GREX CONSULTING

Independent Expert Report
nbn SAU Variation Expenditure

24 April 2023

Final draft

Contents

Part C: Expenditure Assessment – NBN Co processes, prudent and efficient expenditure

1 Part C summary

- The approach taken to the prudent and efficient expenditure assessment described in this Part C has considered:
  - NBN Co's described approach in SAU Supporting Submission Part F,
  - AER's most recently described approach, and
  - The objectives described by and relevant to NBN Co (summarised in Appendix A to this Part C).
- Across the initiatives, programs and other expenditure items described by NBN Co in the ACCC Briefings, an assessment is made of the prudency and efficiency of the expenditure proposed in the SAU Variation, with the following major call outs from the assessment being:
  - "Qualified No" assessment for prudency (qualified yes for efficiency) of expenditure for the Network Upgrade Initiative (FTTN-FTTP Build and FTTC/FTTN-FTTP Connect) (SAU Supporting Submission Part F, App. A, 2.5 - Capability)
  - "Inconclusive" assessments for the prudency and efficiency of the HFC Capacity and Transit Capacity capital expenditure initiatives categorised as Take-Up & Usage (SAU Supporting Submission Part F, App. A, 2.3 - Take-Up & Usage) and the Fixed Wireless Upgrade (SAU Supporting Submission Part F, App. A, 2.5 - Capability),
  - with a further "Inconclusive" for the efficiency (qualified yes for the prudency) of expenditure for FTTx Capacity (Part F, App. A, 2.3) and Direct Operating Costs (Assurance – Service Assurance, Network Assurance, and Network Maintenance) (Part F, App. A, 3.3).
- Reasons for assumptions made and the qualification of assessments against the initiatives are described in section 7 and Appendix B.
- Documentation provided along with a description of both the ACCC Briefings carried out by NBN Co and the subsequent RFI Process is also described towards the end of this Part C to explain the process of assessment, with suggested improvements forming part of the recommended process described in Part D of this Report.

As described in section 7 and Appendix B below, in many instances an assessment of an expenditure item has been rendered difficult (near impossible) due to a lack of information being made available by NBN Co. Wherever this has contributed to a "Qualified" or "Inconclusive" assessment, further information may assist in moving the assessment of the individual expenditure item and overall expenditure for the SAU Variation into a more unqualified assessment.

2 Process and Methodology

2.1 Introduction

The following process was followed to review and assess the documentation provided and briefings given by NBN Co during the ACCC Briefings[1] as well as the documents relied upon in the preparation of this Report.[2] For the avoidance of doubt, the process was carried out strictly in accordance with the instructions received from DLA Piper.

1. Mobilisation & Initiation	Information Review & Assessment		Report Development Recommendation	
	2. Report & Data Collation	3. Analysis & Assessment	4. Report Development & Draft Report	5. Conclusion & Final Report
• Confirmation of Key Objectives. • Confirmation & refinement of Plan, Assessment, Scope and Work.	• Request for existing Information and Data. • Attendance at ACCC briefings (by nbn). • Collect and Review Existing Material and Data. • Request for further Information and clarification from nbn.	• Document and information review & assessment. • Analysis and evaluation based on data gathered according to instructions received from DLA. Piper. • Document Findings.	• Initial Draft Report development & finalisation • Review & verify any further relevant new and revised information & clarification provided by nbn. • Gap analysis to Identify Areas for further Investigation or Opportunity.	• Final Report development & finalisation • Prepare Roadmap (if applicable for Recommendations or further investigation & opportunities). • Final Report.

Table 1: Approach & Methodology

The outcome of this process is described in this Part C and comprises the assessment of NBN Co's proposed First Regulatory Cycle (FRC) expenditure forecasts in the SAU Variation followed by the recommendations in Part D.

2.2 Prudency, efficiency, and objectives

As described by NBN Co in its SAU Supporting Submission Part F, for the purposes of proposing the forecast expenditure set out in the SAU Variation NBN Co has not included a definition of "prudent and efficient" because:

"this recognises the complementary nature of prudency and efficiency and allows for some flexibility in how these concepts are practically applied over time to achieve the Expenditure Objectives"[3]*.*

However, as described by the AER[4] and referenced by NBN Co in SAU Supporting Submission Part F:

[1] The ACCC Briefings comprise the list of documents in Attachment A to this Part C and include the RFI Process.
[2] As listed in Attachment A to this Part C.
[3] SAU Supporting Submission Part F, section 20.3, page 12.
[4] AER - Better Regulation - Expenditure Forecast Assessment Guideline for Electricity Distribution - August 2022, page 9.

"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".

Therefore, whilst it is recognised in the assessment carried out in this Report that "prudent" and "efficient" expenditure are complementary, this Part C seeks to assess each expenditure item according to its prudency and efficiency using the above parameters, i.e.,

- **Prudent expenditure** is that which reflects the best course of action, considering available alternatives, and
- **Efficient expenditure** results in the lowest cost to consumers over the long term.

Combined with this approach to each expenditure item, where possible from the information provided in the ACCC Briefings and all other documentation relied upon in the preparation of this Report, the expenditure items are assessed against the background of:

- **the promotion of the long-term interests of end-users (LTIE)**, which underpins the ACCC's approach to the SAU Variation proposal and which aligns with the statutory criteria summarized by the ACCC[5], and which the ACCC consider as referring to the end-users' economic interests, which include sustainably lower prices, increased quality of service and greater diversity and scope in product offerings,
- the **expenditure objectives** described by NBN Co in its SAU Supporting Submission Part F[6] along with the broader objectives described in Appendix A to this Part C, and
- the **expenditure factors** outlined by NBN Co as compared to the approach taken by the AER.

2.3 Yes, No, Qualified and Inconclusive

The prudency and efficiency of each expenditure item described is assessed against a rating of "Yes", "Qualified Yes", "No", "Qualified No" or "Inconclusive" as described below:

- **Yes:** the expenditure item meets with the definition of "prudency" and/or "efficiency" using the parameters described in section 2.2, and based on an analysis of the available information,
- **Qualified Yes:** the expenditure item possibly meets with the definition of "prudency" and/or "efficiency" using the parameters described in section 2.2, based on an analysis of available information, with certain limitations. Such limitations include but are not always limited to a lack of detailed information on the breakdown of the relevant expenditure item to qualify the assessment further (an individual description of limitations is given against each expenditure item in section 7 and Appendix B),
- **No:** the expenditure item does not meet with the definition of "prudency" and/or "efficiency" using the parameters described in section 2.2, and based on an analysis of the available information,
- **Qualified No:** the expenditure item possibly does not meet with the definition of "prudency" and/or "efficiency" using the parameters described in section 2.2, based on

[5] NBN Co SAU variation - Consultation Paper, page 5.
[6] SAU Supporting Submission Part F, section 20.4, pages 12 and 13.

an analysis of available information, with certain limitations. Such limitations include but are not always limited to a lack of detailed information on the breakdown of the relevant expenditure item to qualify the assessment further (an individual description of limitations is given against each expenditure item in section 7 and Appendix B), and

- **Inconclusive:** an assessment of "Yes" or "No" whether "Qualified" or not cannot be made due to a lack of available information which would support a fuller assessment. An individual description of the information requested, given and missing is provided against each expenditure item in section 7, Appendix B and the RFI Process.

As described in section 7 and Appendix B below, in many instances an assessment of an expenditure item has been rendered difficult (near impossible) due to a lack of information being made available by NBN Co. Wherever this has contributed to a "Qualified" or "Inconclusive" assessment, further information may assist in moving the assessment of the individual expenditure item and overall expenditure for the SAU Variation into a more unqualified assessment.

3 Assessment of NBN Co's approach to demand forecast & capacity planning

In addition to the assessment for prudency and efficiency of the expenditure items described in the ACCC Briefings and other documentation relied upon in the preparation of this Report[7], an assessment has been made of NBN Co's demand forecast and capacity planning process, with corresponding findings and recommendations.

3.1 Description of NBN Co's demand forecast & capacity planning process[8,9]

NBN Co has described in the ACCC Briefings how it has prepared demand forecasts as part of the most recent Integrated Operating Plan (IOP) that underpins NBN Co's FY23 Corporate Plan.

"IOP23" covers the years FY23 to FY26 and is the outcome of a bottom-up planning process that describes a detailed initial first year and forecast following 3 years ('1+3') plan. This process is updated on a yearly basis. 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.

NBN Co's key demand forecasts relate to expansion (with incremental demand from the market to service new developments), take-up (including Speed Tier Mix) and peak usage. These forecasts feed into, and are to varying degrees, interdependent with the expenditure forecasts and the revenue and price forecasts.

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 NBN Co forecast methodology forms input to the IOP process and includes the following key demand forecast items: **Network Utilisation, Active Premises/Services, and Speed Tier Mix (STM).**

3.1.1 Long-term (10-year) forecast

NBN Co appears to have well-developed methodologies for producing its long-term demand forecasts. Looking out over a 10-year horizon, NBN Co 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).

[7] As listed in Attachment A to this Part C.
[8] SAU Supporting Submission Part F.
[9] 005 nbn ACCC Briefing – IOP23 – Demand Forecast Methodology - CONFIDENTIAL

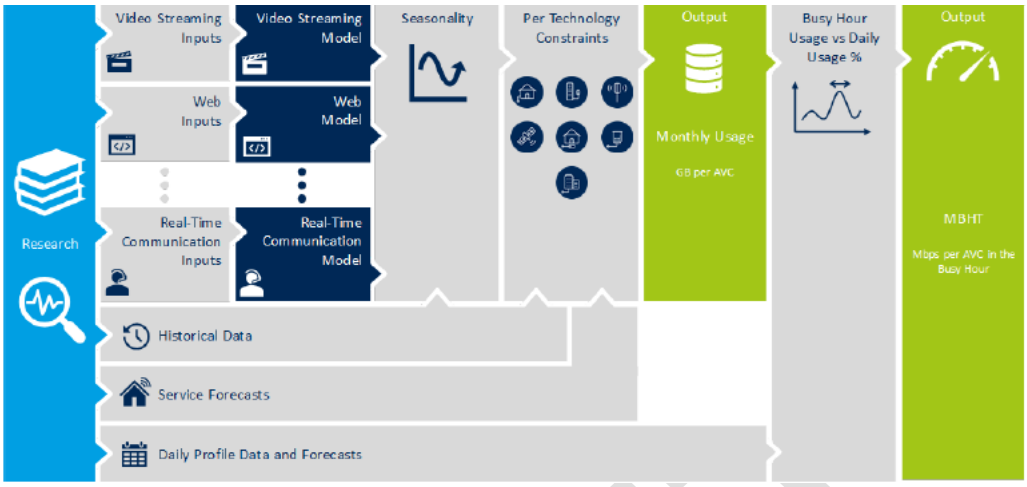

Figure 1: NBN Co's Forecasting Methodology for Usage[10]

NBN Co'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.

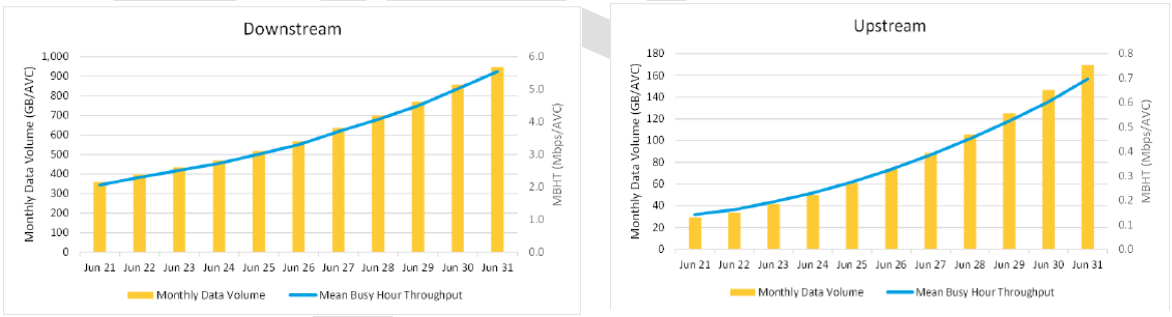

Figure 2: NBN Co's long-term usage and MBHT forecast

3.1.2 Short- to- medium-term (4-year) forecast

NBN Co has described in the ACCC Briefings how it 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 IOP23 (updated yearly as part of the IOP process). In addition, NBN Co forecasts a range of other demand factors relevant to the IOP.

NBN Co's key demand forecasts over the **next four years (FY23 to FY26)** identified by NBN Co in the ACCC Briefings are summarised below[10].

- **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,
- the **number of premises activated** (cumulative) is forecast to **grow by 4.6%** overall,
- 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% to 35%,

[redacted]

- traffic per AVC activated is forecast to grow overall in terms of MBHT by 44% (CAGR 9%) downstream and 102% (CAGR 19%) upstream, and
- Monthly Data Volume (GB per AVC) is forecast to grow overall by 43% (CAGR 9%) downstream and 117% (CAGR 21%) upstream.

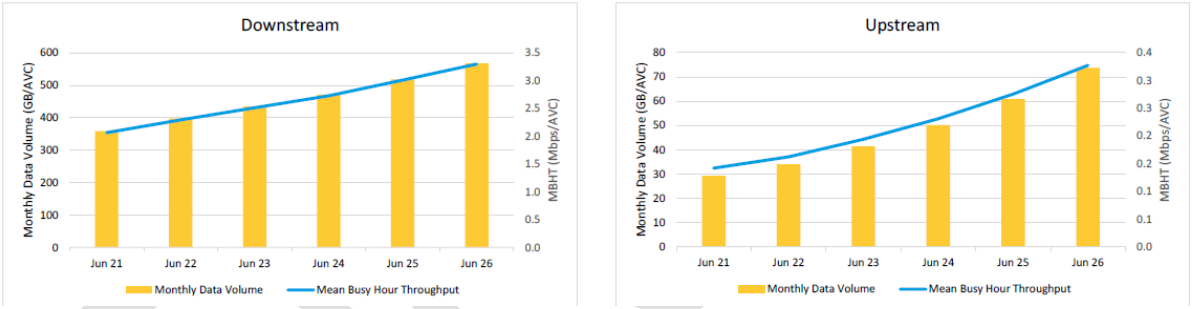

Figure 3: NBN Co's short-term usage and MBHT forecast

NBN Co has also highlighted its' "***good track record of producing stable and reliable network utilization forecasts***"[11] over the last 10 years by underscoring the relatively high level of accuracy of its' forecast demand versus Actual usage for Monthly Data Volume, however, calls out the unpredictability of end-user behaviour and potential for new applications that could easily affect demand e.g., reduced Active AVC vs 3-year forecast for 2021 and 2022 due to COVID.

[10] SAU Supporting Submission Part F.
[11] 002 nbn ACCC Briefing - IOP23 - Network Roadmap - CONFIDENTIAL

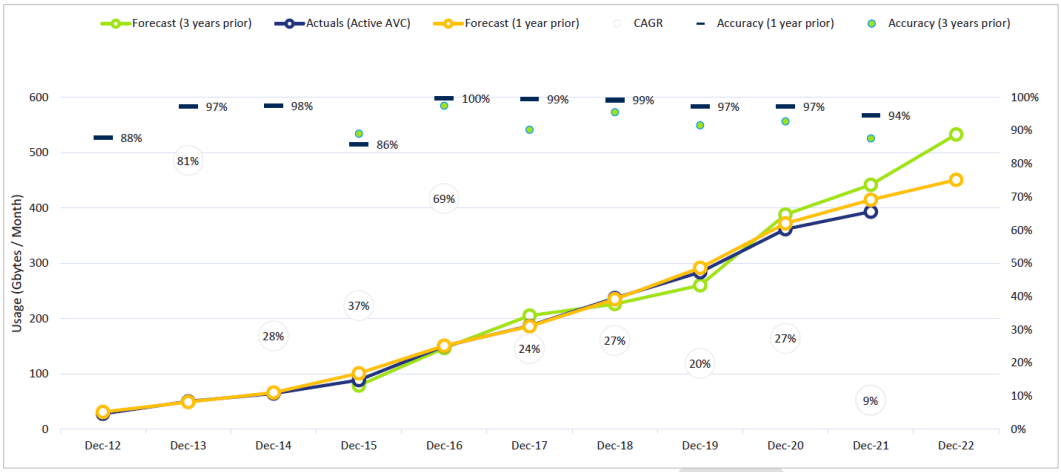

Figure 4: NBN Co's historical forecast vs. actual usage[12]

Given the variability of end-user behaviour and application demand, it is reasonable for NBN Co to incorporate and allow for an appropriate level of contention when designing and dimensioning the network i.e., allowance for intermittent contention during peak network usage. However, the duration and impact of this contention (congestion) on end-users should be minimised by appropriate planning and capacity management.

