet is categorised under the Variation as Competitive Services. As such, consistent with the cost allocation principles in clause 2G.6.2, costs (capex or opex) that are directly attributable to **nbn**[®] Enterprise Ethernet are allocated to Competitive Services and will therefore be excluded from the Core Services RAB Portion. Essentially, this means that the directly attributable costs

⁴² Roberson and Associates LLC, *Future Bandwidth Requirements in Australia – Independent Expert Report*, 2 November 2022.

⁴³ This includes 31 Business Fibre Zones defined under an agreement with the Victorian Government announced on 26 August 2021.



incurred under the SMB Enablement Initiative will not form part of the cost base relevant to the application of the SAU's price controls over time.

The Initiative is also aligned with the August 2021 Statement of Expectations, which provides as follows in relation to fostering competitive and efficient markets (p. 2):

***Services for businesses:** NBN Co should act pro-competitively in supplying wholesale broadband services to retailers to support business end users' needs. The Company should earn commercial returns in supplying these services. In supplying business grade services, NBN Co should aim to improve retail and infrastructure competition and access for businesses, including in less well served areas.*

Regional Co-Investment Initiative

nbn's Regional Co-Investment Initiative complements the Network Upgrade Initiative and SMB Enablement Initiative through the creation of a \$300 million fund to co-invest with federal, state, territory and local governments in programs designed to shift regional premises to more capable technologies. These investments will help meet the growing and diverse needs of Australian homes and businesses.

For an individual program, the extent of any co-investment will be subject to **nbn's** investment governance process.

Relative to IOP22, the size and profile of forecast capex under the Regional Co-Investment Initiative has changed. This reflects the impacts of the Fixed Wireless Upgrade Program described above – as the upgraded capability of the fixed wireless network enables premises to access higher speeds, the forecast level of migration from fixed wireless to FTTP technology in regional areas is lower, meaning the forecast level of capex on fibre upgrades in regional areas is lower. **nbn** remains committed to investing the full amount of the funding, however this investment will be undertaken over a longer period of time, in line with expected take-up of co-investment upgrades. This takes account of the upgraded capability of the fixed wireless network being a more capable substitute for fixed line technologies in regional areas.

The Regional Co-Investment Initiative will address access and speed challenges in regional and remote areas. The forecast expenditure is prudent and efficient expenditure:

- to achieve the Expenditure Objectives – in particular (i) meeting expected demand for products and services, and (iv) maintaining and improving the quality, reliability, safety, security and integrity of supply of any products and services, including by meeting the Benchmark Service Standards that are to apply in the relevant Regulatory Cycle; and
- having regard to the Expenditure Factors – in particular (ii) expected end-user willingness to pay for **nbn's** products and services, including as to connections, speed requirements, data volumes, quality and reliability, and (iv) current and reasonably anticipated future market conditions, including the extent to which **nbn** must adjust product and service quality to meet competition.

The forecast net incremental revenues of the initiative are greater than or equal to the forecast net incremental costs (including a commercial cost of capital).

As discussed in chapter 4 of Part A of this Submission, and supported by an independent review,⁴⁴ the demand for higher speeds will continue to grow over time and ongoing investment to upgrade the network is required to meet this demand, noting the significant lead times in building physical infrastructure. Similar to the Fixed

⁴⁴ Roberson and Associates LLC, *Future Bandwidth Requirements in Australia – Independent Expert Report*, 2 November 2022.



Wireless Upgrade Program, government financial support is critical to projects undertaken under the Regional Co-Investment Initiative.

The Initiative is also aligned with the August 2021 Statement of Expectations, which provides as follows in relation to service expectations (p. 2):

Regional and remote: *NBN Co will improve its wholesale services and assist in addressing access challenges in regional and remote areas. The Government recognises that, in meeting its obligations, NBN Co cannot generate a commercial return on all of its activities in parts of regional and remote Australia. It is expected the Company will support these activities through returns in other parts of its business, and contributions from the Regional Broadband Scheme. NBN Co will be transparent in delivering these activities and ensure its expenditure is efficient, and that it maintains flexibility to adopt future innovations and advancements. The Company will proactively engage with stakeholders and seek specific opportunities to improve outcomes in regional and remote areas. For example, by incorporating non metropolitan areas in upgrade plans where commercially prudent, **including through working with governments and other organisations to fund and deliver enhanced services in these areas.** [Emphasis added]*

A.2.6 Other

Other capex is required across several other categories, including IT (Software Engineering). Average Other capex between FY24 and FY26 is forecast to be 21.9% lower than average Other capex between FY21 and FY23, in real terms. This reflects the completion of several projects under Other Network (relating to Network Management) and IT (including projects that support the Network Upgrade Initiative and the SMB Enablement Initiative). The Enterprise Simplicity Initiative is also forecast to be completed during FY25 (this Initiative is explained further below).

In FY24 to FY26, there is ongoing Other capex required in the following areas:

- Other Network – this includes capex for Network Engineering and Security to: support network capacity upgrades, including the Aggregation Evolution program; run the **nbn** Innovation Lab, which ensures efficient testing of equipment and new initiatives prior to implementation in the live network; manage ongoing cyber-security risks; develop improvements to drive network efficiency; and undertake initiatives to automate processes to reduce human error and meet future regulatory requirements and increased warrant requests. There is also a small amount of Operations capex related to tools needed for **nbn**'s internal field workforce.
- IT (Systems Engineering) – this relates to business-as-usual IT capex necessary to maintain and adapt IT systems over time and support the achievement of **nbn**'s strategic objectives under IOP23. As mentioned above, with many IT projects coming to completion over the next few years the level of ongoing IT capex is much lower in FY26 than in FY21. However, this reduction is partially offset by an increased need to incur IT capex to support the delivery of major network upgrades and business transformation.
- Facilities & Other – this includes capitalised labour costs for business unit subject matter experts for time required to support various initiatives.
- Commercial Works – these works are undertaken on a cost recovery basis. This is often at the request of third parties and may involve activities such as moving **nbn** infrastructure to allow for construction.



Table F13. Other capex, Real \$million (June 2021)

Capex	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Other Network	139	68	101	72	72	65
IT (Systems Engineering)	287	235	284	269	181	167
Facilities & Other	24	14	26	25	13	12
Commercial Works	18	17	39	36	34	33
Total – Other	468	334	450	402	300	276

Enterprise Simplicity Initiative

nbn's Enterprise Simplicity Initiative is an ongoing program of work, towards which \$45 million of IT (Systems Engineering) capex is forecast in the First Regulatory Cycle from FY24-FY26. The initiative seeks to:

- reduce the number of IT applications required by nbn to build and operate the nbn[®] network;
- simplify architecture to make future changes more cost-effective and easier for both nbn and RSPs; and
- drive savings in opex with respect to nbn's systems and processes.

The project commenced in FY21, with the ramp-up later than initially planned because of the need to integrate with the Network Upgrade Initiative and other programs. Benefits started to flow in FY22, delivering \$8 million of opex savings that are forecast to ramp up during FY23 and FY24 as the initiative proceeds. These savings have been factored into the IOP opex forecasts.

The Enterprise Simplicity Initiative reduces net incremental costs and delivers efficiencies plus improved value for customers.

A.3 Operating Expenditure

A.3.1 Overview

This section provides a breakdown of nbn's forecast opex for the First Regulatory Cycle (FY24 to FY26), including the rationale for the forecast. The forecast is based on nbn's IOP for FY22 to FY26, which was developed using the process described in section A.1. The IOP includes only prudent costs and factors in future efficiency gains.

For context, FY21 and FY22 actuals and FY23 forecasts are presented throughout this section in addition to the FY24 to FY26 forecasts that are part of the First Regulatory Cycle.

As discussed in section A.1.1 and demonstrated in Figure F4 and Table F14 below, nbn is currently undergoing a period of significant transformation. As a result, and due to ongoing efficiency initiatives, the level and nature of opex activities has not yet reached a steady-state level consistent with the ongoing operation of the nbn[®] network. As such, the detailed activity-by-activity forecasting approach applied within the IOP process, and subject to nbn's governance processes, provides more accurate forecasts of required opex over the period to FY26 than potential alternative approaches. Furthermore, this approach allows nbn to assess and identify efficiencies at the individual spend level.



With respect to top-down approaches, such as base-step-trend applied in other regulated sectors, **nbn** considers that such approaches are not currently appropriate for assessing opex levels in this First Regulatory Cycle given the transition and transformation **nbn** is undergoing.

Forecast opex has been summarised into six categories relating to the purpose and nature of the expenditure:

Table F14. Opex category descriptions

Category	Activities	Influencing Factors
Infrastructure Payments	Use (under Telstra Arrangements) of ducts, exchanges and dark fibre that form part of the nbn [®] network.	Rates are set out under long-term contracts with Telstra. Expenditure is driven by network size, and volume of infrastructure to be leased.
Direct Operating Costs	Operation and maintenance of the nbn [®] network, excluding the cost of nbn 's internal field workforce.	Largely influenced by asset management (Assurance, Restoration and Maintenance) activities – which are informed by the volume of network faults requiring truck rolls, and the agreed rates with Delivery Partners. Input and material price inflation.
Labour Costs	Activities undertaken by nbn 's internal workforce associated with the build and operations of the nbn [®] network.	Size of nbn 's internal workforce and workforce strategy – headcount of FTEs and TSAs. Salaries influenced by external economic conditions.
Other Operating Costs	Support of all other aspects of nbn 's operations – including non-network facilities, IT and software costs, outsourced functions and insurance.	Different cost items are influenced by a range of factors including levels of ongoing transformation and the level of required support for capital works.
Service Level Rebates	Payments to RSPs where nbn fails to perform in accordance with its Service Level commitments.	Volume of activations (by technology type), volume of service assurance activities.
Subscriber Payments	Payments for disconnections from legacy networks under the Telstra Arrangements and migrations from legacy networks under the Optus Arrangements.	Subscriber Payments are not forecast to be incurred in the First Regulatory Cycle.

As depicted in Figure F4 and set out in Table F15 below, **nbn**'s total opex (in real terms) is forecast to decrease each year over the period to FY26. The dotted lines represent the average total opex (excluding subscriber payments) in each three-year period (FY21-FY23 and FY24-FY26). **[CiC begins]**



[CiC ends]

Figure F4. Opex, Real \$million (June 2021)

Table F15. Opex by category, Real \$million (June 2021)

Opex category	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Infrastructure Payments^a			[CiC begins]			
	794	851				[CiC ends]
Direct Operating Costs	731	751	649	595	562	560
Labour Costs			[CiC begins]			
	831	665				[CiC ends]
Other Operating Costs			[CiC begins]			
	606	503				[CiC ends]
Service Level Rebates^b	20	24	11	9	7	7
Subscriber Payments	1,214	168	15	-	-	-
Total Opex	4,195	2,963	2,631	2,507	2,433	2,391

^a Telstra reports "Recurring nbn DA" income in its public annual reports. Telstra's reporting differs from the Infrastructure Payments set out in this table because Telstra's reporting includes different items and is expressed in nominal terms.

^b Service level rebates are included for FY21 to FY23 for comparative purposes only.

Excluding Subscriber Payments, which are non-recurrent in nature and are currently not forecast to be incurred in the First Regulatory Cycle, following the completion of the initial build and migration/disconnection of end-users from legacy networks,⁴⁵ total opex in FY26 is forecast to be 14.4% lower in real terms than in FY22, comprising:

⁴⁵ While Subscriber Payments are not currently forecast beyond FY23, they still may be payable in certain circumstances for the next ten years.



different technologies having different cost characteristics, e.g., FTTN is more maintenance intensive than FTTP). In addition, higher take-up and usage lead to higher amounts of electricity required to power the nbn® network and higher volumes of Service Assurance and Network Assurance incidents, all else the same.

Over the period from FY22 to FY26, Direct Operating Costs (see Table F16 below) are forecast to decrease by 25.4% in real terms while in parallel:

- the cumulative number of premises ready to connect is forecast to increase by 5.0% (due almost entirely to ongoing growth from new developments);
- the cumulative number of net premises activated is forecast to increase by 4.6%; and
- traffic (mean busy hour throughput) on the nbn® network is forecast to increase by 40% downstream and 106% upstream (see the discussion of demand forecasts in Appendix B).

As set out further below, of the three categories that make up Direct Operating Costs, the largest overall contributor to the forecast decrease is the Assurance, Restoration and Maintenance category (forecast reduction of 43%), and this is followed by the Other Network Costs category (forecast reduction of 30%). The remaining category, Network Operating Costs, is forecast to increase by 13% in real terms; however, a number of opex savings in areas such as Network Power offset unavoidable increases in other items such as additional Spectrum/Apparatus Licences needed to keep up with demand on the fixed wireless network.

Table F16. Direct Operating Costs, Real \$million (June 2021)

Opex category	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Network Operating Costs	235	208	215	221	226	235
Rack Power	20	19	20	21	22	24
Network Power	75	65	60	59	58	60
Pole Rental	22	20	21	21	22	24
Spectrum / Apparatus Licences	[CiC begins]					
						[CiC ends]
Satellite Outsourced Services	-	6	12	14	15	14
Fixed Wireless Site Rental	47	45	47	50	52	54
Site and Network Access ^a	[CiC begins]					
						[CiC ends]
Managed Service Backhaul	13	7	3	2	2	1
Assurance, Restoration and Maintenance	358	417	335	274	248	237
Service Assurance	158	218	147	93	70	65
FTTP	11	19	10	9	9	11
FTTN	85	101	89	48	34	28
FTTB	3	5	1	1	1	1
FTTC	27	48	18	9	3	3
HFC	18	35	20	18	16	15
Fixed Wireless	7	6	5	5	5	5
Satellite	7	4	4	3	3	3



Opex category	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Network Assurance	151	155	149	146	143	138
Network Maintenance	44	41	37	34	33	32
End-User Not in Attendance costs	4	3	2	2	2	2
Other Network Costs	137	125	99	101	89	88
Freight Distribution and Supply Chain	24	31	4	4	4	4
Vendor Support Contract Costs	43	45	56	56	52	51
Other costs (including fleet vehicles)	71	49	38	41	33	33
Total – Direct Operating Costs	731	751	649	595	562	560

^a This includes outgoings (excluding site rental and network power costs) on Fixed Wireless sites and outgoings, electricity (excluding network power costs) and facility maintenance of nbn-owned network sites (Transit Aggregation Nodes and Depots, and satellite earth stations).

The basis for the Direct Operating Costs forecast is as set out below, including efficiencies identified as part of the development of IOP23.

Network Operating Costs

- Rack Power – this relates to the cost of electricity to power nbn equipment in Telstra exchanges under the Telstra Arrangements. nbn recently installed electricity meters in order to accurately measure (and only pay for) its own Rack Power usage. In regard to the volume of power required, nbn has rationalised down the number of line cards by 17,000 but growth in network traffic is still forecast to drive a 17.2% increase in electricity use (kWh), which translates into a 23% increase in Rack Power costs in real terms.
- Network Power – this relates to the cost of electricity to power nbn equipment at network sites other than Telstra exchanges. Network Power opex is forecast to decrease by 8% in real terms between FY22 and FY26. This reflects nbn's ongoing efforts to reduce power usage (kWh) per site and seek out lower electricity rates (\$ per kWh) through re-tendering of sites with metered electricity and renegotiating the rates for unmetered loads.⁴⁶
- Pole Rental – in areas where the nbn® network is aerial, nbn has Pole Rental agreements with electricity distribution networks.
- Spectrum/Apparatus Licences – nbn's fixed wireless network depends on access to sufficient radio spectrum to keep up with forecast traffic growth for each cell and provide for a minimum average download speed per end-user. [CiC begins] [CiC ends] To limit the ongoing need to acquire additional scarce/expensive spectrum, nbn's fixed wireless capacity program (as discussed in section A.2.5) is focused on achieving scale economies from larger cell upgrades that use available spectrum more efficiently.
- Fixed Wireless Site Rental – nbn has long-term agreements with landowners for Fixed Wireless Site Rental and leases space on third party-owned towers via co-location. This is associated with some increases in forecast opex over the period FY21 to FY26 as nbn adds fixed wireless capacity and takes up more space on these towers.

⁴⁶ At this time, unmetered loads are not subject to retail contestability in the electricity market.



- Site and Network Access – this relates to costs for Fixed Wireless sites, satellite earth stations, and Transit Aggregation Nodes and Depots owned by **nbn** and includes outgoings, electricity (excluding network power costs) and facility maintenance. Opex in this category is relatively stable given its nature and the completion of the initial build. **nbn** is reducing mains power usage per site, including through the installation of additional solar panels at **nbn** facilities.
- Managed Service Backhaul – **nbn** leases backhaul links from third-party providers (selected via competitive tender) to service new developments and in some cases multi-dwelling units in brownfield areas. With the completion of the initial build in relevant areas, **nbn** is rationalising its use of Managed Service Backhaul and moving to **nbn**-owned transit links. This involves some up-front capex that will be offset by ongoing opex savings.

Assurance, Restoration and Maintenance

- Service Assurance – this relates to opex associated with responding to Tickets of Work raised in respect of the service provided to individual premises. Except where work is undertaken by **nbn**'s internal field workforce, costs reflect contracted rates with delivery partners. Work on the Fixed Wireless and Satellite networks is fully outsourced under medium-term contracts that were competitively tendered.

The forecast reduction of 70% in Service Assurance opex in real terms between FY22 and FY26 is the result of the following factors.

- **nbn** is taking steps to reduce the frequency of incidents requiring Service Assurance, improve the efficiency with which the Ticket of Work is provided to the technician, and improve efficiency in ensuring that the technician is able to complete the work required in the first instance.
- For Service Assurance on the FTTN network, the effect of these measures is complemented by the Network Upgrade Initiative (as described in section A.2.5). As the Network Upgrade Initiative progresses and end-user take-up of FTTP services increases, the number of Service Assurance tickets raised is forecast to decrease, contributing to a 72% decrease in forecast opex for FTTN Service Assurance in real terms between FY22 and FY26.
- Despite forecast increases in the number of FTTP premises activated, FTTP Service Assurance opex is forecast to decrease by 45% in real terms between FY22 and FY26. This reflects the less maintenance-intensive nature of FTTP as compared to FTTN.
- Relative to IOP22, **nbn** will undertake a higher level of pro-active assurance, where **nbn** and RSPs work together to identify faults and undertake activity to remediate before an incident occurs.
- Network Assurance – as with Service Assurance, except where work is undertaken by **nbn**'s internal field workforce, the opex associated with Tickets of Work raised in respect of particular network issues (not specific to individual premises) reflects contracted rates with delivery partners. The forecast reduction of 11% in Network Assurance opex in real terms between FY22 and FY26 is the result of the same (relevant) factors driving the reduction in Service Assurance opex.
- Network Maintenance – this relates to costs attributable to both proactive and reactive maintenance, which are forecast on a similar basis to Network Assurance. Network Maintenance involves **nbn** monitoring the performance of the network and responding where adjustments are required. This monitoring allows **nbn** to locate sources of signal leakage and speed degradation and take action to meet operational performance targets.



- Over the forecast period, most Network Maintenance costs relate to the FTTN and HFC networks, parts of which are older and more susceptible to degradation than the other network types.
- Overall, Network Maintenance opex is forecast to decrease by 23% in real terms between FY22 and FY26. The cost of maintaining the FTTN assets is forecast to increase over time due to ongoing copper degradation, however this is offset by the forecast reduction in the number of premises on the FTTN network under the Network Upgrade Initiative. The FTTN and the FTTP networks will be operating in parallel within the upgrade footprint and **nbn** needs to maintain service quality for those end-users who remain on the FTTN network.
- End-User Not in Attendance – this relates to amounts **nbn** has to pay its delivery partners for truck rolls where the end-user is not at the premises when the technician arrives, and the Ticket of Work cannot be completed as scheduled. **nbn** has a program in place to reduce the incidence of these events, and this is reflected in the forecast reduction in related opex.