3.2 Findings & Recommendations

- While there is alignment of NBN Co's average forecast volume demand and average actual volume usage, it does not demonstrate the underlying performance of end-user services that may have been constrained or congested by the NBN Co network and consequently result in the average Volume usage alignment i.e., capped network capability may limit or inhibit end-user behaviour and use of the services.
- NBN Co appears to have well-developed methodologies for producing its short and long-term demand forecasts. However, NBN Co does not appear to report network-based performance metrics that demonstrate NBN Co's observance to identify, monitor, report and remediate network congestion within the network that affects end-user performance.

3.2.1 Long-Term Demand Forecast & Capacity Planning

3.2.1.1 Findings

- The overall network usage demand forecast approach and methodology described is based on aggregated data usage at the highest level.
- Whilst the long-term demand forecast and capacity planning approach is defined, its linkage to major capital expenditure capacity upgrade projects such as FTTN to P upgrade and HFC network upgrade and the associated benefits that these would provide is not clear.

[12] 002 nbn ACCC Briefing - IOP23 - Network Roadmap - CONFIDENTIAL.pdf

3.2.1.2 Recommendations

- Ensure that interdependencies and corollary benefits of IOP project initiatives that provide capacity improvement through the uplift in capability are clearly defined and correlated. For example, the Fixed Wireless upgrade should highlight and track the cost reductions to provide higher speeds for end-users.
- ACCC would benefit from key metrics and measures that clearly demonstrate the underlying performance of end-user services that may have been constrained or congested by the NBN Co network for the purposes of assessing capacity-related expenditure for both assessment purposes and LTIE.
- Future assessment of capacity-related expenditure would be better carried out where NBN Co clearly and demonstrably highlighted the benefits provided by IOP capability initiatives and long-term demand forecast and capacity planning activities.

3.2.2 Business as usual capacity management

3.2.2.1 Findings

- For day-to-day capacity management of the network, the ACCC Briefings and RFI Process documentation provided a high-level overview, however, lacked detail particularly in relation to:
    - Current capacity upgrade thresholds,
    - Approach to upgrade methods and their prioritisation,
    - Target capacity threshold for various network segments across access, transit and aggregation e.g., for the transit network upgrade program, it's unclear how and when CNI rack, OLT, AAS and exchange upgrades are used, and
    - Similarly, for the HFC capacity upgrade program, it is unclear when Amplifier upgrade, DAA node upgrade are used versus a node split.
- It is noted that NBN Co is obliged to take remedial action on a shared network resource, if the 30-minute average utilisation exceeds the 90% utilisation threshold for at least three separate days within a rolling 30-day period, however, this is only on the shared network resources.
- Additionally, NBN Co provides monthly progress reporting[13] across a number of metrics. These include the average number of minutes of bandwidth congestion per week/ per service and Fixed Line Network Congestion. These indicate from the review and assessment that:
- Reported average bandwidth congestion across the NBN access network is approximately 25 minutes per week per premise – compared with 18 minutes per week in January 2022. This measure excludes Sky Muster™ satellite. The congestion is a measure of Connectivity Virtual Circuit Allocation by RSP's, which is calculated across all bandwidth purchased by all phone and internet providers across the entire network (CVC congestion) – this construct is a fundamental capacity limitation and constraint, and defines the overall network demand (including the shared components – see below). Given the progressive removal of the CVC construct, this metric is unlikely to

[13] https://www.nbnco.com.au/corporate-information/about-nbn-co/updates/dashboard-january-2023

be appropriate (recommendations relating to the metrics are described in the following section).

- There has been no Fixed Line Network Congestion[14] for the past 12 months (January 2021 – January 2022). The estimate provides monthly average percentage of homes and businesses who experience NBN access network congestion (as per NBN Co's congestion measures for Fixed Line networks excluding NBN Fixed Wireless and Sky Muster™ satellite). The reported metrics are calculated and based on the utilisation of certain parts of the NBN Fixed Line access network that are shared by phone and internet providers.
- Access and transit network capacity thresholds are briefly outlined in IOP23 Usage & Demand Profile document[15]: [redacted]

Access Technology	Shared Link Type
FTTP/C	GPON
FTTP/C	Backhaul
FTTN	DSLAM Backhaul
FTTN	AAS backhaul
HFC	RF-Segment
HFC	Backhaul

Figure 5: Access Technology Shared Link Types[16]

3.2.2.2 Recommendations

It is recommended that key metrics be defined, measured, and reported to identify the location, level and impact of the contention and congestion within the network (shared and dedicated network resources), with particular emphasis on end-user experience.

Additionally, it is recommended that all occurrences of network congestion (including potential instances) impacting end-users are measured and reported. Such reporting should include congested network links / nodes / ports / segments as part of existing / proposed regular reporting process to ACCC. Possible detailed metrics would include:

- Location of congestion (link, node/site, segment),

[14] https://www.nbnco.com.au/corporate-information/about-nbn-co/updates/dashboard-january-2023
[15] 6. IOP23 Usage & Demand Profile - ExCo - 220223.pdf
[16] IOP23 Usage & Demand Profile - ExCo - 220223.pdf, with the table amended according to NBN Co feedback dated 26 April 2023.

- Date, time, duration of congestion,
- Network performance details during congestion such as: utilisation %, bandwidth/throughput, latency, packet/frame loss, jitter, and
- Potentially impacted AVCs.

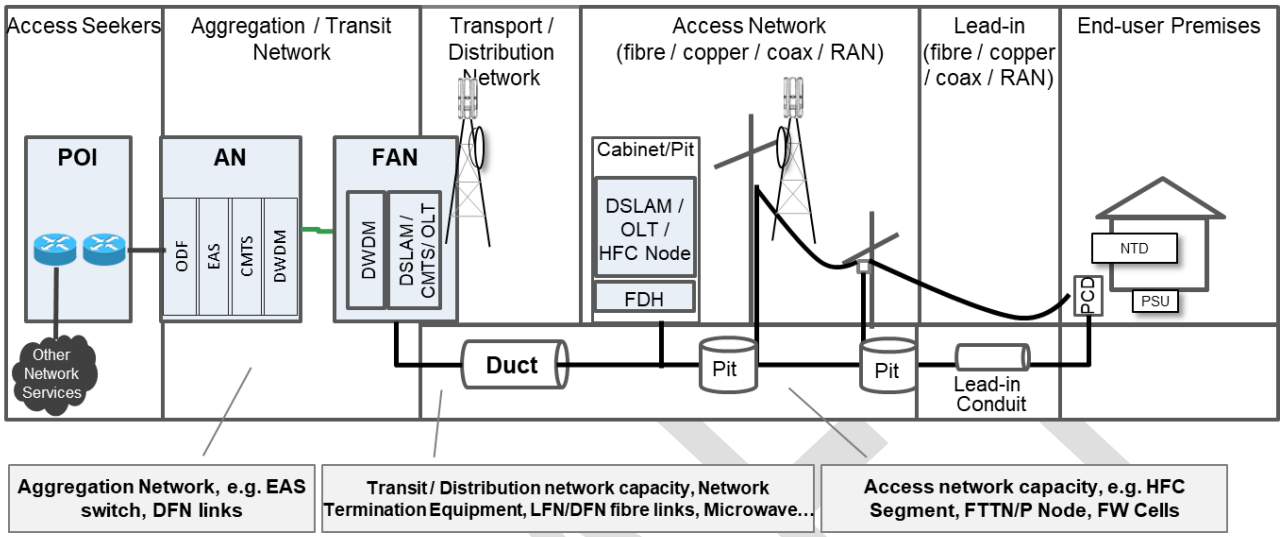

Figure 6: E2E Network – Potential Network Congestion Points

3.2.3 Speed Tier Mix (STM) Forecast

3.2.3.1 Findings

It appears that NBN Co's STM mix forecast of higher speed tier demand (100 Mbps and higher) is on the high side, compared with other industry research such as BCAR forecast:

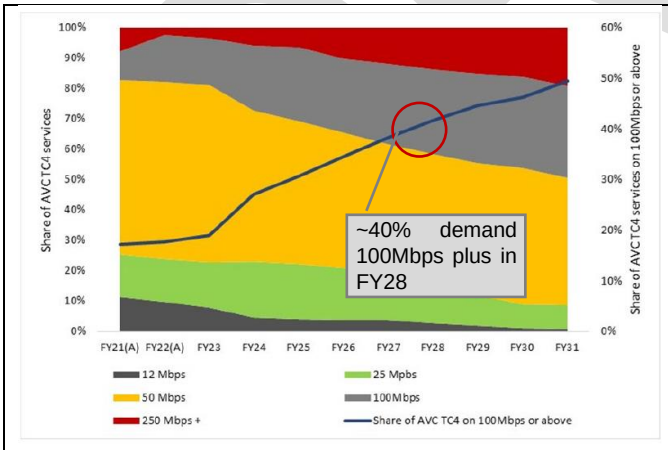

Figure 7: NBN Co STM demand forecast[17]

Households (percentile)	Bandwidth in 2018 (Mbps)	Bandwidth in 2028 (Mbps)
50%	14	29
75%	18	39
90%	22	48
95%	24	56
98%	28	66
99%	29	66
99.9%	35	78

~10% demand 50Mbps plus by 2029

Figure 8: BCAR household demand forecast[18]

[17] SAU Supporting Submission Part F.
[18] Australian Government Bureau of Communications and Arts Research – Demand for fixed line broadband in Australia 2018 2028 working paper, July 2020.

3.2.3.2 Recommendation (forecasting and planning only)

As several major capital expenditure initiatives are predicated on end-users migrating to 100Mbps or higher speed tiers (such as FTTN/C to P connect, FW network upgrade), the method and assumptions of this forecast may require further refinement. Further analysis of these upgrade expenditure items is described in section 7 and Appendix B.

4 Overview of NBN Co's FRC expenditure

Prior to the assessment of the expenditure items described by NBN Co to ACCC in the ACCC Briefings from a prudency and efficiency perspective, the overall findings relating to the proposed SAU Variation expenditure during the First Regulatory Cycle and the interaction between the IOP's forecasts and the BBM is set out in this section 4 and the following section 0.

4.1 Expenditure Overview

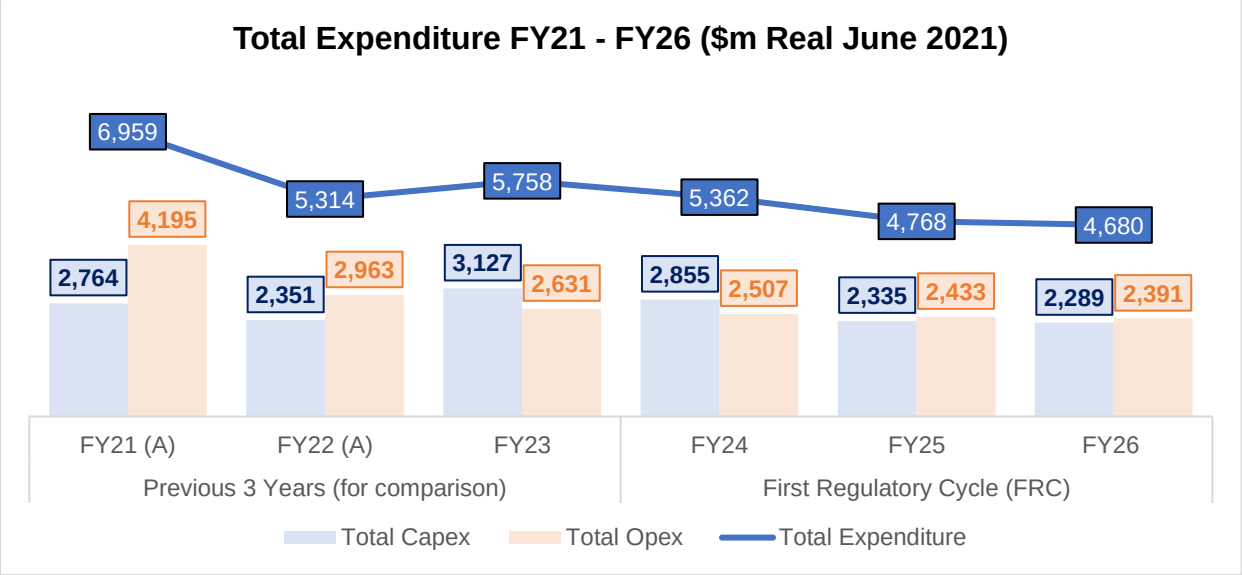

Figure 9 Total Expenditure

Total expenditure is decreasing every year during the FRC at a CAGR of 7%, and the combined expenditure throughout the FRC is 18% less than the previous three years (FY21-FY23).

Capital expenditure experiences a sharp increase in FY23, primarily driven by the FTTN to FTTP Network Upgrade across both built and on-demand connect proposed expenditure, as well as an increase in spend on the Fixed Wireless Upgrade initiative. From FY23 onwards proposed capital expenditure continues to decrease, at a CAGR of 10% over the FRC. This decrease is driven by reductions in proposed expenditure across Connect & Assure, Copper Remediation on FTTN Network, FTTN to FTTP Build, Fixed Wireless Upgrade, and IT capex.

Operating expenditure decreases significantly from FY21 to FY22, largely due to a major reduction in Subscriber Payments which then cease in FY23. Over the FRC, operating expenditure is forecast to decrease at a CAGR of 2%. This decrease is driven by material reductions in proposed expenditure across Service Assurance (excluding FTTP), FTE costs, Outsourced Services (specifically Extended Workforce), and IT and Software. The overall effect of the reductions is tempered, however, by a 1% CAGR increase in Infrastructure Payments over the FRC, which at 37% of spend comprises the largest operating expenditure item.

Cost Type	Category	Total 3-year Value ($m)		Variance between FY21-FY23 & FY24-FY26	Category Proportions (%)		Expenditure FY21-FY26 ($m)							Compound Annual Growth Rate (%)	
		FY21-FY23	FY24-FY26		FY21-FY23	FY24-FY26	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26	FY21-FY26	FY21-FY23	FY24-FY26
Capex	Expansion	1,191	607	-49.0%	14.5%	8.1%	660	286	245	215	191	201	-21%	-39%	-3%
	Take-up & Usage	2,316	1,353	-41.6%	28.1%	18.1%	1,041	669	606	503	426	424	-16%	-24%	-8%
	Maintaining	301	180	-40.2%	3.7%	2.4%	95	80	126	92	55	33	-19%	15%	-40%
	Capability	3,180	4,360	37.1%	38.6%	58.3%	501	981	1,698	1,643	1,364	1,353	22%	84%	-9%
	Other Capex	1,252	978	-21.9%	15.2%	13.1%	468	334	450	402	300	276	-10%	-2%	-17%
	Total	**8,242**	**7,479**	**-9.3%**	**100%**	**100%**	**2,764**	**2,351**	**3,127**	**2,855**	**2,335**	**2,289**	**-4%**	**6%**	**-10%**
Opex	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Direct Operating Costs	2,131	1,717	-19.4%	21.8%	23.4%	731	751	649	595	562	560	-5%	-6%	-3%
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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	Service Level Rebates	55	23	-58.2%	0.6%	0.3%	20	24	11	9	7	7	-19%	-26%	-12%
	Subscriber Payments	1,397	-	-100.0%	14.3%	0.0%	1,214	168	15	-	-	-	-100%	-89%	-
	Total	**9,789**	**7,331**	**-25.1%**	**100%**	**100%**	**4,195**	**2,963**	**2,631**	**2,507**	**2,433**	**2,391**	**-11%**	**-21%**	**-2%**
Total Expenditure		**18,031**	**14,810**	**-17.9%**	**-**	**-**	**6,959**	**5,314**	**5,758**	**5,362**	**4,768**	**4,680**	**-8%**	**-9%**	**-7%**

Table 2 Total Expenditure Overview

4.2 Capex Proposed Expenditure

Capital expenditure is decreasing during the First Regulatory Cycle at a CAGR of 10%. Reductions in category-level proposed expenditure are present across all categories, however, key material reduction items over the FRC can be seen within Capability and Other Capex. These items include FTTN-FTTP Build, which tapers off over the FRC (whilst the related connection capex increases), the Fixed Wireless Upgrade, which reduces at a CAGR of 29%, and IT (Systems Engineering) which reduces at a CAGR of 21%.