Other Network Costs

- Freight Distribution and Supply Chain – this relates to costs for delivery of inventory, warehouse operations and freight costs, and the forecast is based on contracted rates with vendors.
- Vendor Support Contract Costs – these costs are related to warranty support payments to third parties for equipment that forms part of the **nbn**[®] network. The forecast amount is made up of a large number of small contracts with multiple third parties. Although these are forecast to increase by 14% in real terms between FY22 and FY26, this increase would have been higher except that **nbn** will achieve some reductions from FY23.
- Other Costs – these costs relate to a range of items including fleet vehicle costs, security costs and damages and recoverable works that are forecast based on contracted rates with vendors. This is forecast to decrease by 33% in real terms between FY22 and FY26, and this is largely due to the completion of some non-recurrent activities in FY21 as part of the transition to the new field service agreements.

A.3.4 Labour Costs

Labour Costs relate to the opex required for **nbn**'s internal workforce, which is comprised of a mixture of Full Time Equivalent (FTEs) and Temporary Staff Arrangements (TSAs) across the following business units:

- Operations (including the internal field workforce);
- Network Engineering & Security;
- Regional Development & Engagement;
- Systems Engineering & Operations (including IT);
- Customer Products & Marketing; and
- Corporate (including Finance, People & Culture, and other corporate teams).

Over the period from FY22 to FY26, Labour Costs are forecast to decrease [CiC begins] [REDACTED]



[Redacted]

[Redacted]

[Redacted]

[Redacted] [CiC ends]

Table F17. Labour Costs opex, Real \$million (June 2021)

Opex category	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
FTE Costs – opex and capex	[CiC begins] [Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
TSA costs – opex and capex	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
FTE and TSA Capitalisation	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
Workforce Transition Costs	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted] [CiC ends]
Total – Labour Costs (opex only)	831	665	[CiC begins] [Redacted]	[Redacted]	[Redacted]	[Redacted] [CiC ends]

[CiC begins] [Redacted]

[Redacted]

[Redacted] [CiC ends]

The workforce plan was developed using benchmarking to provide an initial guide (noting various caveats applicable to such benchmarking) and then detailed bottom-up analysis of requirements.

[CiC begins] [Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted] [CiC ends]

A.3.5 Other Operating Costs

Other Operating Costs relate to the opex required to support all other aspects of nbn’s operations.

The forecast of Other Operating Costs (see Table F18 below) is based on contracted rates with vendors for the relevant work and services, and reflects efficiencies identified as part of the development of IOP23. Most of these efficiencies relate to reductions in the volume of activity due to completion of the initial rollout and the progressive transition from building to running the nbn® network.



Table F18. Other Operating Costs opex, Real \$million (June 2021)

Opex category	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Outsourced Services	118	97	[CiC begins] ██████████	██████████	██████████	██████████ [CiC ends]
Advisory and Corporate Costs	24	22	20	13	13	13
IT and Software Costs	205	184	177	153	145	138
Marketing and Product Costs	88	44	44	42	40	39
Facilities Costs	88	73	63	57	52	47
TUSMA Levy	31	34	35	36	38	39
Insurance	15	24	27	33	36	38
Other Internal Expenses	36	24	31	31	28	27
Total – Other Operating Costs	606	501	[CiC begins] ██████████	██████████	██████████	██████████ [CiC ends]

Over the period to FY26, Other Operating Costs are forecast to decrease by [CiC begins] ██████████ [CiC ends] in real terms, comprising:

- Outsourced Services – opex for Outsourced Services is forecast to decrease by [CiC begins] ██████████ [CiC ends] in real terms between FY22 and FY26. This relates to reductions in the volume of work associated with outsourced accounts payable functions (as total expenditure decreases), outsourced IT helpdesk functions (as nbn’s workforce reduces), and extended workforce arrangements (also as nbn’s workforce reduces);
- Advisory and Corporate Costs – opex for Advisory and Corporate Costs are forecast to decrease by 41.2% in real terms between FY22 and FY26. This relates to reductions in the volume of work associated with legal services (as there are fewer contracts and arrangements to review) and consulting services (as the operating environment looking ahead matures);
- IT and Software Costs – as a result of the Enterprise Simplicity Initiative (as discussed in section A.2.6), combined with further savings that follow reductions in nbn’s workforce as part of the transition from building to running the nbn® network, IT and Software Costs are forecast to decrease by 25.0% in real terms between FY22 and FY26;
- Marketing and Product Costs – opex for Marketing and Products Costs are forecast to decrease by 10.6% in real terms between FY22 and FY26. Overall, there are forecast to be large reductions in the volume of activity across Advertising & Media, Customer Marketing Programs, Direct Marketing & Partnerships, and Other Marketing and Product Costs;
- Facilities Costs – in line with the reduction of the internal workforce, nbn will rationalise its office accommodation to reduce expenditure on rental payments and outgoings for non-network facilities. As a result, Facilities Costs are forecast to decrease by 36.9% in real terms between FY22 and FY26;



- TUSMA Levy – as **nbn**'s share of industry eligible revenue increases, the amount that **nbn** needs to pay towards the TUSMA Levy will increase. This is forecast to level out from FY23 as the rate of growth of **nbn**'s revenues slows following the completion of the initial rollout early in FY21;
- Insurance costs – this covers insurance to protect **nbn** and its assets (excluding satellite insurance, which is included under Network Assurance), including professional indemnity, directors' and officers' insurance, general and public liability, and cyber liability. The cost of Insurance is forecast to increase over the period in real terms. This reflects the increasing premiums and perceived risk for areas such as cyber and property insurance. There will be a natural increase as the **nbn**[®] network (and asset base) grows, and during 2022 markets have been volatile due to the continued impacts of COVID-19 as well as a number of other global events. **nbn** is looking at a range of options to manage the increased costs, including self-insurance/hybrid models (subject to risk assessments and Board approval); and
- Other Internal Expenses – this category includes accounting, tax and audit fees, recruitment costs, training and development, corporate communications, office supplies and subscriptions, travel and entertainment and other. As a result of the progressive transition from building to running the **nbn**[®] network and the reduction in **nbn**'s workforce, there are reduced volumes in a number of these areas, leading to a decrease in Other Internal Expenses of 25.9% in real terms between FY21 and FY26, stabilising from FY22.

A.3.6 Service Level Rebates

In accordance with **nbn**'s commitments to Service Quality and Service Level reporting and transparency (as discussed in chapters 10 and 11 of Part C of this Submission), **nbn** will provide RSPs (on behalf of end-users) with rebates where **nbn** fails to meet the applicable Service Level. Despite **nbn**'s best efforts to deliver service excellence for end-users, **nbn** expects to incur Service Level Rebates during the First Regulatory Cycle. In practice, some events impacting service performance are outside **nbn**'s control and it is impractical and an inefficient use of resources to seek to completely mitigate all service faults.

Service Level Rebates are forecast with reference to the volumes of forecast activations and service assurance activities, applying historical-based rates. The forecasts capture the impact of initiatives implemented by **nbn** to improve service excellence.

The forecast level of these rebates is decreasing over the period to FY26, aligned with **nbn**'s ongoing commitment to improving performance and achieving service excellence.

Table F19. Service Level Rebates, Real \$million (June 2021)

Opex category	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Service Level Rebates ^a	20	24	11	9	7	7

^a Service level rebates are included for FY21 to FY23 for comparative purposes only.



A.3.7 Subscriber Payments

Subscriber Payments relate to opex required to pay for disconnections from legacy networks under the Telstra Arrangements and migrations from legacy networks under the Optus Arrangements.

The non-recurrent payments to Telstra and Optus are currently not forecast beyond FY22 following the completion of the initial build (see Table F20 below).⁴⁷ Relatively minor opex is forecast in FY23 related to the Medical Alarm Subsidy Scheme and Unconnected Families.

Table F20. Subscriber Payments, Real \$million (June 2021)

Opex category	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Subscriber Payments	1,214	165	15	-	-	-

⁴⁷ While Subscriber Payments are not currently forecast beyond FY23, they still may be payable in certain circumstances for the next ten years.



Appendix B Demand forecasts

B.1 Introduction

This section provides an overview of the demand forecasts used by **nbn** for the purposes of the First Regulatory Cycle (FY24 to FY26).

In this context, the key demand forecasts relate to expansion (with incremental demand from the market to service new developments), take-up (including STM) and peak usage. These forecasts feed into and are to varying degrees inter-dependent with the expenditure forecasts and the revenue and price forecasts.

As discussed in detail in chapter 4 of Part A of this Submission, **nbn**'s traffic modelling methodology and **nbn**'s 10-year usage and speed forecasts 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"*.⁴⁸ 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.

This section is organised as follows:

- Section B.2 describes **nbn**'s overall approach to forecasting demand;
- Section B.3 describes **nbn**'s forecasting methodology;
- Section B.4 sets out the following:
 - long-term demand projections – the period to FY31; and
 - demand forecasts for the short to medium term – the period to FY26 set out in the IOP.

These forecasts are provided solely for the purpose of assisting the ACCC in its assessment of **nbn**'s proposed settings for the First Regulatory Cycle. They should not be relied upon for any purpose not related to this regulatory process. Forecasts in this document reflect **nbn**'s current views and assumptions (as at November 2022), including a considered assessment of present economic and operating conditions, and are subject to risks and uncertainties.

B.2 Overall approach

nbn prepared demand forecasts as part of the IOP that underpins **nbn**'s FY23 Corporate Plan. The IOP covers the years FY23 to FY26 and is the outcome of a bottom-up planning process. The IOP has already been reviewed and approved/endorsed by **nbn**'s Executive Committee and Board, and submitted to Shareholder Departments and Shareholder Ministers.

Although it covers only four years, the IOP is informed by and aligned with much longer term (10-year) product and network roadmaps that are informed by long-term demand forecasts.

⁴⁸ Roberson and Associates LLC, *Future Bandwidth Requirements in Australia – Independent Expert Report*, 2 November 2022.