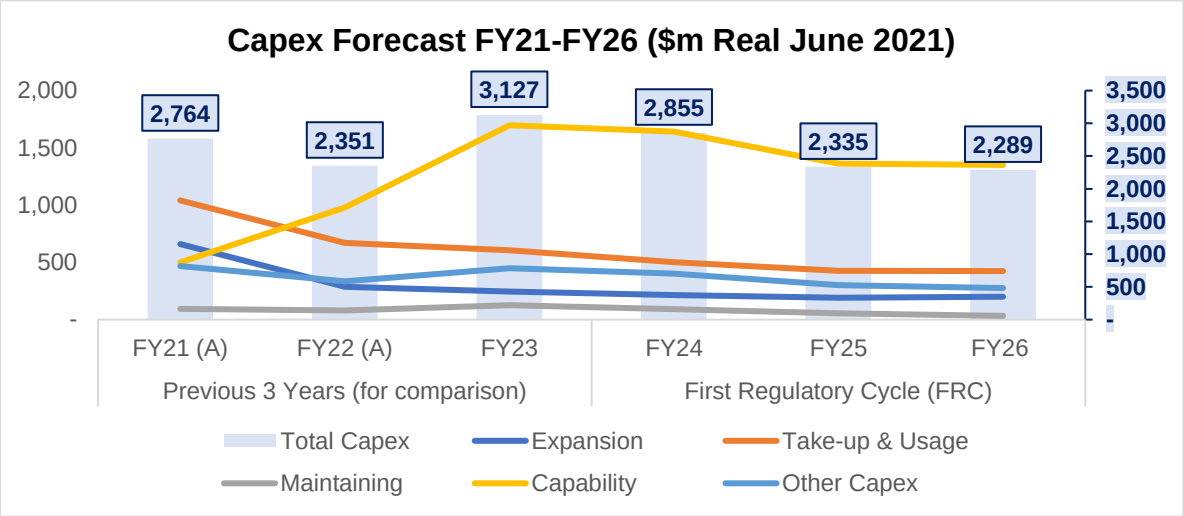


Figure 10 Capex FY21-FY26

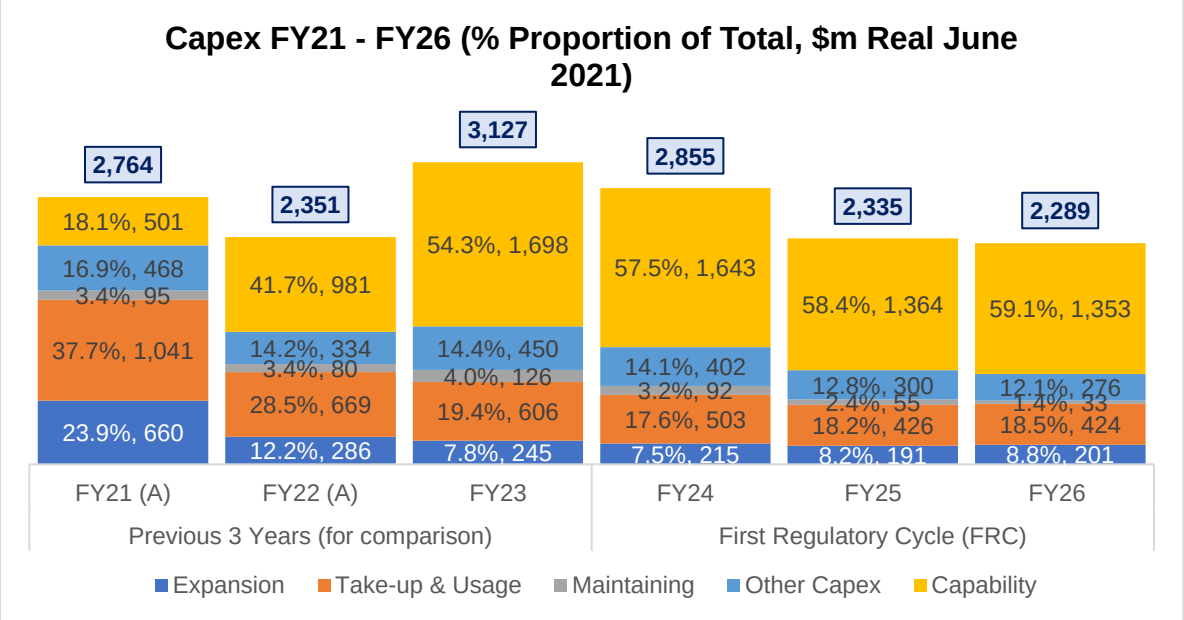


Figure 11 Capex FY21-FY26

Comparing the FRC proposed expenditure against the previous period (FY21-FY23), significant reductions are present across all categories except for Capability, which has 37% more capital proposed over the FRC due to the upgrade of ~3.5m premises to FTTP which includes build

and connection proposed expenditure, $2.3b and $833m over the period, respectively. ‘Other’ proposed expenditure increases within Capability include the Fixed Wireless Upgrade and Regional Co-Investment.

Despite the overall reduction in spend between the two 3-year periods evident, some items within the categories increase materially. HFC Capacity proposed expenditure is 81% higher than FY21-FY23, and Commercial Works are 39% higher.

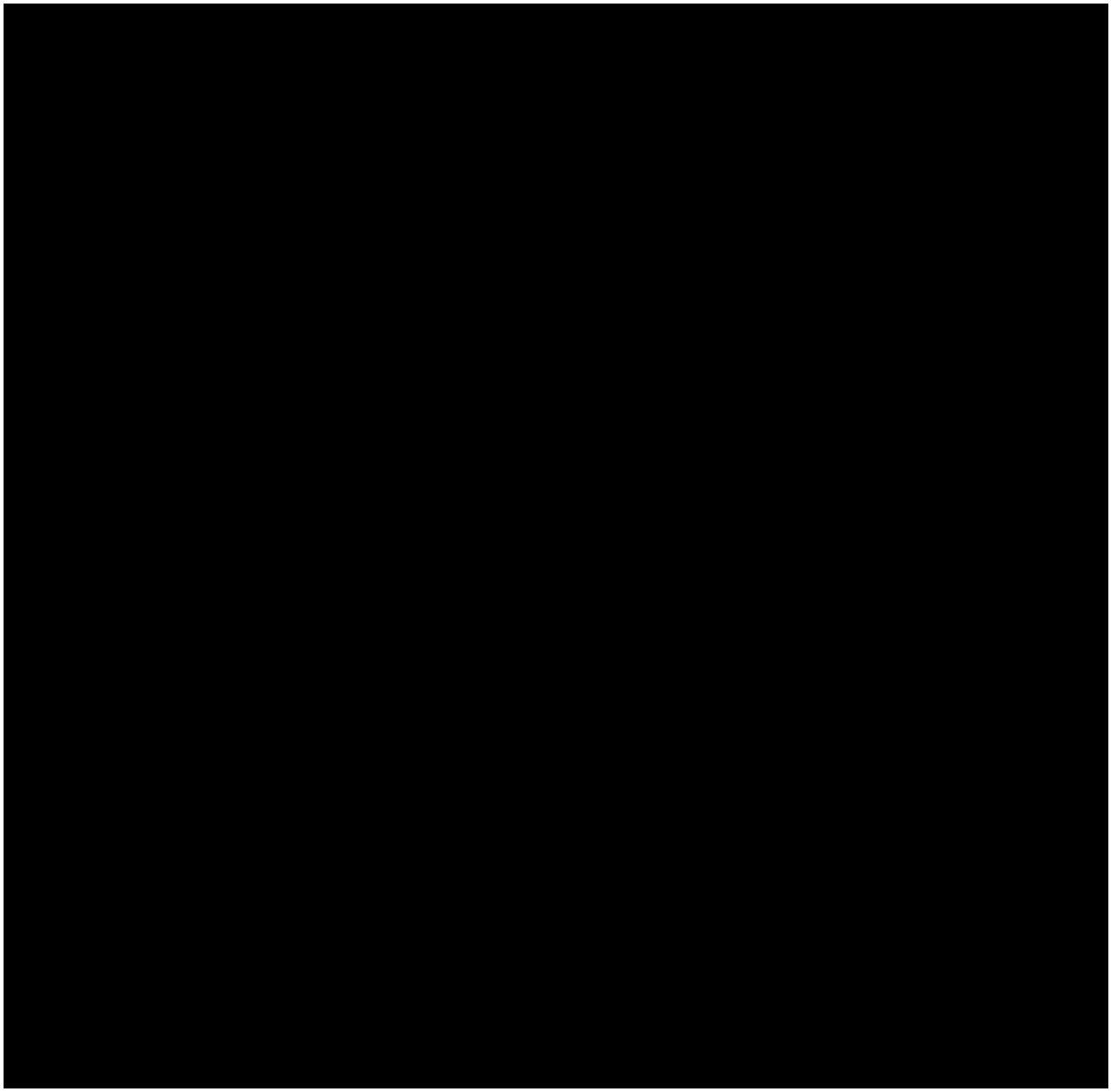
4.3 Opex Proposed Expenditure

Operating expenditure is decreasing at a rate of 2% CAGR over the FRC. This is driven by decreases in proposed expenditure across all opex categories except Infrastructure Payments, which is increasing at a CAGR of 1% over the FRC.

Opex Category	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Infrastructure Payments	794	851				
Direct Operating Costs	731	751	649	595	562	560
Labour	831	665				
Other Opex	606	503				
Service Level Rebates	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

Table 3 Opex FY21-FY25 ($m Real June 2021)



Opex Category	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Infrastructure Payments	18.9%	28.7%				
Direct Operating Costs	17.4%	25.3%	24.7%	23.7%	23.1%	23.4%
Labour	19.8%	22.4%				

Other Opex	14.4%	17.0%	[redacted]	[redacted]	[redacted]	[redacted]
Service Level Rebates	0.5%	0.8%	0.4%	0.4%	0.3%	0.3%
Subscriber Payments	28.9%	5.7%	0.6%	0.0%	0.0%	0.0%

Table 4 Opex FY21-FY26 Proportions (% Real June 2021)

Comparing the FRC proposed expenditure against the previous regulatory period of FY21-23, the material changes are:

- a 100% reduction in Subscriber Payments, due to the completion of disconnection from legacy Telstra and Optus networks,
- a 19% reduction in direct operating costs, driven by improved efficiency as well as FTTN to FTTP migration, and

[redacted]

Despite the overall reduction in spend between the two 3-year periods evident, some items within the categories increase materially. Network Operating Costs are 4% higher in the FRC than the previous 3 years. This is driven by increases across Rack Power, Pole Rental, Spectrum / Apparatus Licences, Satellite Outsourced Services (139%), Fixed Wireless Site Rental, and Site and Network Access. Other opex items that are higher in the FRC include the TUSMA Levy, Insurance (62%), and Vendor Support Contract Costs.

4.4 Flow-On Effects of Capex Initiatives

A number of NBN Co's capex initiatives reduce expenditure items across capex and opex. The table below summarises this across the capex item, its description, as well as the affected expenditure item and description of the effect.

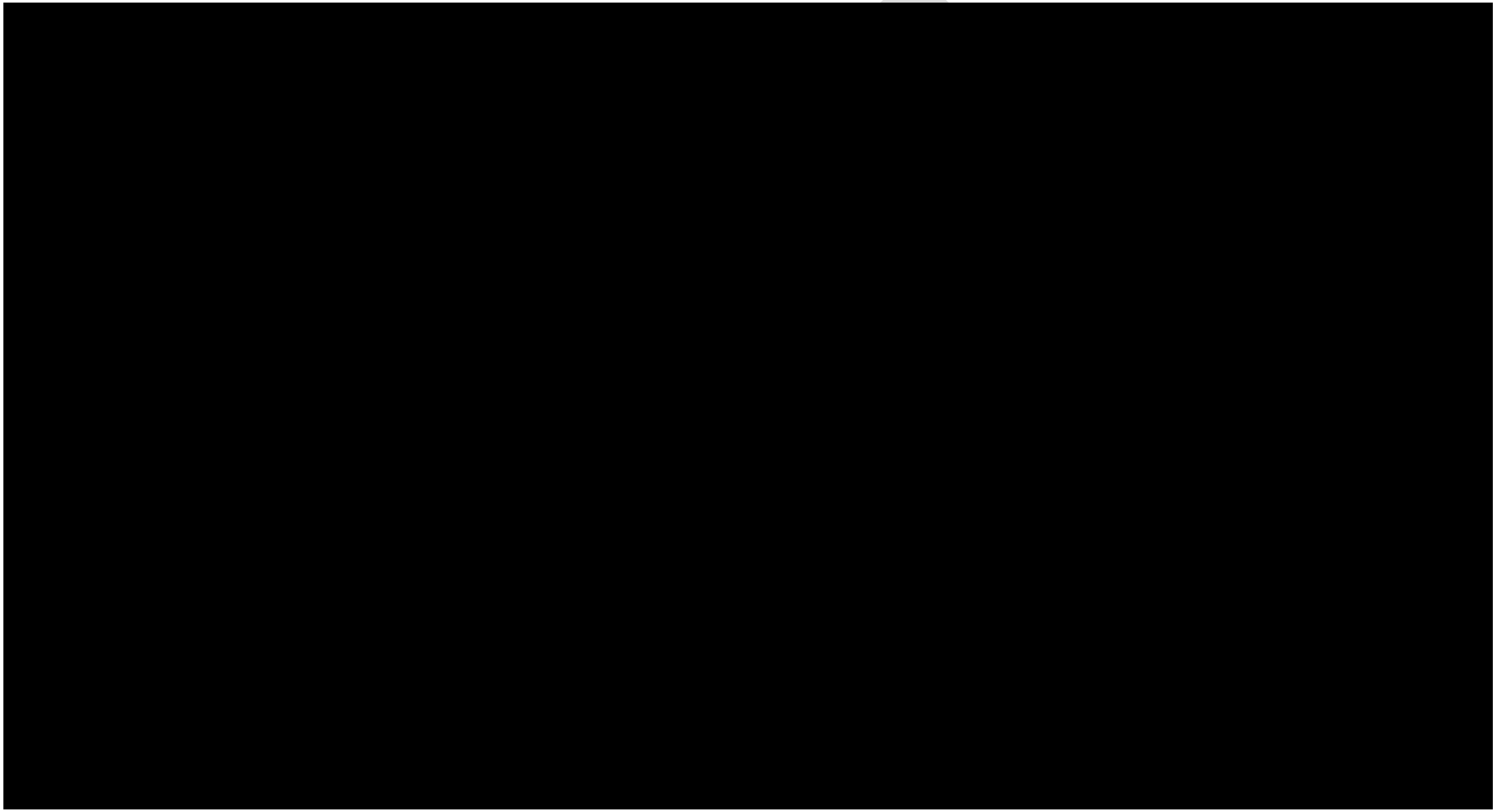
Capex Item	Description	Impacted Item	Consequence Description
Expansion – Initial Build	The completion of the initial build (i.e., going from 'build' to 'run') carries inherent flow-on effects	**Opex - Labour**	Reduction of approx. [redacted] through the reduction in capex investment and build activity required during the build phase
		Capex – Connect & Assure	Reduction of new build related connection truck rolls
		Opex - Subscriber Payments	No forecast expenditure for disconnections from legacy networks under the Telstra Arrangements
Capability – Network Upgrade Initiative - FTTN to FTTP Upgrade	The build and subsequent on-demand connection of premises within the upgraded FTTN to FTTP footprint will result in lower costs across multiple expenditure items	**Opex - Direct Operating Costs – Assurance, Restoration and Maintenance: FTTN Service Assurance**	Fewer active FTTN services due to upgrades will result in less FTTN-related Service Assurance opex
		Opex - Direct Operating Costs – Assurance, Restoration and Maintenance: FTTN Network Assurance	Fewer active FTTN services due to upgrades will result in less FTTN-related Network Assurance opex
		Opex - Direct Operating Costs – Assurance, Restoration and Maintenance: FTTN Network Maintenance	Fewer active FTTN services due to upgrades will result in less FTTN-related Network Maintenance opex
		Maintaining Capex: Copper Remediation on FTTN Network	Copper remediation will not be required on FTTN services that are upgraded to FTTP
Other Capex – IT (Systems Engineering) - Enterprise Simplicity	Decommissioning of 166 applications across NBN Co's IT function	**Opex - Labour**	Reduction of approx. [redacted] is expected through the Enterprise Simplicity Programme
		Capex – Other Capex – IT (Systems Engineering)	Reduced IT & Systems capex through simplified applications

		Opex - Other Operating Costs – IT and Software Costs	BAU IT & software costs reduction through simplified applications

Table 5 Flow-On Effects of Capex Initiatives

4.5 Differences between Proposed Expenditure and Associated Volumes and Unit Costs

As part of the RFI Process unit costs and volumes were provided for a selection of the initiatives and cost items. Plotted below are the proposed expenditures as presented in NBN Co's SAU Supporting Submission Part F, the proposed expenditures as calculated from the RFI response (volumes multiplied against unit costs), and the difference expressed as a total and as a percentage.



When further clarification was sought, NBN Co advised that:

> ***"The Rate and Volume in most cases will not fully account for the costs. This is because we have provided the Key Cost Drivers/KPIs to manage performance and expenditure activity but in almost all cases there will be other costs that are not tracked at a rate and volume level (e.g., overheads, on-costs, one-off expenses, minor spend). Additionally, for Capex the build costs can occur over a series of months, or the rate might be an estimate at completion for the entire footprint cost. Therefore, the rate and volume in any given period will not align."***

The above RFI response notwithstanding, significant differences are noted, including three instances where the RFI-calculated total exceeds the proposed expenditure presented in NBN Co's SAU Supporting Submission Part F.

5 Reconciling the BBM to the IOP

NBN Co has based its (overall) expenditure forecasts for the First Regulatory Cycle on IOP23.