B.3 Methodology

The IOP relies on two sets of demand forecasts:

- high-level, long-term demand forecasts that drive the product and network roadmaps and strategic decisions on the evolution of the **nbn**[®] network and condition expectations around future revenues and prices; and
- detailed short- to medium-term demand forecasts that drive opex and capex activity levels (including on projects such as the Network Upgrade Initiative) and inform pricing intentions over the IOP period.

The development of each of these, together with some observations on the accuracy of past forecasts, is discussed in the following sub-sections.

B.3.1 Long-term demand forecasts

nbn forecasts long-term demand on the **nbn**[®] network with a particular focus on those aspects of take-up and usage that will drive expenditure and revenue over time – that is, premises activated, peak (rather than average) usage and STM. The long-term forecasts incorporate the relevant IOP short- to medium-term forecasts and for the years beyond the IOP’s horizon (that is, for FY27 to FY31) are projections based on applying a sequence of reasonable and well-informed assumptions over time.

nbn has well developed methodologies for producing its long-term demand forecasts, as depicted below for example in relation to peak usage (Mbps per AVC TC-4 in the busy hour, also referred to as MBHT or mean busy hour throughput) and STM (see Figure F5 and Figure F6).

Looking out over a 10-year horizon, **nbn** draws on a wide range of domestic and international sources to inform its models, including insights from CableLabs, the BCAR, OOKLA, Comcast, Cisco VNI, Sony, Microsoft, Deloitte, Nokia MS-ISA Application awareness platform, Omdia (previously Ovum) and the Australian Bureau of Statistics (**ABS**).

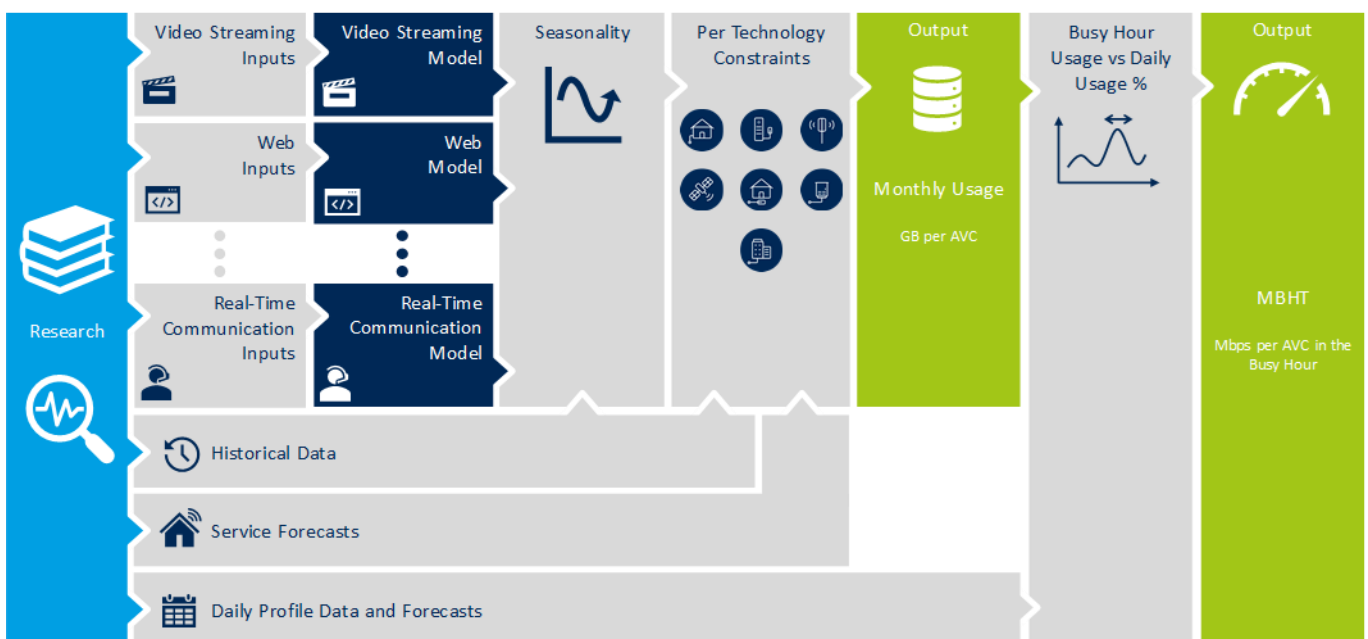


Figure F5. Forecasting methodology for usage

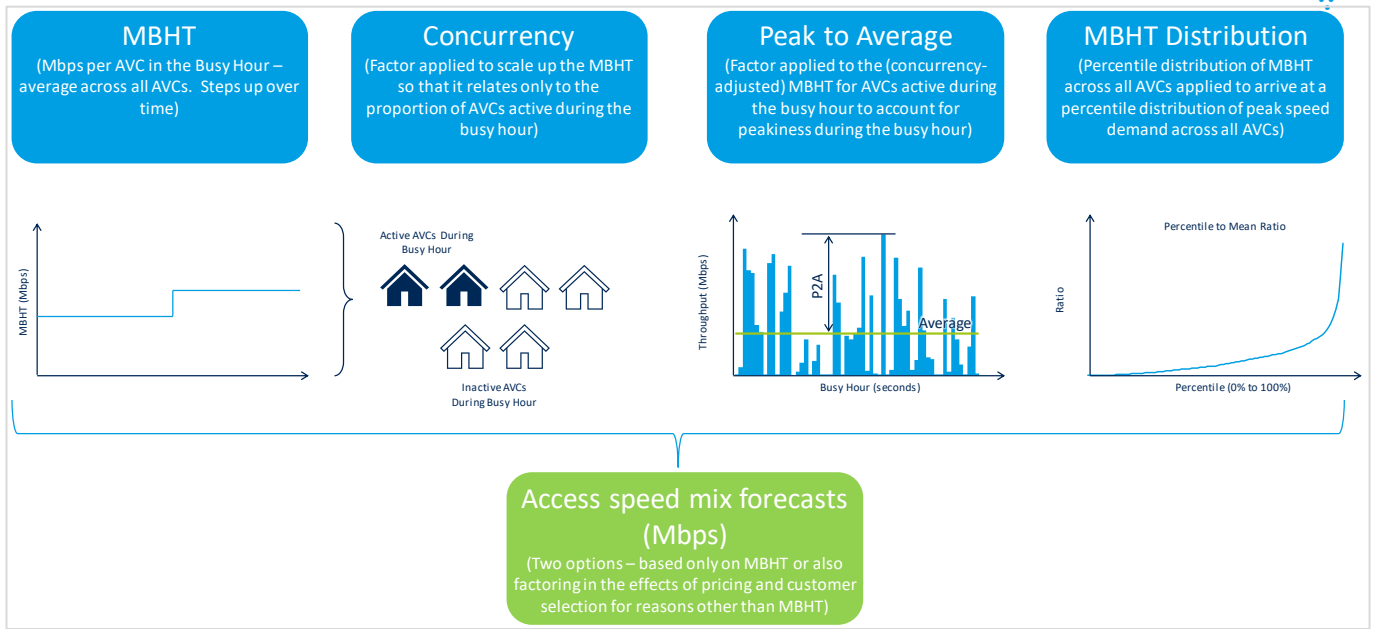


Figure F6. Forecasting methodology for access STM

nbn recognises that projecting long-term demand, particularly STM, is challenging because it relies on the interaction over time of various factors, many of which can be difficult to predict.

- Consumer adoption of new technologies:** demand for bandwidth is expected to increase substantially over time as consumers rely more on broadband services and the increase usage for each application (e.g., as streaming moves from HD to 4K and 8K in later years). However, the rate of growth will also be heavily influenced by the availability of relevant content together with gaming and other applications that are compelling for Australian audiences.
- Consumer willingness to pay for broadband:** residential consumers make decisions based on their individual budget constraints, and the share of wallet devoted to broadband will depend on the utility offered by available retail broadband services relative to all other goods and services. Over time, the relative utility that can be derived from broadband (and different speed tiers of broadband) will change and with it the consumer willingness to pay. The same is true for business consumers, but with willingness to pay related to how broadband supports business and commercial activities, for example by enabling productivity growth or otherwise adding value to the products and services offered in downstream markets.
- Pricing of nbn’s services over time:** nbn’s wholesale prices, including the price gradient across speed tiers, fixed vs. variable components of pricing and relativity to effective substitutes, will be a key driver of the retail pricing of broadband services and therefore consumer choices over whether to purchase nbn-based broadband, and which type and speed.
- RSP marketing decisions:** as nbn is wholesale-only, the retail services that consumers can choose from are determined by the decisions made by RSPs in relation to how nbn-based services are priced, packaged, positioned and presented. These RSP marketing decisions may be influenced by nbn campaigns and incentives to promote increasing take-up and usage of the nbn® network in such a way as to better align with apparent consumer preferences as revealed by willingness to pay studies.
- Effective substitutes:** the geographic extent to which substitutes to nbn’s services are available and the relative capabilities and pricing of those substitutes is subject to the decision making of nbn’s competitors



(many of which are also RSPs) and ongoing development in substitute technologies. To the extent that **nbn**'s competitors are also RSPs, this may have implications for the RSP marketing decisions discussed above. Although **nbn** closely follows technology trends across all potential substitutes, there are always many possible scenarios around the extent to which these may manifest as competition to the **nbn**[®] network over time, and increase risk of churn off the **nbn**[®] network.

- **nbn**[®] network capability: in the short to medium term, **nbn** has firm plans to upgrade the network (and make higher speed products available) in particular locations under the Network Upgrade Initiative and the Fixed Wireless Upgrade Program. However, in the long term, **nbn**'s plans will be subject to ongoing development with consideration given to the outcomes of network upgrades in the short to medium term (among other factors).

In applying its long-term forecasting methodology, **nbn** combines:

- internal forecasts based on industry best practice traffic forecasting techniques for usage and access speed; and
- external forecasts of demand and related research in regard to Australia and similar countries (such as NZ).

For STM, the long-term forecasting methodology is used to produce a demand range for the percentage of higher speed tier TC-4 AVCs as at the end of the 10-year horizon. Within this range, based on the experience of campaigns such as Focus on 50, or Focus on Fast, **nbn** sets a more targeted STM expectation and identifies changes to its pricing (and incentives to RSPs) required to deliver the target STM over time. Consistent with **nbn**'s purpose to lift the digital capability of Australia, **nbn** targets an FY31 STM towards the upper bound of the forecast range and develops its year-on-year profile from the current STM based on expected network capability over time and current churn rates.

B.3.2 Short- to medium-term demand forecasts

In concert with the long-term demand forecasts, **nbn** forecasts short- to medium-term demand on the **nbn**[®] network on a detailed month-by-month basis, seasonally adjusted, for the four years covered by the IOP.

In addition, **nbn** forecasts a range of other demand factors relevant to the IOP. For example, **nbn** prepares detailed month-by-month and location-specific forecasts in respect of:

- new developments – incremental premises ready-to-connect (**RTC**);
- TC-4 AVC premises activated;
- **nbn**[®] Enterprise Ethernet;
- Demand usage & capacity; and
- High speed upgrades.

The drivers of demand in each case are different and **nbn** maintains forecasting models that integrate data and trends from a variety of sources. These forecast models also recognise that **nbn** faces competition for the provision of network build in new developments and the consequential supply of residential and business-grade services, as well as facing infrastructure-based competition from fixed, mobile and satellite networks.

By way of example, **nbn** has set out below the steps involved in forecasting premises activated and STM over the period of the IOP (FY23 to FY26).



Forecasting premises activated

Premises activated in each rollout region is forecast for the IOP using the following steps:

- Bottom-up predictions for each rollout region consist of two Machine Learning (**ML**) models, predicting terminal penetration as well as the weekly phasing for each rollout region. The models consider a number of factors associated with underlying demand, including demographic characteristics, historical order trends and legacy service take-up.
 - New developments are factored in based on a ready-to-connect profile per region, which is determined from current development pipelines and long-term ABS forecasts of housing growth. Once the ready to connect profile is determined, the same bottom-up process set out above occurs to forecast premises activation in new footprints.
 - The bottom-up predictions are overlaid with higher-level adjustments, including any demand generation campaigns and incentives currently or expected to be in market.
- Additional overlays are also considered, including:
 - RSP ordering behaviour – for example, order lifecycle metrics such as cancelled and rejected orders (applied using historical percentages at the service class level); and
 - likely behaviour of competing networks, informed by market announcements and other market intelligence related to target migration volume to non-**nbn** alternatives and expansion targets for alternative infrastructure rollouts.
- Finally, the demand forecast is adjusted for supply-side constraints. This is primarily in regard to the time needed from order to activation, which takes into account the complexity of the activation process based on technology, service class and labour constraints of **nbn** or delivery partners (as relevant).

Emerging mobile and fixed wireless competition adds additional layers of complexity to forecasting premises activated. **nbn** is carefully monitoring the potential impact of competition on overall demand going forward and is updating its forecasting models over time as the market develops.

Forecasting speed tier mix

STM is forecast over the period of the IOP on a basis that is consistent with, but more detailed than, the long-term forecasting methodology described above. Relevant inputs and tools used in the short- to medium-term STM forecast include the following:

- **Premises activated and usage:** forecasts of net premises activated (accounting for customer churn), upstream and downstream monthly data volume (GB/AVC) and MBHT are forecast for each technology type.
- **Current STM of the active base:** split by:
 - RSP;
 - product;
 - segment (residential and business); and
 - technology.
- **Technology mix across the footprint:** this is necessary to account for the constraints on maximum speeds attainable on some technologies.



- **‘RSP cost minimisation’ principles:** as **nbn** is wholesale-only, it is necessary to account for how RSPs minimise their costs by purchasing a pool of **nbn** products that can be transformed in various ways to minimise the cost of creating retail offerings that best meet the needs of each RSP’s target market.
- **RSP ‘go to market’ STM history:** each RSP positions itself differently based on its target market, and this is reflected in which speed tiers an RSP chooses to promote over time and provides an indication of what mix they may promote into the future.
- **Current trading insights and in-market offers by respective RSPs:** at any point in time, each RSP will have particular retail offers in market in an effort to differentiate themselves and promote take-up and usage on a profitable basis. Observing the outcomes that RSPs achieve in the market provides useful insights into possible demand trends for **nbn**’s wholesale products.
- **Pricing relativities between speed tiers:** the intersection of pricing relativities with evolving end-user willingness to pay will affect the relative attractiveness of each speed tier over time. The potential effect of this on STM demand will be related to the RSP cost minimisation principles noted above.
- **Planned nbn campaigns or initiatives:** **nbn** will factor into its forecasts any upcoming campaigns or initiatives of its own that are expected to have an impact on STM, such as the Focus on Fast campaign, which encouraged take-up of 100 Mbps+ services, or the fibre upgrade program, which will address technology speed constraints.
- **Willingness to pay studies:** **nbn** conducts an annual study of broadband decision makers (end-users) to understand choice drivers, price elasticity and willingness to pay for different broadband features. The study captures responses across approximately 4,000 residential (metro and regional) and 2,000 business respondents (micro through to enterprise). Focus group discussions feed into the questionnaire development to refine areas for a deeper understanding of evolving drivers. The study is used to inform and guide wholesale pricing decisions and to understand trends and market demand to support product development and portfolio optimisation. For example, the 2022 survey shows that as penetration of higher speeds has increased the proportion of respondents unaware of the speed tier they are currently subscribed to has declined from 53% in 2018 to 38% in 2022 (in respect of respondents that have a fixed line as their main connection).
- **Customer churn analysis:** **nbn** analyses a range of factors that may impact how customers churn between different speed tiers. This includes, for example, competition, pricing and availability of substitutes, and impacts from inter-RSP dynamics.

B.3.3 Forecast accuracy

nbn monitors the accuracy of its forecasts over time to inform the ongoing development and future application of the forecasting methodology.

In regard to the accuracy of previous take-up and usage forecasts, **nbn** makes the following observations.

Net premises activated (cumulative)

Over the period FY19 to FY22, the accuracy of the forecast of net premises activated (cumulative) from one year prior was 96.4% to 99.6% relative to the actual number of such services for the relevant year. This range of accuracy is related to the initial rollout, which was still underway during that period and involved large numbers of premises being migrated to the **nbn**[®] network each year (e.g., 1.7 million premises in FY20, which translates to annual growth of 31%).



Speed tier mix

As noted in previous sections, **nbn**'s STM is highly influenced by **nbn**'s own pricing and by RSP marketing and decisions. Over the last three years (FY19 to FY22), this has led at times to some material differences between the STM forecast one year prior and the actual STM that eventuated (see Table F21 below). STM is impacted by both active pricing campaigns (such as Focus on 50) and more implicit pricing incentives, such as changes to relative CVC inclusions, that impact the behaviour of RSPs and customers. The difference between forecast and actual STM in recent years is a function of both pricing campaigns that were devised and implemented after the forecast was made, as well as uncertainty in the implementation of, and RSP response to, pricing incentives over the forecast period. Looking ahead, **nbn** has developed a projection for the take-up of higher speed tiers by FY31 and will develop various pricing initiatives over time consistent with those projections (consistent with **nbn**'s purpose to lift the digital capability of Australia). **nbn** notes that the Variation proposes new pricing structures and revised price relativities (e.g., TC-4 Flat Rate Offers and TC-4 Bundled Offers, which charge for utilised CVC until CVC charging on these offers is phased out by 1 July 2026), in respect of which **nbn** has limited historical demand data. This may initially impact on the accuracy of the forecasts for STM until direct experience of demand response to these pricing structures is gained.

Table F21. Speed tier mix, actual versus forecast one year prior – June 2019 to June 2022

TC-4 AVC speed tier (downstream)	June 2019		June 2020		June 2021		June 2022	
	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast
12 Mbps	17%	18%	15%	22%	12%	16%	10%	12%
25 Mbps	19%	12%	16%	19%	14%	13%	14%	13%
50 Mbps	55%	60%	60%	52%	57%	60%	59%	45%
100 Mbps	9%	10%	9%	8%	10%	10%	15%	23%
250 Mbps and above	0%	0%	0%	0%	8%	0%	2%	6%

Usage

Over the period June 2019 to June 2022, comparing **nbn**'s peak usage forecasts from one year prior and three years prior to the level of actual peak usage (downstream MBHT in Mbps per AVC) for the relevant year, the level of forecast accuracy is reasonably high taking into account the level of actual variability in the annual growth rate – see Figure F7 below. Accuracy on a one-year prior basis ranged from 90% to 97%, and on a three-year prior basis ranged from 83% to 94%. Over the same period, the one-year CAGR of actual peak usage ranged from 10% to 24%, which highlights the challenging nature of accurately forecasting usage over time.

Looking ahead, **nbn** expects to maintain a similar level of forecast accuracy in regard to peak usage as seen in past years.