For capex, as described in the ACCC Briefings and RFI Process, whilst the IOP process is an integral and critical component of how NBN Co plans and seeks approval of its operating plan, there is no direct link to the SAU Variation proposal in terms of ongoing monitoring and reporting. Further, there is no direct correlation to the detailed processes and budgets allocated to the various initiatives and programs described by NBN Co in the ACCC Briefings and the BBM.

This is understood as the BBM has a specific function, which is to calculate annual maximum allowable revenue (ABBRR in the SAU) in order to inform pricing constructs.

The above chart illustrates the relationship between the IOP total capex and the BBM total capex. As described above, there is no direct linkage between the initiatives / expenditure items and the BBM. The chart shows the reconciliation of the total nominal capex as presented in the BBM to the real capex as presented in the IOP, as provided by NBN Co during the RFI process described in Part D of this Report and pictured below.

Capex $m's	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Capex BBM @ Nominal Table F4 of submission				**3,470**	**2,884**	**3,175**
Add: Back Grants @ Nominal				100	101	102
Less: movement in construction in progress				231	154	399
Capex BBM @ Nominal - as incurred				3,339	2,831	2,878
Building Block Model - June on June CPI %		6.14%	6.25%	3.69%	3.69%	3.69%
Index rate to convert to real June 2021 dollars	1.000	0.942	0.887	0.855	0.825	0.795
Capex BBM @ Real				**2,855**	**2,335**	**2,289**
Capex SAU Table @ Real-Table F8 of submission				**2,855**	**2,335**	**2,289**

Figure 16 Capex BBM & IOP Reconciliation RFI Response

The key differences between the numbers are the basis of the forecast development (as-commissioned vs as-incurred), Government grants, movement in construction in progress (CIP) due to the development basis, and indexation to June 2021, which is the base year of the real figures presented in the IOP:

- **As-incurred vs as-commissioned:** NBN Co's IOP capex forecast is on an as-incurred basis and has been converted to an as-commissioned basis in nominal terms for the BBM with the assumption of an average 6-month lag between when capex is incurred and when it is commissioned. This is implemented using half year capex profiles – for example, as-commissioned capex for FY23 is equal to the sum of as-incurred capex in H2 FY22 and as-incurred capex in H1 FY23.
- **Grants:** a number of NBN Co'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 presented in the IOP reflect the 'gross' amount of capex NBN Co will incur in the First Regulatory Cycle (rather than the 'net' amount after accounting for the grants). As reflected in Figure 15, in order to reconcile between the capex presented in the BBM and the capex presented in the SAU Supporting Submission Part F, the value of grants must be added on to the BBM total capex. This is because the value of grant funding is not included within the BBM or RAB, but is included ("baked in") within the initiative and expenditure item-based capex projections presented in SAU Supporting Submission Part F.
- **Construction in progress (CIP):** CIP is a mechanism whereby NBN Co can factor in commissioned construction costs that have not yet been transferred to a permanent asset account. This is important in the BBM due to the effect on ABBRR. However, as the IOP is presented on an as-incurred basis, CIP costs are not relevant and therefore must be removed in order to reconcile the BBM capex with the IOP capex. NBN Co recognises in the carrying amount of an item of property, plant and equipment the value of assets in the course of construction. For the purposes of the actual and forecast information, consistent with the BBM, construction in progress is not allocated to items of property, plant and equipment or intangible assets, and is reported as an aggregate value as at the start and end of each financial year.

- **Indexation**: numbers presented in the BBM are shown in nominal terms. The IOP uses real values in order to better explain the profile of spend over time. In order to compare the BBM values to the IOP values, BBM values must be indexed to June 2021 as per the process followed in IOP23.

The only difference between the BBM operating expenditure and the IOP operating expenditure provided is the indexation to June 2021.

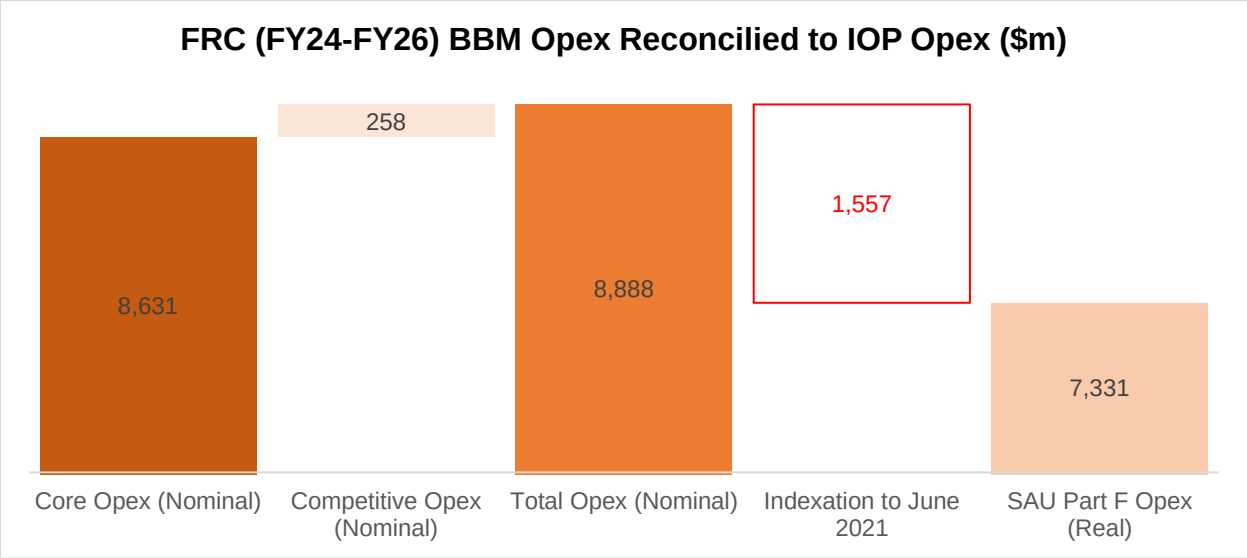


Figure 17 Opex Reconciliation[19]

As with capex, the calculations to reconcile opex from the BBM to the IOP (pictured below) were provided by NBN Co during the RFI Process described in Attachment A.

Opex $m's	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Opex BBM @Nominal - Table F4, 2G.2.1 of submission				**2,932**	**2,950**	**3,007**
Building Block Model - June on June CPI %		6.14%	6.25%	3.69%	3.69%	3.69%
Index rate to convert to real June 2021 dollars	1.000	0.942	0.887	0.855	0.825	0.795
Opex BBM @ Real				**2,507**	**2,433**	**2,391**
Opex SAU Table @ Real - Table F15 of submission				**2,507**	**2,433**	**2,391**

Figure 18 Opex BBM & IOP Reconciliation RFI Response

Ultimately, whilst the BBM is a regulatory tool that is a critical component of NBN Co's ABBRR calculation and pricing mechanisms, it is not fit-for-purpose as constructed to assess expenditure

[19] Competitive Opex calculated as the difference between Total Operating Expenditure and Core Regulated Services as provided in "Public version – Forecasts in support of SAU Variation", 16 December 2022.

forecasts from a prudency and efficiency perspective, or to conduct ongoing monitoring of the expenditure, due to the lack of detail as outlined above.

6 NBN Co's Core & Competitive Cost allocation assessment

Outside of the broader analysis of the interrelation between the IOP forecasts presented in the ACCC Briefings and the BBM presented in the SAU Variation, NBN Co's cost attribution approach for capital expenditure between Core Regulated and Competitive services is assessed in this section.

The approach described by NBN Co can be summarised as follows:

- Allocate capex types that are directly attributable to Competitive Services,
- Identify whether the remaining asset costs in an asset category are solely related to a single connection cost category (FTTx, HFC, Fixed Wireless, Satellite) or, if not, the costs are classified as either Overhead, Shared or Shared-FL (Shared Fixed Line) reflecting that the costs are spread across multiple cost categories incorporating both Core Regulated Services and Competitive Services, and
- If a cost is not attributed to a single cost category, the asset is allocated by either of premises passed, premises connected or provisioned bandwidth.

6.1 Allocation of Shared Costs

The BBM calculations are based on the Premises Passed/Connected and Provisioned Bandwidth. The percentage allocation based on these parameters provides a simple mechanism, that can provide an approximation of the use of shared infrastructure. It does not consider other service parameters that differentiate competitive services such as the SMB Enablement initiative to deliver business grade services.

6.1.1 Service Parameters

Service parameters are not considered in the BBM calculations, that relate to enhanced service support levels and agreements, enhanced network quality of service parameters for the provisioned bandwidth, and shared systems infrastructure for assurance, and IT platforms. The network data usage profile, for an enterprise, may also result in different utilization of shared resources, beyond what the provisioned bandwidth indicates. The performance characteristics can vary between the enterprise service profile and a typical residential service profile.

6.1.2 Summary and Recommendation

Without considering service and usage parameters in the BBM model, the calculation does not reflect the different service levels of Competitive Services.

As Competitive Services there is a need to monitor the appropriateness of the competitive percentage and parameters applied for the shared infrastructure between regulated core and competitive services. This is to ensure costs are allocated according to the service characteristics.

It is recommended that competitive percentage regarding shared infrastructure should also consider the materiality of additional parameters to the provisioned bandwidth in the modelling including (i) service quality, (ii) service standards (e.g., enhanced availability/reliability, customer support for fulfillment and assurance), and (iii) data usage afforded to Enterprise customers.

Some possible key cost metrics to be monitored and identified for Competitive Services that can impact the cost allocation across the shared network include:

- Labour (program/project resources, internal workforce management, operations and assurance of shared network and IT infrastructure),
- Facilities (Data centres),
- Shared Network Infrastructure costs across multiple premises (e.g., transit, switches/routers),
- Network and Service Assurance (e.g., network/service incidents),
- Data Centre Footprint & Costs,
- Network/Service Incidents Type and Resolution Time (per product),
- Network Performance metrics (per product) including network usage,
- Service Quality metrics (per product),
- Technology Finance Costs metrics (e.g., GL codes, number of assets (and type)) (per product),
- Network Capacity Modelling and Forecasts (per product)[20], and
- Assets/inventory (including configuration database, network and service model and network/service inventory).[21]

6.2 Directly Allocated Competitive Costs

The majority of Competitive Costs presented in the BBM are allocated directly [redacted] The below chart illustrates the known and assumed IOP components that comprise Competitive Capex.

[redacted]

[20] Lifecycle capacity upgrades of shared network infrastructure was not considered in the business case beyond the initial years to cater for increased Enterprise Ethernet data usage.
[21] It is noted that the Enterprise Simplicity program is expected to improve this business capability, and NBN Co's desire to be adopt a data-driven operating model.

The chart depicts how Competitive Capex is built up within the BBM, the indexation required to convert the BBM value from nominal to real terms, and the items that comprise the IOP real Competitive Capex.

7 Expenditure assessment

The initiatives and programs described by NBN Co in the ACCC Briefings have been described in Part B of this Report and are assessed based on the information provided to ACCC by NBN Co in the ACCC Briefings and the RFI Process where relevant.

The assessment of each expenditure item is based on the initiative described and forecast by NBN Co for the First Regulatory Cycle.

The order of the assessment below follows the order of description given by NBN Co in both the SAU Supporting Submission Part F and the ACCC Briefings which mapped across to the categories of expenditure described.

A fuller description of the assessment for each of the expenditure items assessed is provided in Appendix B to this Part C.

The prudency and efficiency of each expenditure item described is assessed against a rating of "Yes", "Qualified Yes", "No", "Qualified No" or "Inconclusive" as described below:

- **Yes:** the expenditure item meets with the definition of "prudency" and/or "efficiency" using the parameters described in section 2.2, and based on an analysis of the available information,
- **Qualified Yes:** the expenditure item possibly meets with the definition of "prudency" and/or "efficiency" using the parameters described in section 2.2, based on an analysis of available information, with certain limitations. Such limitations include but are not always limited to a lack of detailed information on the breakdown of the relevant expenditure item to qualify the assessment further (an individual description of limitations is given against each expenditure item in this section 7 and Appendix B),
- **No:** the expenditure item does not meet with the definition of "prudency" and/or "efficiency" using the parameters described in section 2.2, and based on an analysis of the available information,
- **Qualified No:** the expenditure item possibly does not meet with the definition of "prudency" and/or "efficiency" using the parameters described in section 2.2, based on an analysis of available information, with certain limitations. Such limitations include but are not always limited to a lack of detailed information on the breakdown of the relevant expenditure item to qualify the assessment further (an individual description of limitations is given against each expenditure item in this section 7 and Appendix B), and
- **Inconclusive:** an assessment of "Yes" or "No" whether "Qualified" or not cannot be made due to a lack of available information which would support a fuller assessment. An individual description of the information requested, given and missing is provided against each expenditure item in this section 7, Appendix B and the RFI Process.

Item	Initiative or BAU Activity	Forecast FRC Expenditure ($)	FRC Goal	FRC Volume & Unit Cost Target[22,23,24]	Deployment Plan	Prudent?	Efficient?
Capital Expenditure Assessment							
Expansion – Initial Build (Part F, App. A, 2.2)	BAU	$52m	Access and ownership transfer of relevant Telstra legacy assets Resolution of serviceability issues for held orders due to necessary civils works. NBN Co described this as subject to large variation	[redacted]	Reduced activity	**Qualified Yes**	**Qualified Yes**
Expansion – New Development (Part F, App. A, 2.2)	BAU	$555m	Bring premises in new developments to ready to connect phase	[redacted]	BAU: Ongoing activity	**Qualified Yes**	**Qualified Yes**
Take-Up & Usage – HFC Capacity ((Part F, App. A, 2.3)	Initiative	$277m	Increase HFC network Down Stream (DS) and Up Stream (US) capacity on-demand	[redacted]	DAA upgrade and outside plant modernization	**Inconclusive**	**Inconclusive**

[22] 017 ACCC RFI - nbn Response - tranche 4 - CONFIDENTIAL.xlsx
[23] 019 ACCC RFI - nbn Response - tranche 5 _question 13_ - CONFIDENTIAL.xlsx
[24] 020 ACCC RFI - Grex consolidated - nbn Response 24 March.xlsx
[25] 009 nbn ACCC Briefing - IOP23 - New Developments - CONFIDENTIAL.pdf

Item	Initiative or BAU Activity	Forecast FRC Expenditure ($)	FRC Goal	FRC Volume & Unit Cost Target[22,23,24]	Deployment Plan	Prudent?	Efficient?
				[redacted]	plan not provided		
Take-Up & Usage – Transit Capacity (Part F, App. A, 2.3)	BAU	$275m	Increase transit network capacity on-demand	[redacted]	BAU: Ongoing activity	**Inconclusive**	**Inconclusive**
Take-Up & Usage – FTTx Capacity (Part F, App. A, 2.3)	BAU	$34m	Increase FTTx network capacity on-demand	[redacted]	BAU: Ongoing activity	**Qualified Yes**	**Inconclusive**

Item	Initiative or BAU Activity	Forecast FRC Expenditure ($)	FRC Goal	FRC Volume & Unit Cost Target[22,23,24]	Deployment Plan	Prudent?	Efficient?
				[redacted]			
Take-Up & Usage – Truck Rolls (Connect) (Part F, App. A, 2.3)	BAU	$421m	Customer Connect (first time), achieve 67% saving compared with FY21-23	[redacted]	BAU: Ongoing activity	**Qualified Yes**	**Qualified Yes**

Item	Initiative or BAU Activity	Forecast FRC Expenditure ($)	FRC Goal	FRC Volume & Unit Cost Target[22,23,24]	Deployment Plan	Prudent?	Efficient?
Take-Up & Usage – Truck Rolls (Reconnect) (Part F, App. A, 2.3)	BAU	$112m	Customer reconnect, achieve 16% saving compared with FY21-23	[redacted]	BAU: Ongoing activity	**Qualified Yes**	**Qualified Yes**
Take-Up & Usage – Truck Rolls (CSA) (Part F, App. A, 2.3)	BAU	$234m	Customer service assurance (<30 days from connect), achieve 38% saving compared with FY21-23	[redacted]	BAU: Ongoing activity	**Qualified Yes**	**Qualified Yes**
Maintaining – Copper Remediation (Part F, App. A, 2.4)	BAU	$148m	Maintain copper network quality, no clear goals defined	[redacted]	BAU: Ongoing activity	**Qualified Yes**	**Qualified Yes**
Maintaining - Pole Replacement (Part F, App. A, 2.4)	BAU	$3m	Replacement of NBN owned poles for aerial network	[redacted]	BAU: Ongoing activity	**Yes**	**Yes**