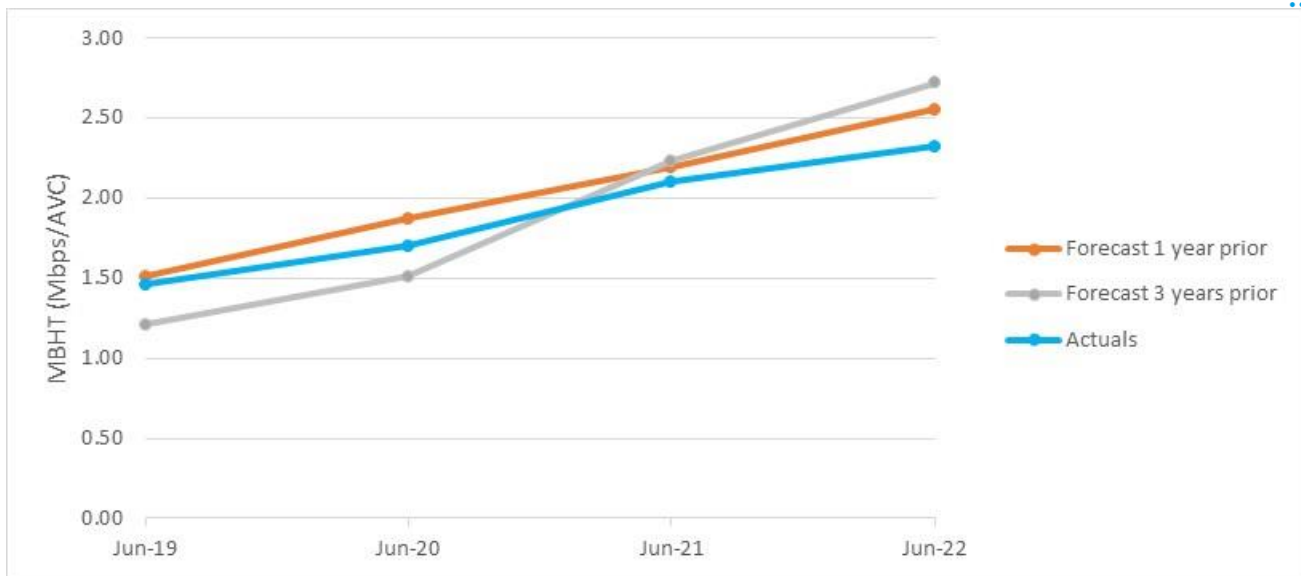


Figure F7. Accuracy of forecast peak usage

B.4 Forecasts

B.4.1 Long-term demand forecasts

nbn's long-term demand forecasts over the period to FY31 are as set out below in regard to take-up and usage.

- The number of TC-4 active services is forecast to grow by 17.90% overall from FY22 to FY31 with a CAGR of 1.85% (see Figure F8 below). Over time, growth is driven largely by new developments.
- The TC-4 AVC STM is forecast to move upwards such that the percentage on higher speed tiers (100 Mbps and above) in FY31 is 49.5%, as compared to 18% in FY22 (end of year) – see Figure F9. This forecast is based on:
 - nbn's internal traffic forecasts;
 - BCAR's 2018-2028 estimates of demand for fixed line broadband in Australia;⁴⁹ and
 - Research from Omdia that projects STM for Australia from 2021 to 2026 and that (separately) analyses the STM in 2021 across a basket of 15 gigabit-capable countries – given similarities in consumer behaviour between Australia and NZ, the current NZ mix provides a useful benchmark for higher speed tier take-up in Australia once nbn's gigabit capability is expanded.

The FY31 forecast is an ambitious and achievable target that is consistent with nbn's purpose and achieving it would significantly uplift digital capabilities for Australian consumers and better position nbn in an increasingly competitive market.

Once RSPs and their end-users have adjusted to the new wholesale pricing constructs in the Variation, nbn anticipates more active marketing of higher speed tier services over time in conjunction with improved network capabilities.

⁴⁹ BCAR, *Demand for fixed-line broadband in Australia 2018–2028*, Working paper, July 2020. Access: [Demand for fixed-line broadband in Australia 2018–2028 \(infrastructure.gov.au\)](https://www.infrastructure.gov.au/bcar/research/working-papers/2020-07-2018-2028).



- Traffic per AVC activated is forecast to grow from June 2022 to June 2031 in terms of MBHT by 142% (CAGR 10%) downstream and 330% (CAGR 18%) upstream, and in terms of Monthly Data Volumes by 138% (CAGR 10%) downstream and 398% (CAGR 20%) upstream (see Figure F10). This growth reflects the interaction of many factors including consumer adoption of new technologies such as 4K- and 8K- enabled devices (as discussed above) and higher rates of working from home over time than pre-COVID-19.

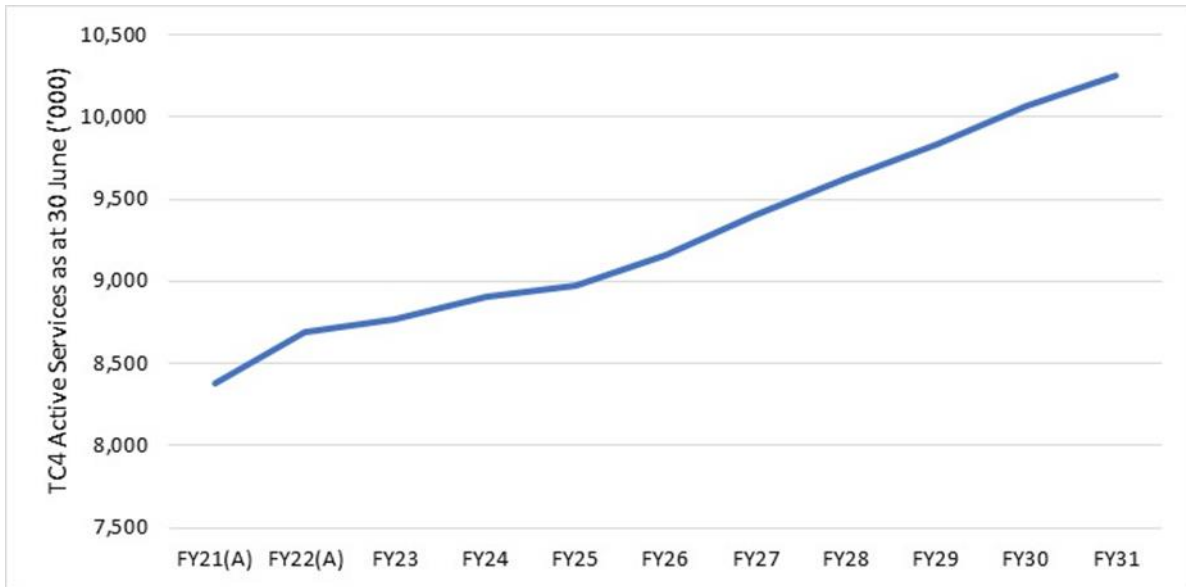
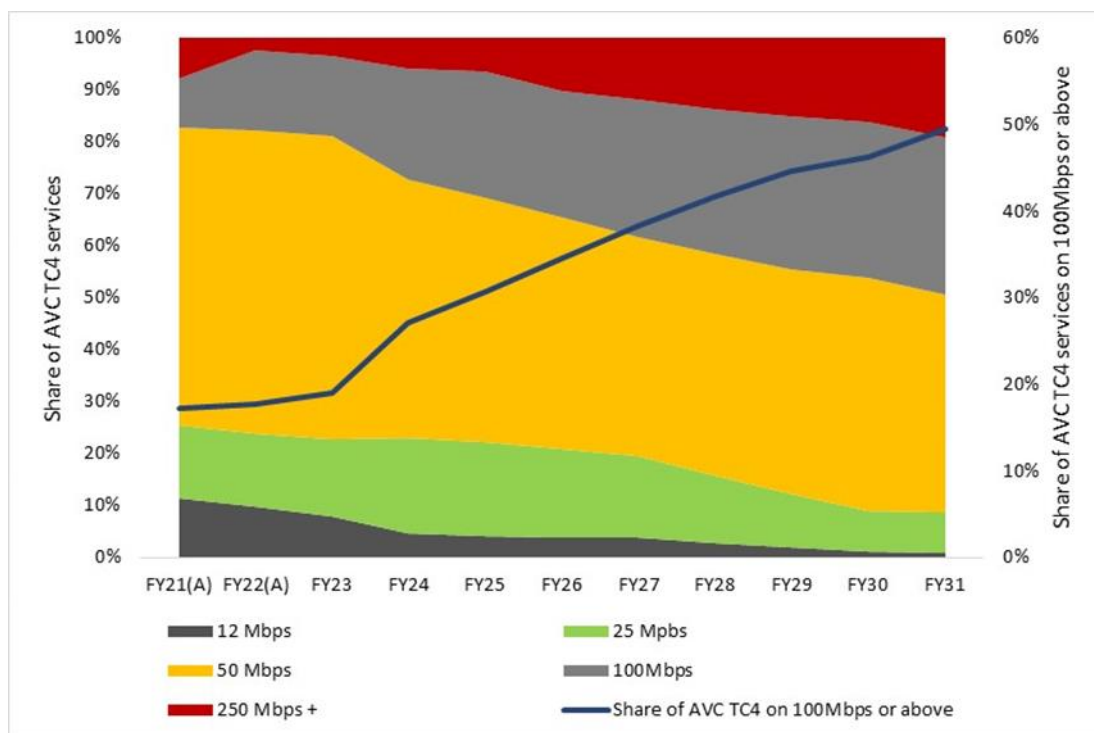


Figure F8. TC-4 active services – long-term forecast



Note: the Voice-only AVC TC-4 offer is expected to become available in FY24.

Figure F9. Speed tier mix – long-term forecast

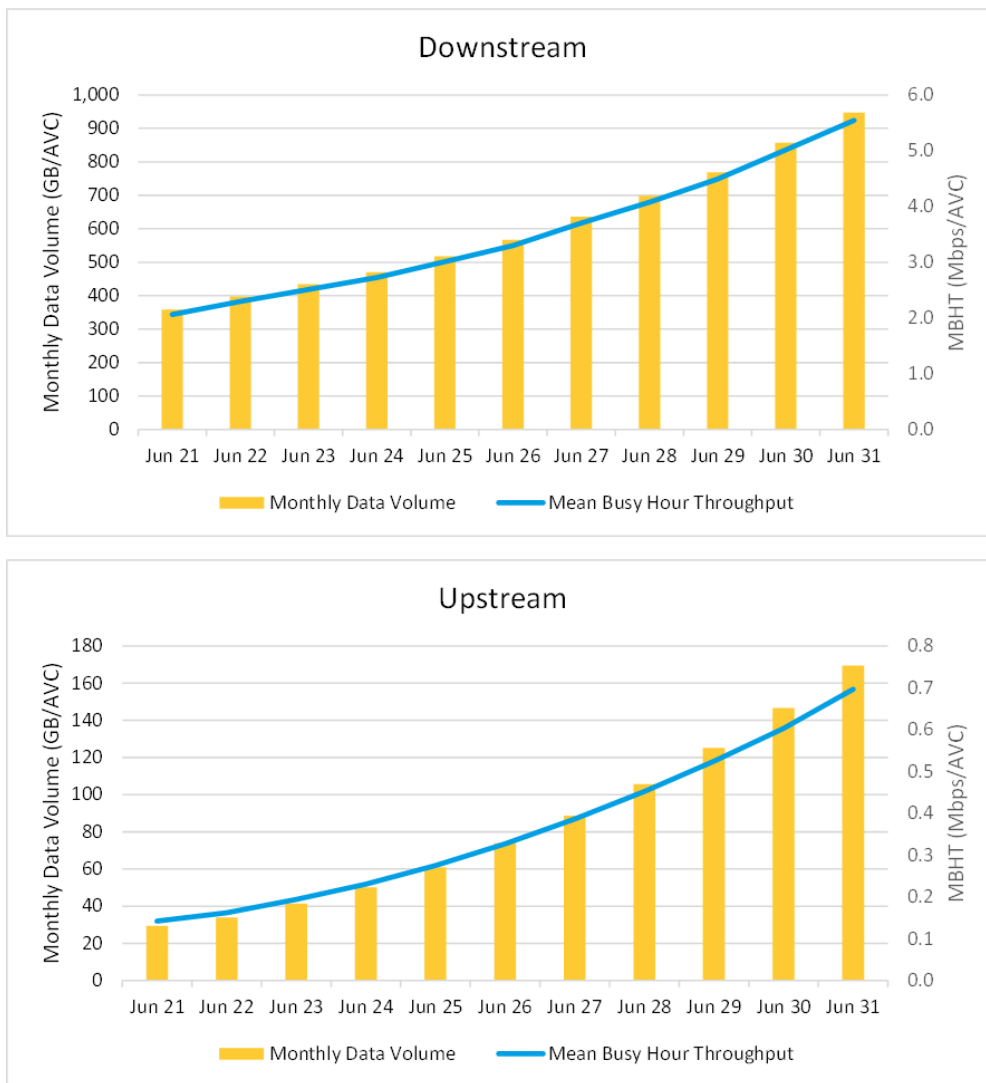
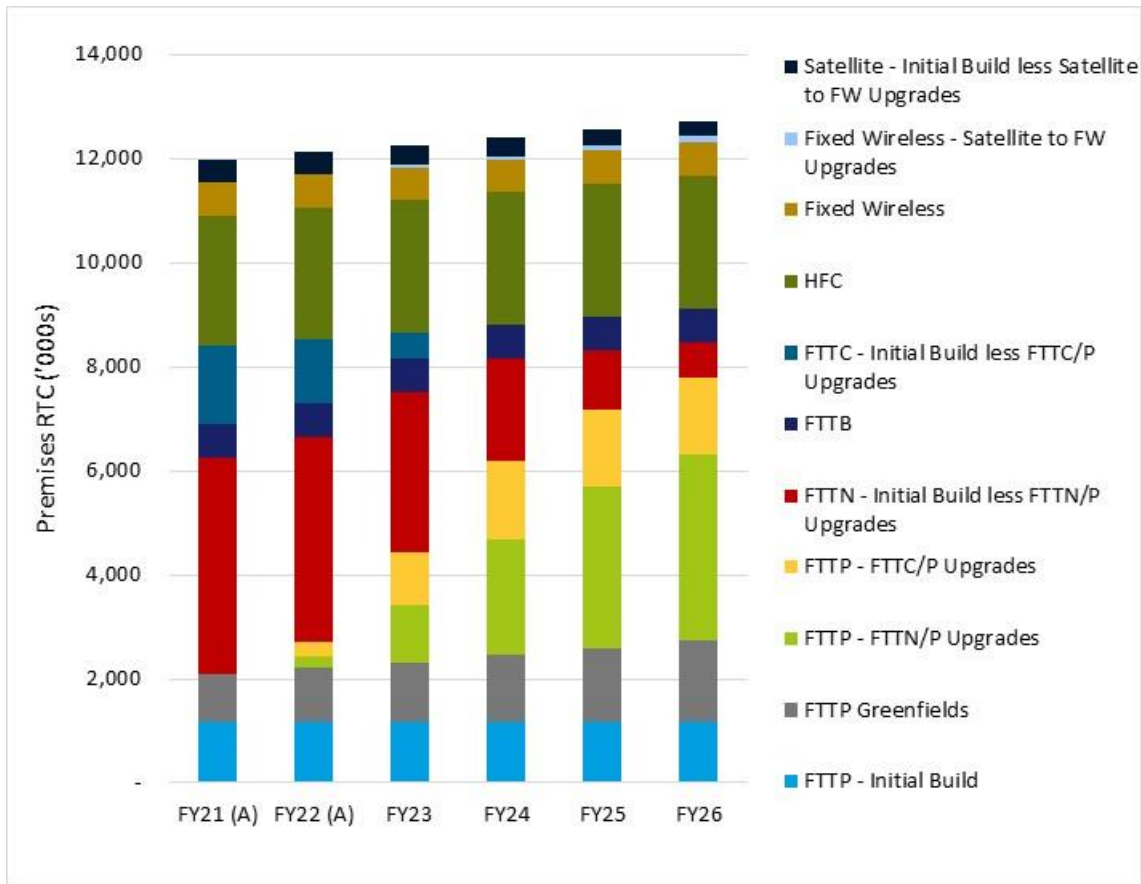


Figure F10. Traffic – long-term forecast

B.4.2 Short- to medium-term demand forecasts

Under the IOP, the key demand forecasts over the next four years (FY23 to FY26) are as summarised below in regard to expansion, and take-up and usage.

- **Expansion:** premises ready to connect (RTC) are forecast to grow by 5.0% overall, with a CAGR of 1.2% driven by market demand to extend the nbn® network into new developments (see Figure F11).



Note: FTTP – Initial Build reductions over time reflect clean-up of footprint (duplicates/invalids/vacant lands) and premises rebuilt as New Developments (knockdown rebuilds). Upgrades reflect premises ready to order an upgrade from FTTN or FTTC to FTTP and ready to migrate from Satellite to Fixed Wireless. HFC in FY21 reflects the impact of the Stop Sell.

Figure F11. Premises RTC by technology, FY21 to FY26

- **Take-up and usage:** driven by market demand for connection, access speed and quality, and usage:
 - the number of premises activated (cumulative) is forecast to grow by 4.6% overall, with a CAGR of 1.1% but annual growth of 1.9% in FY26 (see Figure F12). Within this, there is a progressive (on-demand) migration of FTTN and FTTC services to FTTP within the footprint of the Network Upgrade Initiative – the percentage of all fixed line premises able to order TC-4 higher speed tier services of up to one Gbps is forecast to grow from 47% in FY22 to 89% in FY26 (see Figure F13); and

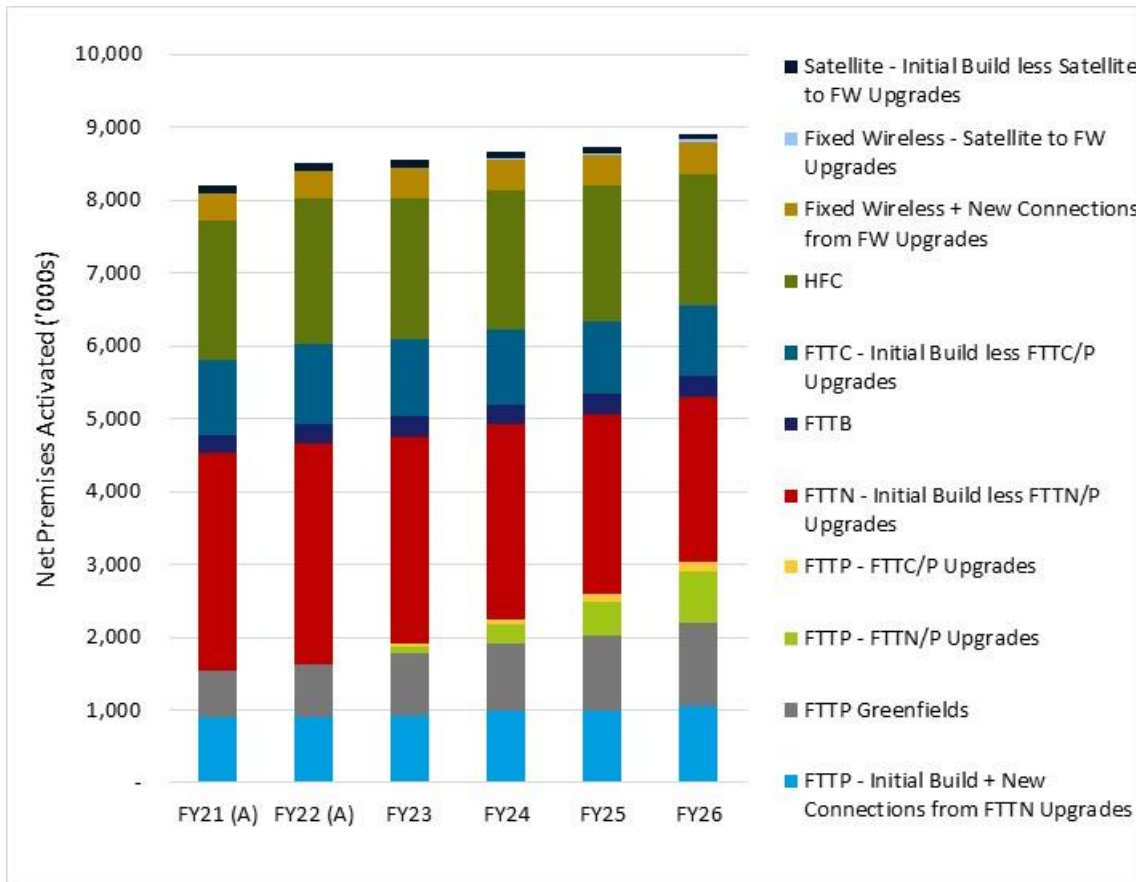
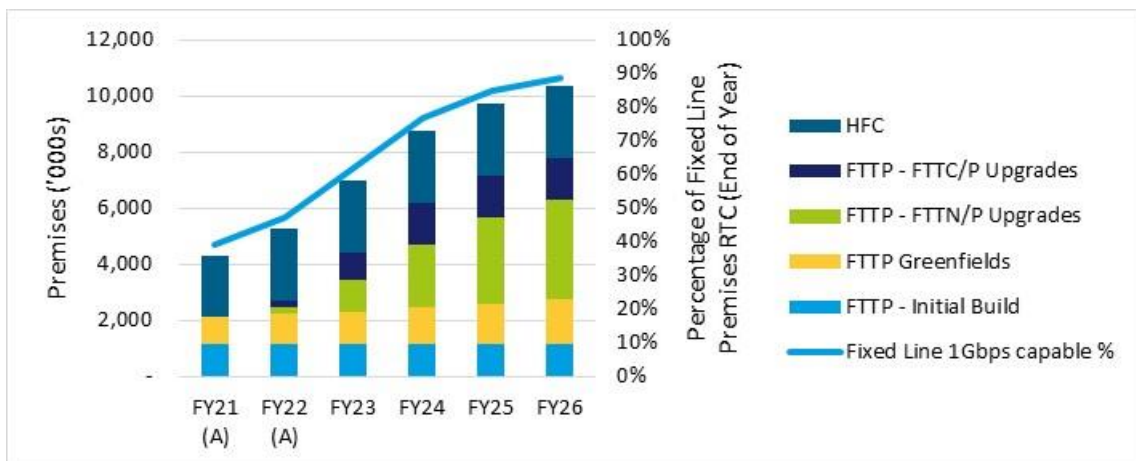