Item	Initiative or BAU Activity	Forecast FRC Expenditure ($)	FRC Goal	FRC Volume & Unit Cost Target[22,23,24]	Deployment Plan	Prudent?	Efficient?
Maintaining – LTSS (Part F, App. A, 2.4)	BAU	$28m	Minor upgrades and minor lifecycle replacements for LTSS	[redacted]	BAU: Ongoing activity	**Yes**	**Yes**
Capability – FTTN to FTTP Upgrade (Part F, App. A, 2.5)	Initiative	$2,295m	Enable 3.5m FTTN premises and 1.5m FTTC premises the ability to access FTTP services	First 2m premise passed by Dec 2023 Next 1.5m premise passed by Dec 2025 [redacted]	Finish build by FY26	**Qualified No**	**Qualified Yes**
Capability – N/C to P Connect (Part F, App. A, 2.5)	Initiative	$950m	Migrate FTTN and FTTC end-users to higher speed tier FTTP services on-demand	[redacted]	On-Demand	**Qualified No**	**Qualified Yes**
Capability - FW Upgrade (Part F, App. A, 2.5)	Initiative	$747m	Achieve 50Mbps TWBPS across all sites All FW premises 100/20 capable, 85% premises 250/20 capable	[redacted]	Complete all sites upgrade by Dec 2024 Site upgrade post Dec-2024 to maintain	**Inconclusive**	**Inconclusive**

Item	Initiative or BAU Activity	Forecast FRC Expenditure ($)	FRC Goal	FRC Volume & Unit Cost Target[22,23,24]	Deployment Plan	Prudent?	Efficient?
			Migrate 120k satellite end users to FW network		committed speeds		
Capability - SMB Enablement (Part F, App. A, 2.5)	Initiative + BAU	[redacted]	Demand is planned to increase significantly in FY24-FY26 for nbn Enterprise Ethernet services	[redacted]	This is an ongoing BAU activity. Initial project activities are small and mostly planned for FY21-23	**Not Applicable**	**Not Applicable**
Capability - Regional Co-Investment (Part F, App. A, 2.5)	Initiative	$72m	Contracted upgrade programs. Government co-investment of $300m	[redacted]	Co-funding programs until 2033	**Qualified Yes**	**Qualified Yes**
Capability – Other (Part F, App. A, 2.5)	BAU	[redacted]	Tech choice program (funded up-front) and Business Satellite Service enhancements	[redacted]	BAU: Ongoing activity (Tech Choice)	**Qualified Yes**	**Qualified Yes**
Other - IT (Systems Engineering) (Part F, App. A, 2.6)	BAU and Initiative (e.g., ES25)	capex: $617m among which ES25 accounts for $43m (7% of Systems Engineering)	• Optimisation, rationalisation & modernisation of legacy systems • 23% decrease in IT & Software opex (~$130m savings due to ES25, from $566m in FY21-	[redacted]	BAU: Ongoing activity Enterprise Simplicity program is initiative planned to complete in FY25. SEO Roadmap includes Horizon 2 and	**Qualified Yes**:	**Qualified Yes**

[26] "[CIC] NBN Co – SAU supporting submission – Efficiency of NBN's expenditure and demand forecasts – 16 December 2022 ("SAU Supporting Submission Part F"), Section A.2.5 Capability, Page 49-50"

Item	Initiative or BAU Activity	Forecast FRC Expenditure ($)	FRC Goal	FRC Volume & Unit Cost Target[22,23,24]	Deployment Plan	Prudent?	Efficient?
			23 to $436m in FY24-26)		3 extending to FY31+		
Other - Other Network (Part F, App. A, 2.6)	BAU	$209m	BAU network engineering & security, and operations activities	[redacted]	BAU: Ongoing activity	**Qualified Yes**	**Qualified Yes**
Other – Facilities (Part F, App. A, 2.6)	BAU	$50m	Capitalised SME costs for initiatives	[redacted]	BAU: Ongoing activity	**Yes**	**Yes**
Other - Commercial Works (Part F, App. A, 2.6)	BAU	$103m	Cost recovery (construction) due to request of third parties such as property owners, government	[redacted]	BAU: Ongoing activity	**Yes**	**Yes**
Operational Expenditure Assessment							
Infrastructure Payment (Part F, App. A, 3.2)	BAU	[redacted]	Use of Telstra infrastructure such as ducts, exchanges, and fibre	[redacted]	BAU: Ongoing activity	**Yes**	**Yes**

Item	Initiative or BAU Activity	Forecast FRC Expenditure ($)	FRC Goal	FRC Volume & Unit Cost Target[22,23,24]	Deployment Plan	Prudent?	Efficient?
Direct operating costs – Network Opex (Part F, App. A, 3.3)	BAU	$682m	Opex required to physically operate and maintain the NBN network	The following data has been provided • Rack power: usage and rate • Network power: volume and unit cost • Pole rental: volume and yearly rental • Apparatus license: volume and unit cost • FW site: site volume and rental	BAU: Ongoing activity	**Qualified Yes**	**Qualified Yes**
Direct operating costs - Assurance (Part F, App. A, 3.3)	BAU	$760m	Service assurance, network assurance and network maintenance	Service assurance: truck roll volume and unit cost by technology Network assurance and network maintenance expenditure ***Assessment note:*** *Unit cost decreases are based on NBN Co's referenced weather pattern forecast and assumed efficiency improvements which have not been received and reviewed for this Report.*	BAU: Ongoing activity	**Qualified Yes**	**Inconclusive**
Other Network Costs (Part F, App. A, 3.3)	BAU	$278m	Freight distribution & supply, vendor support contract and others such as fleet vehicle and security	Expenditure breakdown only	BAU: Ongoing activity	**Yes**	**Yes**

Item	Initiative or BAU Activity	Forecast FRC Expenditure ($)	FRC Goal	FRC Volume & Unit Cost Target[22,23,24]	Deployment Plan	Prudent?	Efficient?
Labour Costs (Part F, App. A, 3.4)	BAU Initiatives Enterprise	[redacted]	[redacted]	[redacted]	Progressively to FY26	**Qualified Yes**	**Qualified Yes**
Other Operating Costs (Part F, App. A, 3.5)	BAU	[redacted]	Outsourced Services, Advisory, IT & Software Costs, Marketing, Facilities, TUSMA Levy, Insurance, Other expenses	Expenditure breakdown of outsourced services, IT & software breakdown, internal costs are provided	BAU: Ongoing activity	**Qualified Yes**	**Qualified Yes**
Service Level Rebate (Part F, App. A, 3.6)	BAU	$23m	Service Level Objectives (failed to meet)	Expenditure breakdown for the following rebates provided: • New service never worked.	BAU: Ongoing activity	**Qualified Yes**	**Qualified Yes**

Item	Initiative or BAU Activity	Forecast FRC Expenditure ($)	FRC Goal	FRC Volume & Unit Cost Target[22,23,24]	Deployment Plan	Prudent?	Efficient?
				• Daily connection rebate • Daily service fault rectification rebate • Daily missed appointment rebate – connection • Daily missed appointment rebate – service fault			
Subscriber Payments (Part F, App. A, 3.7)	BAU	$0m	Disconnection of legacy networks (Initial build)	Zero forecast expenditure	BAU: Ongoing activity	**Not Applicable**	**Not Applicable**

Glossary

Selected terms used in this Report are set out and described below. For the most part these terms are sourced from the documentation provided as listed in Attachment A to this Report together with the SAU Variation itself. Where there is any inconsistency between a term below and the SAU Variation, the term used in the SAU Variation will apply.

Term	Description
ABBRR	Annual Building Block Revenue Requirement
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
AER	Australian Energy Regulator
AVC	Access Virtual Circuit
BAU	Business As Usual
BBM	Building block model
BSS	Business Satellite Services
CAGR	Compound annual growth rate
Capex	Capital expenditure
CMTS	Cable Modem Termination System
CPE	Customer Premises Equipment
CPI	Consumer Price Index
CVC	Connectivity Virtual Circuit
DAA	Distributed Access Architecture
DFN	Distribution Fibre Network
DOCSIS	Data Over Cable Service Interface Specifications
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
ES25	Enterprise Simplicity 2025
FRC	First Regulatory Cycle
FTE	Full Time Equivalent
FTTB	Fibre-to-the-Building
FTTC	Fibre-to-the-Curb
FTTN	Fibre-to-the-Node
FTTP	Fibre-to-the-Premises
FTTx	Fibre-to-the-Building, Fibre-to-the-Curb, Fibre-to-the-Node, and Fibre-to-the-Premises
FW	Fixed Wireless
FY	Financial Year
GBE	Government Business Enterprise
Gbps	Gigabits per second
HFC	Hybrid Fibre Coaxial
ICRA	Initial Cost Recovery Account
IOP	Integrated Operating Plan
LFN	Local Fibre Network
LTIE	Long-term interests of end-users
LTSS	Long Term Satellite Service
MAC-PHY	Media Access Control - Physical

Term	Description
MBHT	Mean busy hour throughput
Mbps	Megabits per second
MTM	Multi-technology mix
NBN	National Broadband Network
NBN Co	National Broadband Network Company Pty Ltd
Opex	Operating expenditure
RAB	Regulatory Asset Base
RCIF	Regional Co-investment Fund
RFI	Request for Information
RSP	Retail Service Provider
RTC	Ready-to-connect
SAED	Site Acquisition, Environment and Design
SAU	Special Access Undertaking
SIP	Statutory Infrastructure Provider
SMB	Small and Medium-sized Businesses
SOE	Statement of Expectations
STM	Speed Tier Mix
TC	Traffic Class
TC-4	Traffic Class 4
TFR	Total Fixed Remuneration
TOW	Ticket of Work
TSA	Temporary Staff Arrangement
TUSMA	Telecommunications Universal Service Management Agency
WAPC	Weighted Average Price Control
WBA	Wholesale Broadband Agreement
WNTD	Wireless Network Termination Device

Appendix A: Further context – expenditure objectives, expenditure factors and themes

As summarised in Part B of this Report, NBN Co has provided a description of its expenditure processes and proposed approach to the First Regulatory Cycle and beyond through various documents, including the SAU Variation and its supporting submissions.

Further to this process, NBN Co has specified in the SAU Variation[27] how forecasts of expenditure (capital and operating) must reasonably reflect the prudent and efficient expenditure that an operator in NBN Co's position would incur in achieving the following objectives:

i. meeting the expected demand for products and services,

ii. complying with all Regulatory Requirements,

iii. implementing a project or program which is the subject of a Government Policy Project Notice, 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 which are to apply in the relevant Regulatory Cycle.

Together, these "Expenditure Objectives"[28] are given further context by NBN Co in its SAU Supporting Submission Part F, including in relation to government policy[29], demand forecasting methodology, product and network roadmaps, risk and governance[30].

Additionally, the SAU Variation specifies the following Expenditure Factors[31] in forecasting the prudent and efficient expenditure that an operator in NBN Co's position would incur in achieving the Expenditure Objectives:

i. actual and expected Relevant Expenditure in previous Regulatory Cycles, and historical trends in Relevant Expenditure,

ii. expected end user willingness to pay for NBN Co's products and services, including as to connections, speed requirements, data volumes, quality and reliability,

iii. the extent to which Relevant Expenditure includes expenditure to address the concerns of Access Seekers and Consumer Advocacy Groups as identified by NBN Co in the course of its engagement with such persons,

iv. current and reasonably anticipated future market conditions, including the extent to which NBN Co must adjust product and service quality to meet competition,

[27] SAU Variation, Schedule 2G.2.5.
[28] CONFIDENTIAL] "nbn Special Access Undertaking Variation 2022 – Supporting submission, Part F: Efficiency of nbn's Expenditure and Demand Forecasts", November 2022, Chapter 20.4, Expenditure Objectives, Page 12-13
[29] NBN Co describes the Statement of Expectations and more broadly government policy. For the purposes of this Report the latest Statement of Expectations has been reviewed. It is also noted and acknowledged that NBN Co is subject to external governance frameworks including but not limited to the Commonwealth GBE – Governance and Oversight Guidelines and the Public Governance, Performance and Accountability Act 2013 (Cth) (PGPA Act) and related legislation and guidance materials ("PGPA Requirements").
[30] SAU Supporting Submission Part F, A.1.4, pages 32 – 37.
[31] SAU Variation, Schedule 2G.2.5.

v. NBN Co's procurement and governance framework, and whether NBN Co's asset management and planning framework reflects generally accepted industry standards and practice,

vi. NBN Co's ability to finance Relevant Expenditure,

vii. the substitution possibilities between Operating Expenditure and Capital Expenditure, and

viii. any other relevant matters.

And finally, NBN Co has described a further set of expenditure themes as defined through its IOP[32]. These themes are described by NBN Co as building on NBN Co's purpose, vision, strategic objectives and needs to drive the expenditure plans, and recognise and reflect the operating environment and regulatory requirements, i.e., Statement of Expectations (SOE) and regulatory framework. The most recent IOP23 describes six expenditure themes which focus on the promotion of the long-term interests of end users (LTIE) include:[33]

- End user experience,
- Successful partnerships,
- Resilient and reliable network,
- Upgrading and evolving the network over time,
- Build a sustainable, efficient business, and
- Supporting regional and remote Australia.

These descriptions from NBN Co are given within the broader context of the regulatory regime which seeks to promote the LTIE (Long Term Interests of End-Users) of carriage services and services provided by means of carriage services, whereby the CCA[34] requires the ACCC to consider whether the following broad objectives are being met:

- promoting competition in markets for listed services,
- achieving any-to-any connectivity in relation to carriage services that involve communications between end-users,
- encouraging the economically efficient use of, and economically efficient investment in the infrastructure by which these services are supplied, and any other infrastructure by which these services are, or are likely to become capable of being supplied, and
- provide for the end-users' economic interests, which includes sustainably lower prices, increased quality of service and greater diversity and scope in product offerings.

Due regard has been given to the above descriptions within the regulatory framework in preparing the assessments made and described in this Report.

[32] 001 nbn ACCC Briefing – IOP23 Expenditure Overview – CONFIDENTIAL, "IOP23 Expenditure Themes",
[33] "001 nbn ACCC Briefing – IOP23 Expenditure Overview – CONFIDENTIAL", Page 6, IOP23 Expenditure Themes
[34] Competition and Consumer Act, 2010 (Cth), section 152AB(2).

Appendix B Detailed assessment description

To support the findings from the assessment summarized in the previous section, a description of the detailed assessment carried out in relation to each major expenditure item is described in this section.

CAPITAL EXPENDITURES

1. Expansion - Initial Build[35]

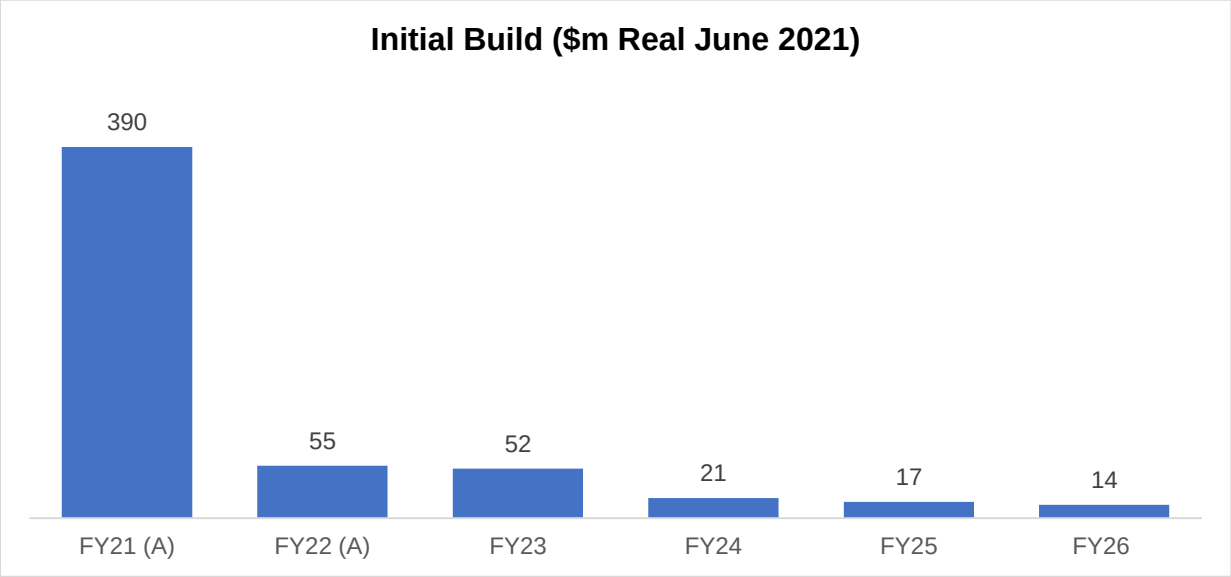


Figure 20 Initial Build ($m Real June 2021)

The NBN network is treated as built and fully operational. However, $52m during the FRC is forecast in capital expenditure under "Expansion" in the SAU Variation. This relates to two areas:

- Expenditures related to the Telstra Arrangements for data and support requirements concerning the access and ownership transfer of relevant Telstra legacy assets, such as lead-in conduits. No volume or unit cost metrics have been provided, and
- Resolution of serviceability issues for a small remaining group of first-time connections to the NBN network that became held orders due to the necessary civil works required to facilitate connection. The average cost per premise for held order remediation is $7k with a range of $5k - $43k[36]. No volume data has been provided.

The prudency of the expenditure is assessed to be **Qualified Yes**, as:

- This represents the remaining connections from the Initial Build that required civil works, and transfer of Telstra legacy assets.

[35] SAU Supporting Submission Part F, Chapter A.2, Capital Expenditure, Page 37, 38, 40, Chapter A.2.2, Expansion Page 41
[36] 020 ACCC RFI - Grex consolidated - nbn Response 24 March.xlsx (RFI #20).

The efficiency of the expenditure is assessed to be **Qualified Yes**, as:

- The cost per premise is significantly higher than new connections, but this reflects the different nature of the connection requiring additional civil works and contracted Telstra arrangements.

2. Expansion - New Development[37]

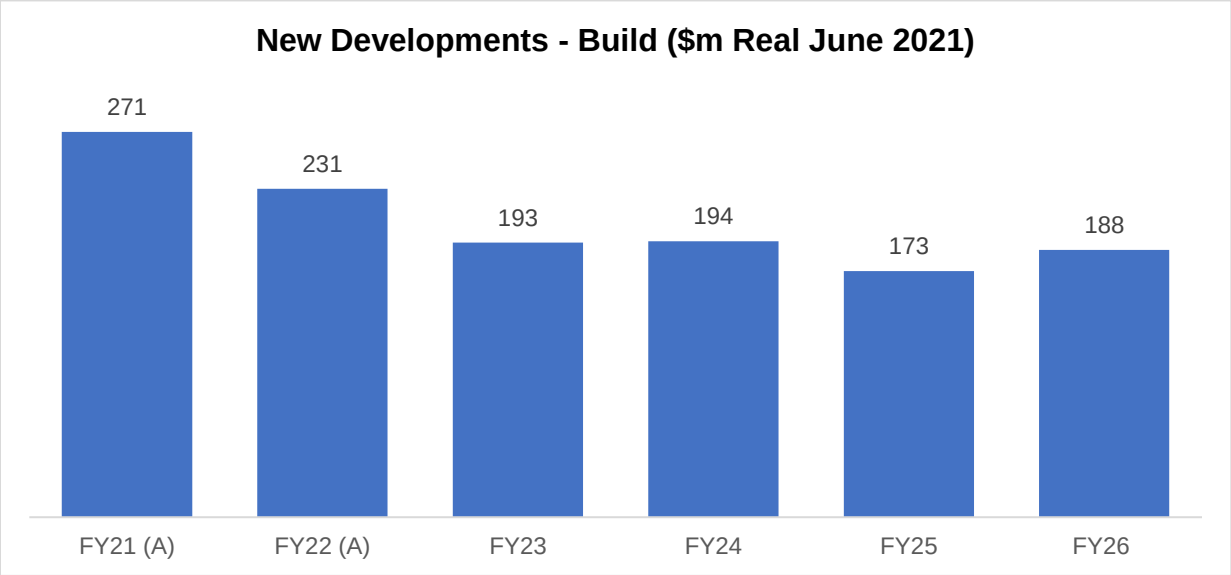


Figure 21 New Developments - Build ($m Real June 2021)

The New Developments initiative represents most of the capital expenditure forecast by NBN Co under "Expansion" in the SAU Variation and ACCC Briefings, with a forecasted $555 million over the Forward Rollout Cost (FRC) of the total $607 million for total Expansion, compared to $695 million from FY21-FY23 (-20%).

At present, New Developments total 1.2 million premises Ready to Connect (RTC), incurring $2.1 billion in build-related capex, which equates to an average of $1,750 per premise. Of the 1.2 million RTC premises, 91% have been delivered via Fibre to the Premises (FTTP), while the remaining 9% were delivered via Fibre to the Node (FTTN), Fibre to the Building (FTTB), Fibre to the Curb (FTTC), or Hybrid Fibre Coaxial (HFC).

This proposed capital expenditure only refers to the capital expenditures required to bring premises in new developments to ready to connect phase, while the capital expenditure for connecting individual premises to the network in the street falls under NBN Co's description of forecast expenditure for "Take-up & Usage". Build activities encompass the design and build of both the distribution network and in-estate component (LFN).

[37] Refer to "009 nbn ACCC Briefing – IOP23 – New Developments - CONFIDENTIAL" and SAU Supporting Submission Part F, Chapter A.2, Capital Expenditure, Page 37, 38, 40, Chapter A.2.2, Expansion Page 41

Figure 22: New Development Drivers[38]

New developments are classified as SD1s or SD2s, with SD1s being large developments of 8+ premises and accounting for 87% of volumes. SD2s are smaller developments of up to 8 premises, accounting for the remaining 13%. Volumes are influenced by national new developments and an assumed share for NBN Co as the population expands. Costs are influenced by technology type, distances involved, the number of premises per development, dwelling type (Single Dwelling Unit (SDU) vs. Multi-Dwelling Unit (MDU)), location (metropolitan vs. regional), and build type (residential vs. commercial).

[38] 017 ACCC RFI - nbn Response - tranche 4 - CONFIDENTIAL.xlsx

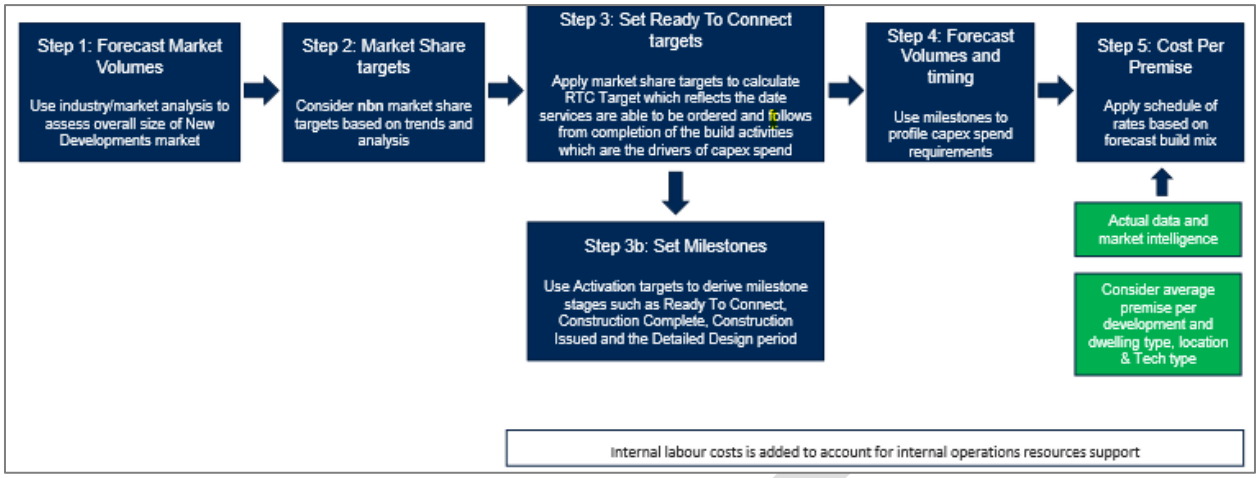


Figure 23: New Development – Build, Forecasting Approach

Figure 24: New Development – Build, Delivery Approach

Key risks for this initiative include construction-driven risks such as supply chain delays and resource shortages, as experienced during the Covid pandemic. Remedial action will be taken when required, such as implementing a fourth Delivery Partner to take on held order volumes. Successfully bidding for new development opportunities, determining the appropriate technology mix, and the average premises per development are also critical factors that are considered by NBN Co.

Volumes for national new developments are driven by:

- Population expansion,
- Number of Constructions commenced, and
- Assumed market share for NBN Co.

The costs drivers per premises for new developments include:

- technology type,
- distances involved,
- number of premises per development,
- dwelling type (SDU vs MDU),
- location (metro vs regional),
- build type (residential vs commercial), and
- internal labour and fixed contract overheads.

NBN Co has described how these costs are based on actual data and market intelligence, all of which appears reasonable and logical. NBN Co's describes the reduction in Cost Per Premise (CPP) as a direct result of contract efficiencies, cost optimisation initiatives and a favorable movement in the build mix[39].

The key monitoring metrics per premises for new developments used by NBN Co include:

- Target outcome volumes: e.g., [redacted], and
- Costs Per Premises (CPP) annually to ensure efficiencies are realised.

The prudency of the expenditure is assessed to be **Qualified Yes**, as:

- This is a BAU activity for having premises ready to connect for new developments. Further detailed information on the activity to qualify the assessment further was not made available during the RFI Process.
- The expenditure is based on demand forecasts related to new planned developments.

The efficiency of the expenditure is assessed to be **Qualified Yes**, as:

- There is a continued decrease in the Cost Per Premise over the FRC due to improved efficiencies.
- This is a BAU activity. Further detailed information on the activity to qualify the assessment further was not made available during the RFI Process.

3. Take-up & Usage – HFC Capacity Upgrade[40]

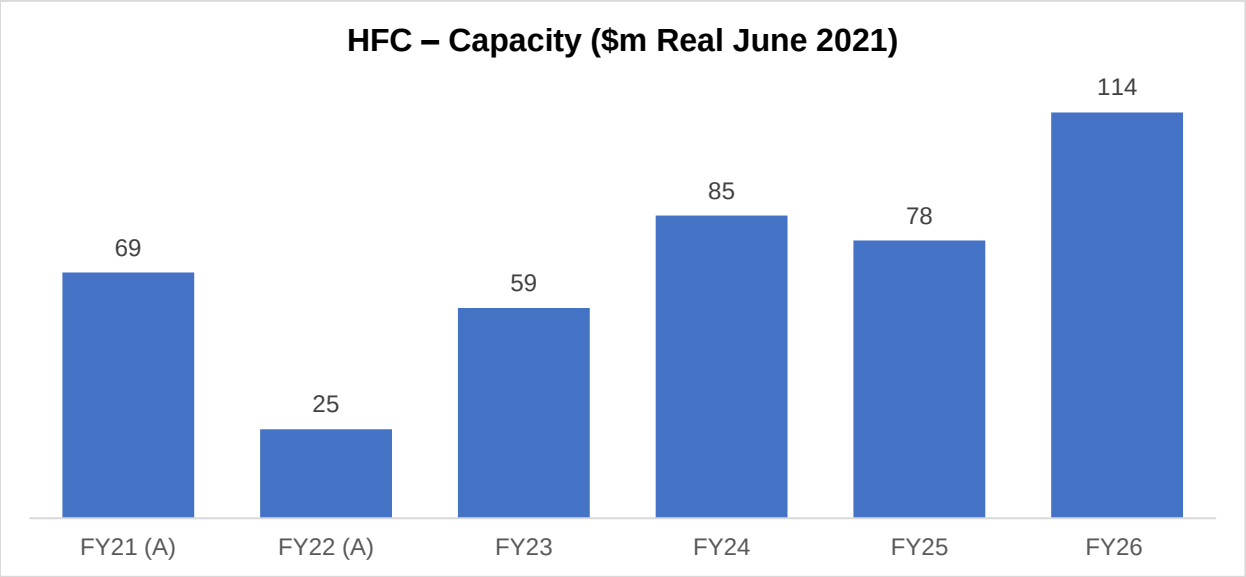


Figure 25 HFC – Capacity ($m Real June 2021)

[39] 020 ACCC RFI - Grex consolidated - nbn Response 24 March.xlsx
[40] SAU Supporting Submission Part F, Chapter A.2.3, Take-up and Usage, pages 41 – 43, with more detail provided in 010 nbn ACCC Briefing – IOP23 – Capacity – CONFIDENTIAL and through the RFI Process.

NBN's HFC network represents the second biggest technology in NBN Co's MTM in terms of homes passed (2.5m), just behind FTTN. The HFC network has been upgraded to DOCSIS 3.1 recently, as described by NBN Co.

Traditionally, "Node Split" has been the main method of increasing upstream and downstream capacity by splitting a single Radio Frequency (RF) segment covered by a single optical node into two segments by adding a second optical node. However, in the upcoming FRC and beyond, NBN Co has described how it is planning to adopt new technologies to increase the network capacity, namely Outside Plant Modernization and Distributed Access Architecture (DAA) Node Upgrade whereby:

- Outside plant modernisation refers to the replacement of RF amplifiers in the outside plant to support DAA and future technologies, and
- DAA involves moving the physical and MAC layer of the CMTS functions to the node (Remote MAC-PHY). This has been described as offering multiple benefits such as increased capacity, reduced latency, power and space reduction in exchanges, more cost economical digital optical fibres, and virtualisation/cloud-ready CMTS (remaining upper layer functions).

An illustration of these upgrade approaches is provided below:

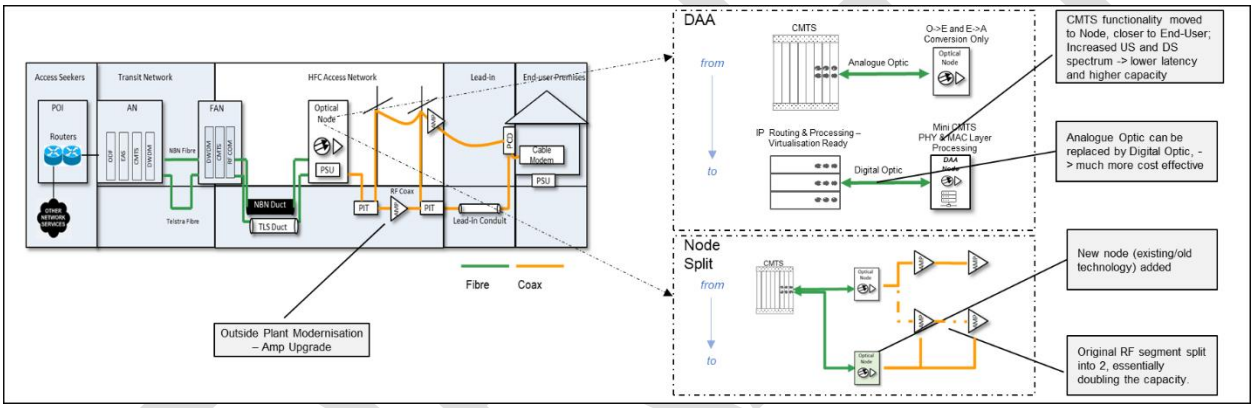


Figure 26: HFC network architecture, and capacity upgrade mechanisms through DAA and Node Split[41],

NBN Co has not provided any documentation such as cost-benefit analysis or business case that describes these technologies and the approach taken in selecting these technologies in detail. From the information provided through the ACCC Briefings and RFI Process, it is understood that both methods will offer upstream and downstream capacity uplift by allowing more downstream spectrum (up to 1.2GHz) and upstream spectrum (mid-split and high-split).

It has also been described by NBN Co that the high-level purpose of the initiative is to meet customer demand on a just-in-time model. However, no information on the specific target network capacity utilization as well as the current baseline network capacity and trigger thresholds for upgrade has been provided by NBN Co outside of the following high level volume (i.e. no units, rationale), as part of multi-year deployment plan:

[41] NBN Network Design Rules – June 2022.

- Outside plant: 750, 750, 750[44]
- DAA node upgrade: 50, 200, 200[44]
- Physical Node Split: 28, 6, 49[42]
- Virtual Node Split: 12, 2, 34[42]
- Coax rebalance: 2, 7, 44[42]

It is worth nothing that through the ACCC Briefings and RFI Process, the information presented on the details of Node Split was inconsistent.

Some risks have been identified and described by NBN Co such as technology choice and dependency on Foxtel users migrating off the HFC network. Other risks are assumed to include:

- Early DAA Deployment:
  - DAA technology based on Remote MACPHY is reasonably new, its deployment would be one of first among cable operators, bringing inherit product function, stability and performance risks.
  - Delivery partners are unlikely to have any prior experience and skills of DAA deployment, which could cause potential delays, and installation quality issues. NBN Co has indicated it is working with the industry to increase available resources with skills and experience[43].

- External factors limiting upstream and downstream capacity:
  - Delayed Foxtel customer migrations impacts both Upstream and Downstream capacity upgrade. It is required for the key high-split upstream capacity uplift which utilise up to 204MHz for upstream traffic. There are existing Foxtel customers present in 9,307 HFC segments, among which 664 segments are critical to the DAA strategy. Delayed Foxtel customer migrations may trigger 'regret' Node Split activities to increase capacity[44].
  - Upstream capacity in particular, is also limited by the reservation of DOCSIS upstream channels for Telstra use, which can only be freed up if all Telstra customers migrate off the segment. This limitation would have an impact to the total upstream capacity.

- 'Regret' Node Split expenditure.
  - If a node split has to be performed instead of outside plant modernisation or DAA node upgrade, this is potentially 'Regret' investment that incurs technology debt, as any Node added as part of Node Split, which uses current technology, will need to be upgraded to DAA node in the future.

    The information provided NBN Co on Node Split has been inconsistent throughout the RFI process, e.g. '019 ACCC RFI - nbn Response - tranche 5 _question 13' only

[42] 020 ACCC RFI - Grex consolidated - nbn Response 24 March.xlsx
[43] 010 nbn ACCC Briefing - IOP23 - Capacity - CONFIDENTIAL.pdf
[44] 019 ACCC RFI - nbn Response - tranche 5 _question 13_ CONFIDENTIAL_.xlsx

listed DAA and amplifier upgrade volume in the IOP extract, yet mentions node split volume in the risk description, '020 ACCC RFI - Grex consolidated - nbn Response 24 March' has a different set of node split volume, without any DAA and amplifier upgrade data.