Figure F12. Net premises activated (cumulative) by technology, FY21 to FY26



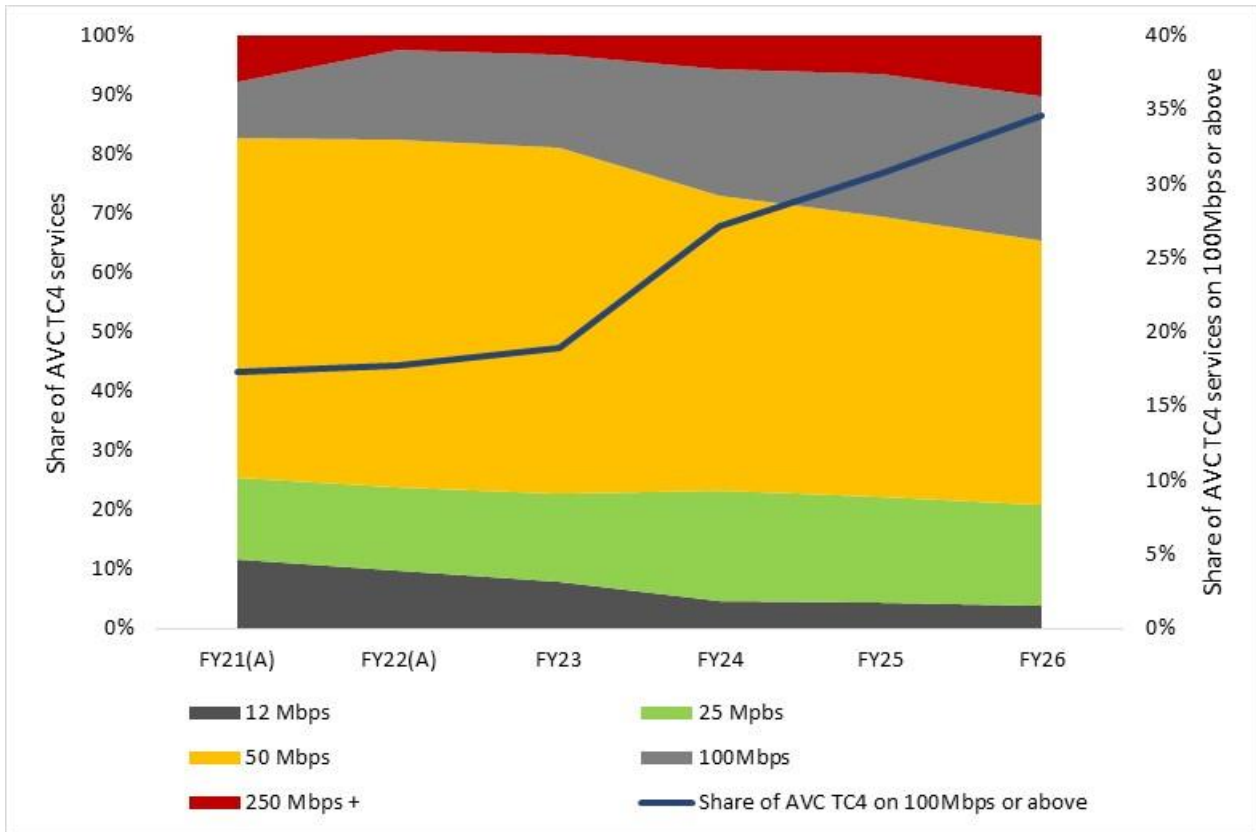
Note: At the end of FY20 (A), the Fixed Line 1 Gbps percentage was 20%.

Figure F13. Fixed Line Premises capable of one Gbps by technology, FY21 to FY26

- facilitated by the Network Upgrade Initiative, the TC-4 AVC STM is forecast to shift progressively towards higher speed tiers, with the percentage of services 100 Mbps and above increasing from 18% in FY22 to 35% in FY26 (see Figure F14). The shift to an AVC-only arrangement for 100 Mbps and above is expected to unlock existing latent demand for higher speed tiers, and the percentage of such services is forecast to increase from 19% to 27% between FY23 and FY24. As part of the package of product and pricing changes, nbn will also introduce a new Voice-only option in FY24. This will be priced at \$12 per month (ex-GST) on



introduction and provided using the 12/1 Mbps speed tier. The different prices applying to Voice-only 12/1 and broadband 12/1 is based on a threshold data test, where services utilising below a certain bandwidth threshold would be categorised as Voice-only services; while services that exceed the bandwidth threshold would be categorised as broadband services and charged accordingly;



Note: the Voice-only AVCTC-4 is expected to become available in FY24.

Figure F14. AVCTC-4 speed tier mix, FY21 to FY26

- take-up of business-grade (Enterprise Ethernet) services is forecast to grow rapidly from around [CiC begins] [redacted] [CiC ends] in FY22 to [CiC begins] [redacted] [CiC ends] in FY26 (see Figure F15). This reflects that nbn® Enterprise Ethernet is becoming a more mature product from a pricing and capability perspective, with platforms to support scale take-up. Forecast growth in take-up is also associated with the SMB Enablement Initiative as described in section A.2.5; [CiC begins]



[CiC ends]

Figure F15. Enterprise Ethernet take-up, FY21 to FY26



- traffic per AVC activated is forecast to grow overall in terms of MBHT by 44% (CAGR 9%) downstream⁵⁰ and 102% (CAGR 19%) upstream and in terms of the Monthly Data Volume (GB per AVC) by 43% (CAGR 9%) downstream and 117% (CAGR 21%) upstream (see Figure F16). In relation to the effects of COVID-19 on traffic/usage, downstream MBHT is forecast to continue to grow even as workers return to the office (because the residential downstream peak is in the evening rather than during business hours). Upstream MBHT is also forecast to increase due to organic growth based on a higher rate of working from home than pre-COVID-19; and
- there has been an increase in mobility with people spending less time in their homes during peak hours, coupled with a significant increase in the number of households going on extended holidays. Over recent years, as Australians have gone in and out of lockdown, **nbn** has observed a clear negative correlation between mobility and internet usage on its network.⁵¹ Downstream traffic per AVC activated is expected to revert to the previous trend over the medium to long term.

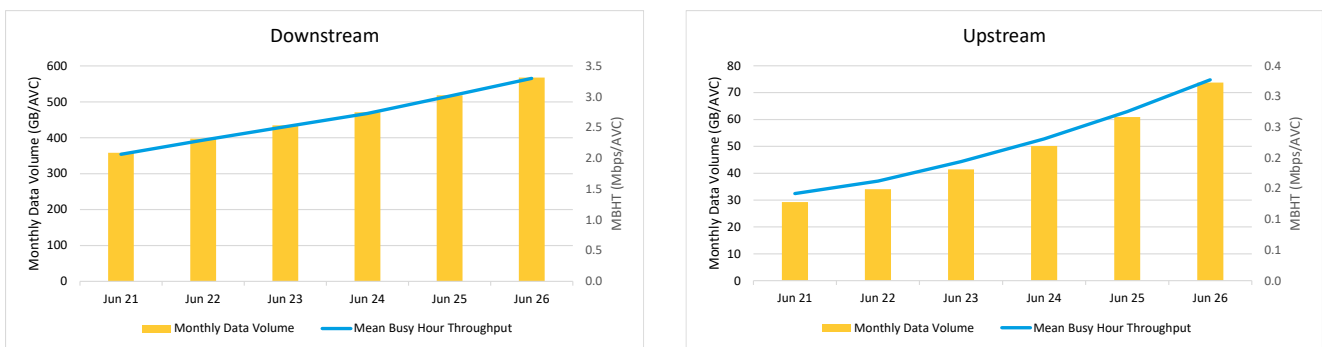


Figure F16. Traffic forecasts, FY21 to FY26

⁵⁰ These forward-looking estimates involve lower rates of growth than those observed in previous years, including during the traffic surge associated with working from home during COVID-19 lockdowns. This is because of continual improvement to video codec efficiency, the aftereffects of post-lockdowns, including increased extended travel over the near to longer term, and the number of hours spent on real-time entertainment in a day reaching exhaustion.

⁵¹ Mobility data is sourced from Apple Mobility Trends Reports, showing requests for directions.