- Using the node split volume and unit cost provided in '020 ACCC RFI - Grex consolidated - nbn Response 24 March', the expenditure attributed to physical node split, virtual node split and coax rebalancing is ~$21m. This compares to total FRC expenditure forecast of $277m. This indicates that the majority of the capacity upgrade is met by amplifier upgrade and DAA node upgrade (although with no unit cost information provided), which makes technological sense. However, the risk section of '019 ACCC RFI - nbn Response - tranche 5 _question 13' states that there is an 'exponential need' for node splits in FY26 and FY27, with volumes many times of that documented in '020 ACCC RFI - Grex consolidated - nbn Response 24 March'. This could be interpreted to means that the expenditure on node split could be significantly higher than $21m.
- The above inconsistency introduces challenges in both prudency and efficiency assessment as

  1) it is not clear if node split is part of the capacity upgrade program and what the forecast volume is,

  2) if node split is part of the capacity upgrade program, the trigger point for node split and the drivers of the node split volume are unclear, and

  3) for any node/segment that requires capacity upgrade, the prioritisation / selection criteria to choose between node split which is current and soon-to-be legacy technology, and long-term technologies such as amplifier upgrade, DAA node upgrade are not clear.

In conclusion, the prudency of this expenditure is **inconclusive**, as:

- A description of a documented process undertaken by NBN Co to assess alternative options has not been provided. As a result, an analysis of whether this expenditure item reflects the best course of action considering available alternatives (e.g., Remote PHY) and associated strategic considerations to longer term technology evolution (e.g., to DOCSIS 4.0) is not supported by documented evidence[45].
- There is no detailed description of the technology and benefits of the new upgrade technologies: amplifier upgrade and DAA node upgrade.
- Baseline network capacity, trigger thresholds for upgrade and rationale, and target network capacity / benefits are not available. Without this information, it is difficult to assess current capacity limitations and the proposed benefits to end-users of the NBN network.
- No clear, documented mitigation strategy has been provided for this assessment for identified risks such as delayed Foxtel customer migration.

[45] NBN Co has also described the chosen evolution path is an enterprise risk 019 ACCC RFI - nbn Response - tranche 5 _question 13_ - CONFIDENTIAL.xlsx

- It is unclear if node split will be used, and if so, what the rationale is in doing so.

An assessment of the efficiency of this expenditure is **inconclusive**, as:

- No unit cost and accompanying model / calculations have been provided on either amplifier upgrade or DAA node upgrade.
- Whilst the forecast volume of amplifier upgrades and DAA node upgrades has been provided, the underlying model / calculations have not been provided for the purposes of this assessment.
- There is inconsistent information about whether or not node split will be used and the volume of node splits during the RFI Process. This is likely to be 'regret' expenditure that introduces technology debt, unless rationale is provided to justify its use.
- There is no detailed roll out / deployment plan for the overall upgrade program, and the modelling/calculations behind it to support supply-demand analysis.

Without this information, it is difficult to assess if the expenditure is the lowest cost option to the end-users over the long term.

4. Take-up & Usage – Transit Capacity Upgrade[46]

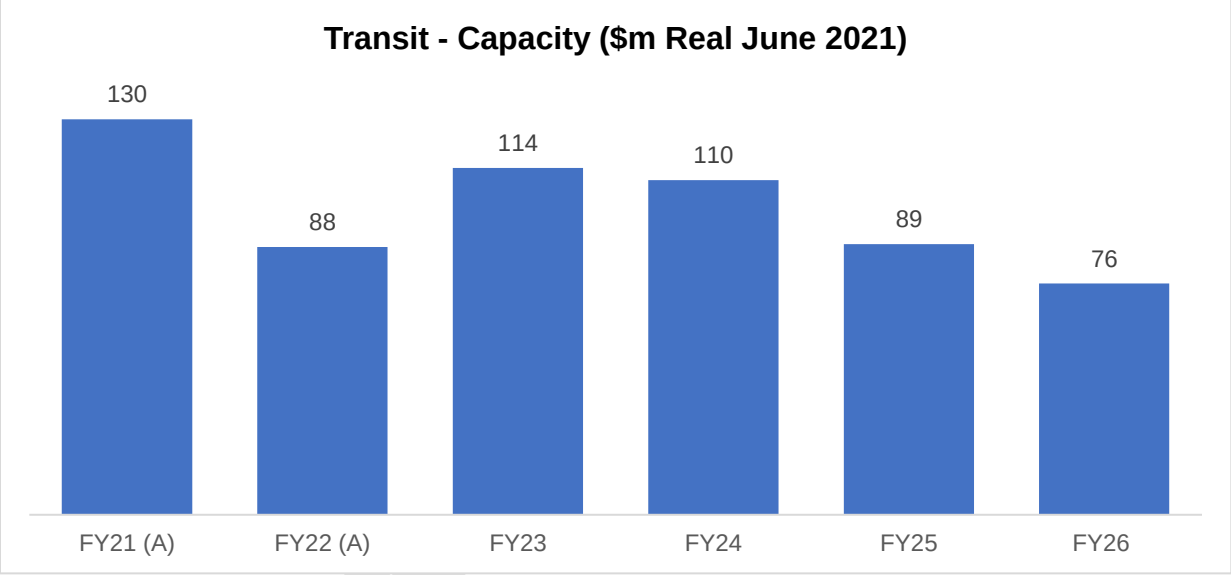


Figure 27 Transit - Capacity ($m Real June 2021)

The Transit Capacity Upgrade is one of the Fixed Line Capacity Upgrade initiatives described by NBN Co in the ACCC Briefings and RFI Process. The transit network is responsible for aggregating traffic from all access networks (except for Satellite, see Figure 28)

[46] 010 nbn ACCC Briefing - IOP23 - Capacity - CONFIDENTIAL.pdf

The objective of the initiative is to upgrade transit network capacity to meet customer demand in line with forecast traffic growth. It involves just-in-time capacity upgrade of 1) Port Capacity 2) Network/link capacity.

Capex estimate is $275m forecast over the FRC, compared to $332m FY21-FY23 (-17%).

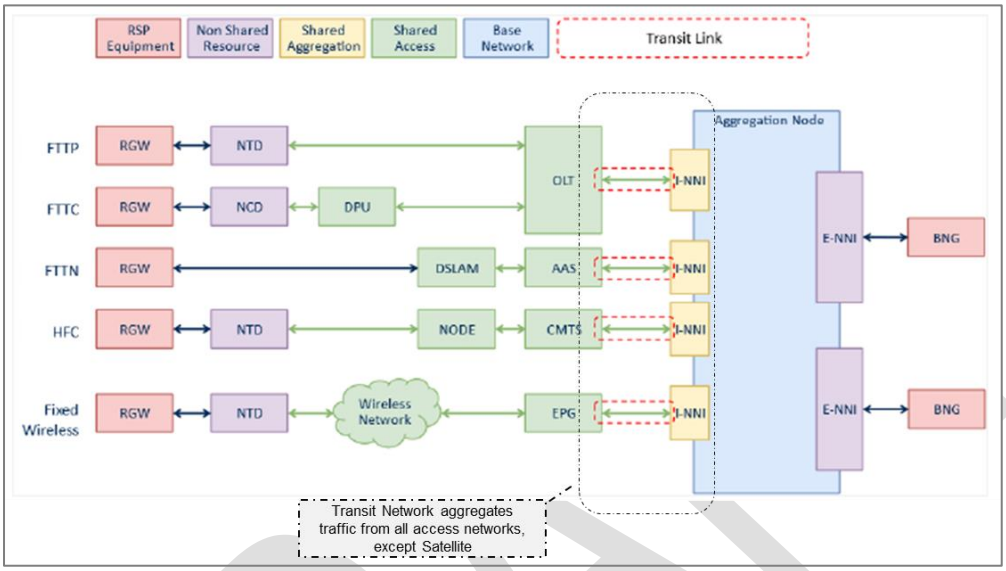


Figure 28: Transit Network Illustration[47]

The volume drivers, in general, are the transit devices and links that need to be upgraded, based on pre-defined trigger points of the capacity usage. [redacted]

[47] 010 nbn ACCC Briefing - IOP23 - Capacity - CONFIDENTIAL.pdf
[48] 6. IOP23 Usage & Demand Profile - ExCo - 220223.pdf

Access Technology	Shared Link Type
FTTP/C	GPON
FTTP/C	Backhaul
FTTN	DSLAM Backhaul
FTTN	AAS backhaul
HFC	RF-Segment
HFC	Backhaul

Figure 29: Access Technology Shared Link Types[49]

The most recent NBN OpCo reports[50] have listed the following items as part of the Transit Network Capacity Upgrade: CNI Racks, OLTs, AAS, Exchange Readiness. Volume and unit cost metrics for each upgrade method are illustrated in the figure below.

However, through the ACCC Briefings and RFI Process NBN Co did not provide a description of the actual technology used, the reasons and trigger points for the upgrade, and the models and calculations behind the metrics. Additionally, it is noted that the total expenditure calculated from the provided volume and unit cost data is ~$69m, which is significantly lower than the SAU Variation forecast of $275m. This difference could be due to the reasons stated in section 4.5, where NBN Co stated that there are other costs such as overheads which are not tracked at a rate and volume level. It is also possible that there has been a reduction in the forecast scope and/or cost since the original expenditure forecast. However, no conclusion can be drawn from the documentation provided by NBN Co during the ACCC Briefings and RFI Process.

[49] IOP23 Usage & Demand Profile - ExCo - 220223.pdf , with the table amended according to NBN Co feedback dated 26 April 2023.
[50] 013 ACCC RFI – FY213 Opco Report Jan-23 Final – CONFIDENTIAL.pdf

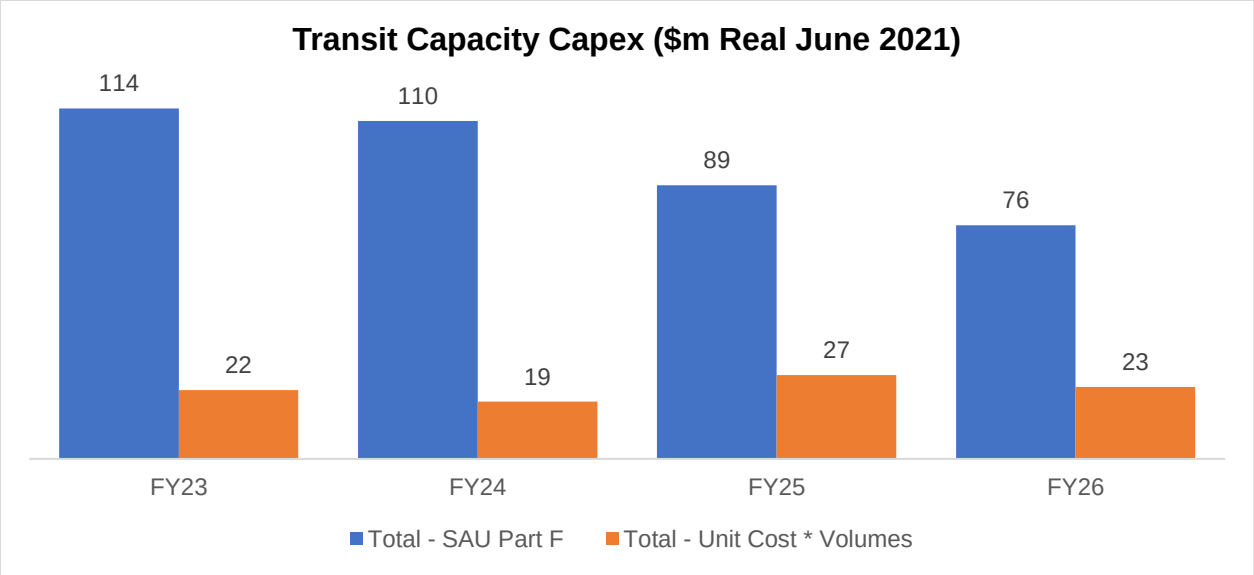


Figure 30 Transit Capacity Capex ($m Real June 2021)

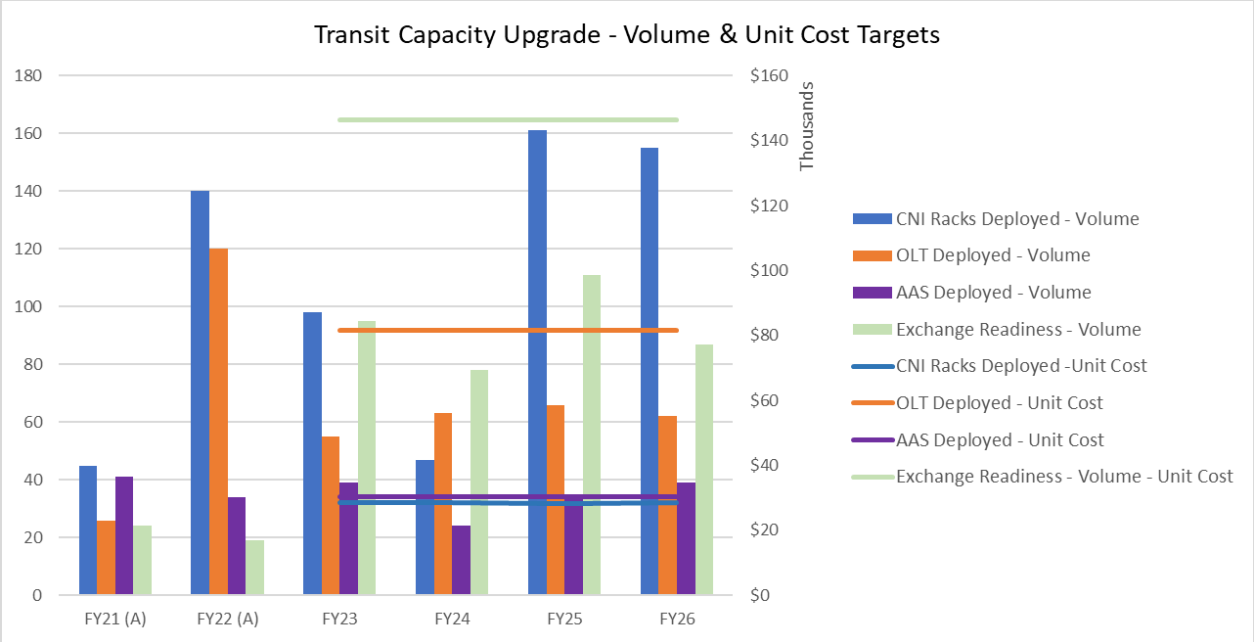


Figure 31: Transit Capacity Upgrade Volume & Unit Cost Targets[51]

The prudency of the expenditure is assessed to be **Inconclusive**, as:

- Although this is required BAU activity, the total expenditure amount based on volume and unit cost data of the four upgrade methods only accounts for 25% of total expenditure forecast with the remaining 75% of the expenditure not defined.

[51] 020 ACCC RFI - Grex consolidated - nbn Response 24 March.xlsx

- No description of the four capacity upgrade methods was detailed by NBN Co through the ACCC Briefings, including any explanations of trigger points for capacity upgrade, upgrade methods and target capacity thresholds.

The expenditure efficiency is assessed as **Inconclusive**, as:

- There is no underlying model, calculations and assumptions supporting the provided unit cost.

5. Take-up & Usage – FTTx Capacity Upgrade[52]

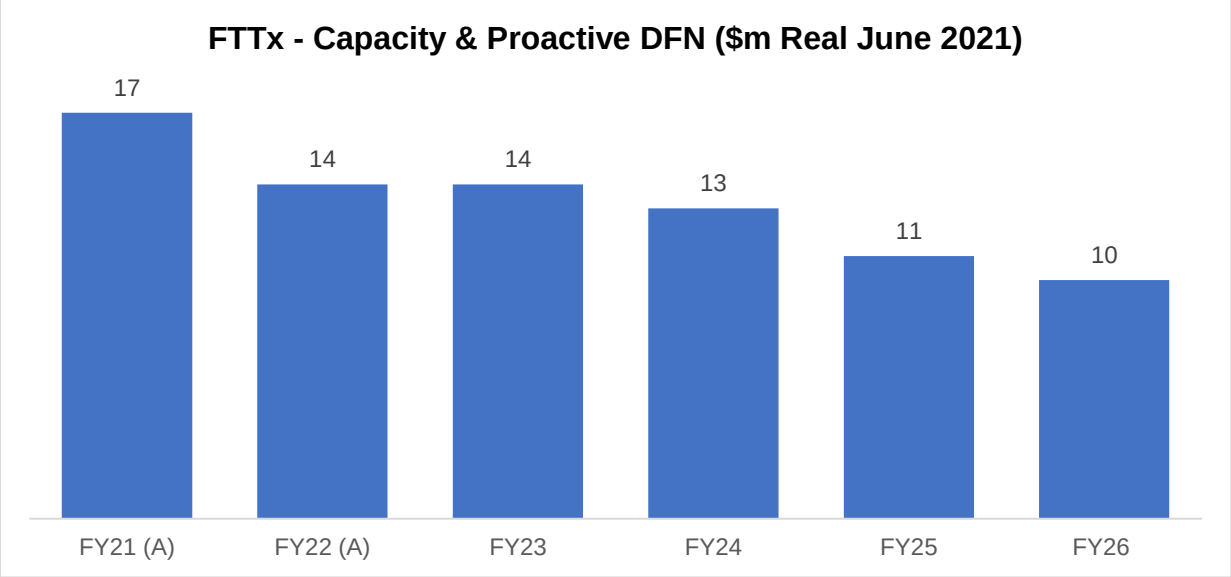


Figure 32 FTTx - Capacity & Proactive DFN ($m Real June 2021)

The FTTx Capacity Upgrade is part of overall Fixed Line Capacity Upgrade initiative, along with the HFC capacity upgrade and Transit capacity upgrade initiatives.

The objectives of this initiative are to:

- Upgrade capacity to meet forecasted customer demand, and
- Minimise 'wasted / regret' capex spend on legacy technologies (vs. FTTN/C/B upgrade).

The scope includes just-in-time capacity upgrade of FTTx nodes and DFN cables. Capex expenditure forecast is $34m over the FRC, compared to $45m FY21-FY23 (-24%).

Volume drivers are the number of FTTx nodes and FDN cables to be upgraded. Generally, for DFN cable/fibre upgrade, the length of fibre is typically the main cost driver, as fibre deployment is labour intensive (e.g., trenching, laying ducts) and incurs high cost.

The volume and unit cost target for each upgrade method is shown below, although again without underlying supporting data. It is noted that:

[52] 010 nbn ACCC Briefing - IOP23 - Capacity - CONFIDENTIAL.pdf

- DSLAM expenditure needs to be further assessed, as this is potential tech debt, given the FTTN-P network upgrade program.
- The total FRC expenditure from the RFI response is calculated to be ~20m which is significantly different to the SAU Variation forecast of $34m.

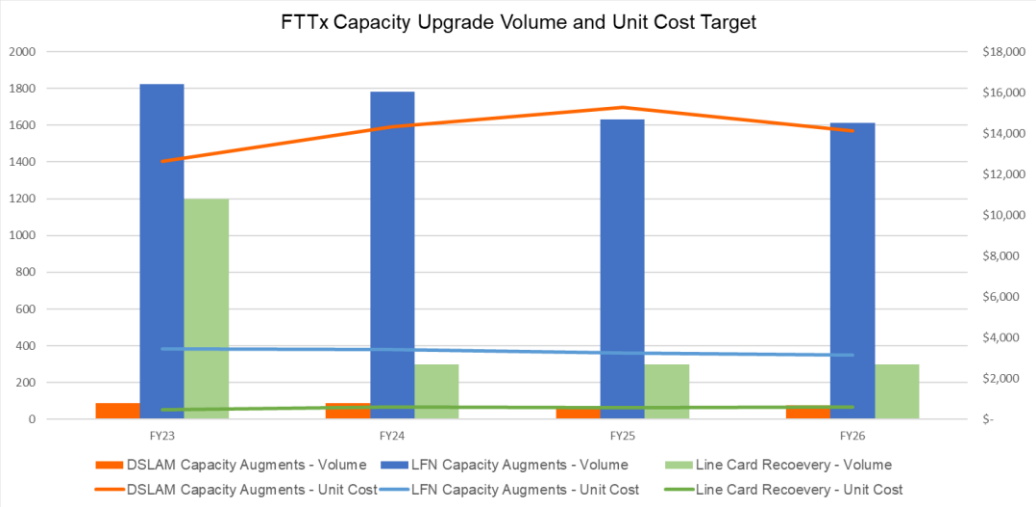


Figure 33: FTTx Capacity Upgrade Volume and Unit Cost Target[53]

The prudency of the expenditure is assessed to be **Qualified Yes**, as:

- This is required BAU activity,
- It is assumed the forecast expenditure on DSLAM upgrade is required lifecycle management, with inflight FTTN to P network upgrade program taken into consideration.
- Information on this activity to qualify the assessment further was not made available during the ACCC Briefings and RFI Process.

The efficiency of the expenditure is assessed as **Inconclusive**, as:

- There is no underlying model, calculations and assumptions supporting the provided unit cost.

6. Take-up & Usage - Trucks Rolls[54]

The NBN Co truck roll activities, as part of the Take-up & Usage capex category comprise: -

- Customer Connect,
- Customer Reconnect, and
- Customer Service and Assurance

For example, this includes ticket of work for customer connect/reconnect requests.

[53] 020 ACCC RFI - Grex consolidated - nbn Response 24 March.xlsx
[54] SAU Supporting Submission Part F, Chapter A.2.3, Take-up and Usage, pages 41 – 43, with more detail provided in 008 nbn ACCC Briefing – IOP23 – Truck Rolls – CONFIDENTIAL and through the RFI Process.

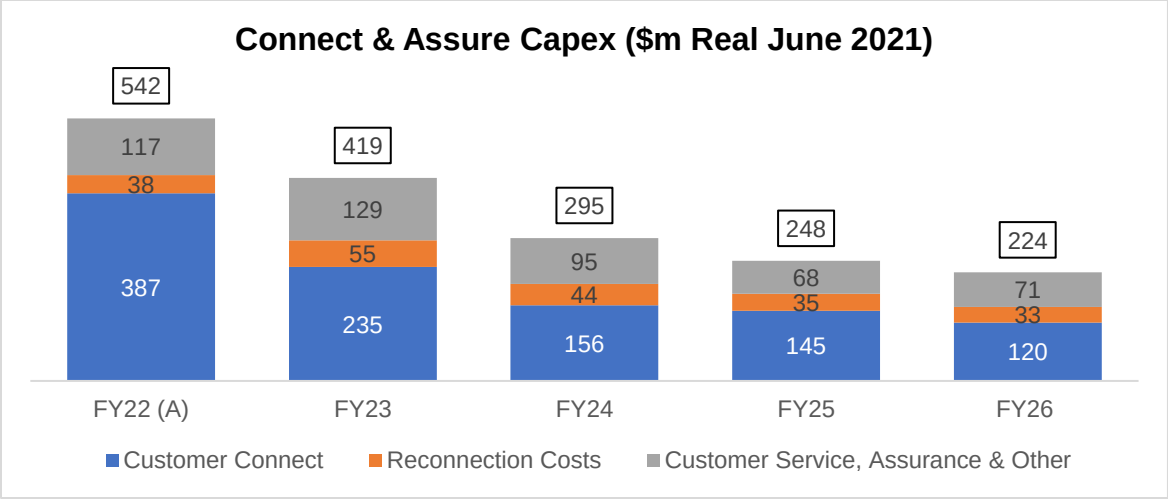


Figure 34 Connect & Assure Capex ($m Real June 2021)

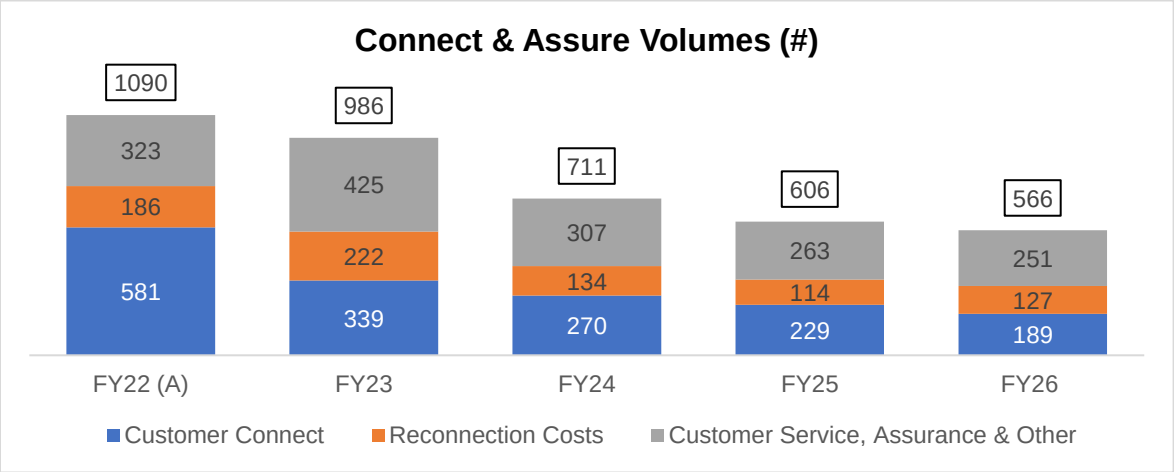


Figure 35 Connect & Assure Volumes

The related NBN Co truck roll activities for Take-up and Usage category related to operating expenditure comprise: Service Assurance, Network Assurance, and Network maintenance.

Truck Rolls is an ongoing business as usual activity with a focus on productivity gains, including the truck roll reduction program (relevant to Customer (Re)Connect). There are forecast savings including reductions in the incidence of the end-user not being in attendance and repeat truck rolls, i.e., the average cost per (Re)connection is forecast to decrease over time in real terms.

Volumes for truck rolls are driven by end-user demand (e.g., New Developments), Customer Experience (i.e., Customer assurance and related service and network Incidents) and maintenance activities. The corresponding monitoring metrics tracked include the truck roll volumes, activity type (connect or assure), technology type, Customer not in attendance (NIA), and Use of Self-Replacement Kits (SRKs).

Costs are controlled by a ticket of work (TOW) and are driven by Delivery partner rates, materials, overheads, internal labour costs and technology.

Truck Rolls savings are predominantly the result of the reduction in scale because of the completion of the initial build phase of the NBN network. This has resulted in the reduction in Truck Rolls volumes for take-up and usage needed for end-user connection and service assurance. Revenue is generated directly from these activities, with volumes driven by user and market demand to connect or re-connect. Other reasons for the overall expenditure and volume reduction, as described by NBN Co, are:[55]

- FTTP: reduction in the % of connections requiring remediation and the cost of that remediation by implementing cost control processes.
- FTTN: lower remediation assumptions and increased internal labour efficiency.
- HFC: initiatives to reduce the base rate of the delivery partner and increased internal labour efficiency.
- FTTB: increased internal labour efficiency.
- For FTTC re-connection specifically, there is a higher % of refurbished equipment driving cost reduction.
- Customer service assurance (within 30 days of re-connection) reduction is also due to broader Truck Roll reduction program that is to drive down volume for service assurance across technologies.

Related service assurance costs have decreased with the decrease in (re)connect volumes. There has also been a corresponding decrease in unit costs for (re)connect. This decrease in unit cost implies a further decrease in capex beyond the decrease in volumes. This is not fully reflected in the overall capex savings, with the overall decrease in capex not in proportion to the reported decrease in volumes and unit cost.

Consequently, the prudency assessment of this expenditure item is a **Qualified Yes,** as:

- Capex reductions for connect and assurance result from savings from reduced Truck Roll volumes due to completion of initial build phase.
- This is qualified as the breakdown and modelling of the activities, improvement initiatives undertaken and market demand that drive the expenditure has not been made available by NBN Co. This information would assist to better understand this forecast and the overall benefits/improvements including service quality that may be delivered.

The efficiency assessment expenditure is also a **Qualified Yes,** as:

- There is a corresponding decrease in unit costs for (re)connect, indicating improvements.
- This is qualified as the overall capex reduction was expected to be higher in proportion to the combination of volume reduction and decrease in unit costs. More detailed costs and modelling against the activities and initiatives undertaken can assist to better understand the overall efficiency (and any risk) for the forecast.

[55] 020 ACCC RFI - Grex consolidated - nbn Response 24 March.xlsx

- Customer Service Assurance savings are also dependent on the Fixed Line Upgrade migrations of FTTN/C to FTTP.

Understanding the detailed costs and modelling, and the reason that the reductions are not in proportion to the decrease in volumes and unit costs may lead to discovery of further insights. Therefore, it is recommended that NBN Co expand the system capabilities and detail in monitoring, and reporting of metrics (e.g., data and analytics, delivery partner management) that are in place on the expenditure to verify the trend in reduced volume and unit costs for (re)connect, and the increase in quality (i.e., reduction in assurance costs).

7. Maintaining - Copper Remediation[56]

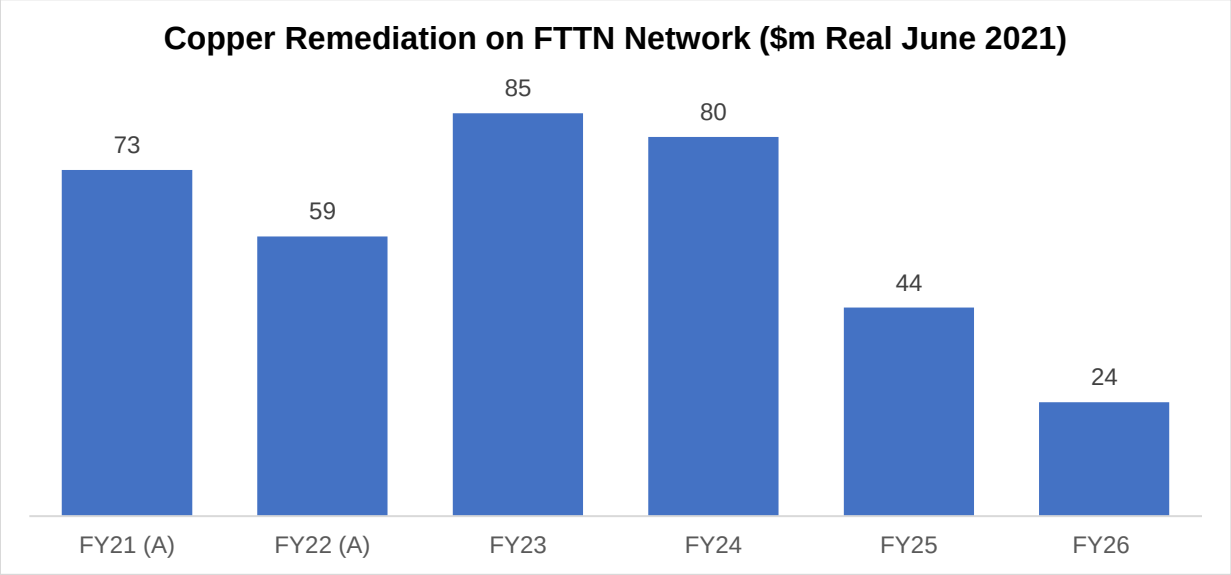


Figure 36 Copper Remediation on FTTN Network ($m Real June 2021)

The "Maintaining" categorisation used by NBN Co for forecast capital expenditure largely relates to ongoing Copper Remediation for the FTTN network to offset asset degradation due to time and weather events, i.e., the key maintenance capex initiative is to remediate or replace ageing or degrading copper assets.

NBN Co has described how it will continue to maintain quality for premises served by all access technologies, including the FTTN network. This is specified by the Benchmark Service Standards incorporated in the SAU.

The Capex for the ongoing copper remediation on FTTN network to keep up with time-based degradation is forecast for $148m over the First Regulatory Cycle (i.e., 2% of the overall capex spend).

Volumes for the copper remediation are driven by:

[56] Refer to "010 nbn ACCC Briefing – IOP23 – Capacity - CONFIDENTIAL" and SAU Supporting Submission Part F, Chapter A.2, Capital Expenditure, Page 37, 38, 40, Chapter A.2.4, Maintaining Page 43-44

- Expected degradation of the copper network: There are ~110k underperforming FTTN premises which do not meet 25/5Mbps, and expected to increase to 212k in FY25 without intervention[57].
- The interaction of the degradation of copper assets with the FTTN to P network upgrade and connect initiatives.

It is noted that the volume and speed of migration of FTTN premises to FTTP (including the underperforming ones described above), subject to the network being ready and end-users willingness to migrate, will have a direct impact on the copper remediation program and the proposed benefits of reduced expenditure.

The key cost metrics for copper remediation initiative include:

- Expected degradation of the copper network,
- The interaction of the degradation of copper assets with the forecast network upgrade initiatives for migrations from FTTN to FTTP network, and
- Length and location of the copper remediation of the FTTN network.

The expenditure prudency is assessed to be **Qualified Yes**, as:

- This is a required BAU activity. Further detailed information on the activity to qualify the assessment further was not made available by NBN Co during the RFI Process.

The expenditure efficiency is assessed to be **Qualified Yes**, as:

- Total expenditure per financial year has been provided for the purposes of this assessment, and this is business as usual activity. Further detailed information on the activity to qualify the assessment further was not available by NBN Co during the RFI Process.

[57] 010 nbn ACCC Briefing - IOP23 - Capacity - CONFIDENTIAL.pdf

8. Maintaining - Pole Replacement[58]

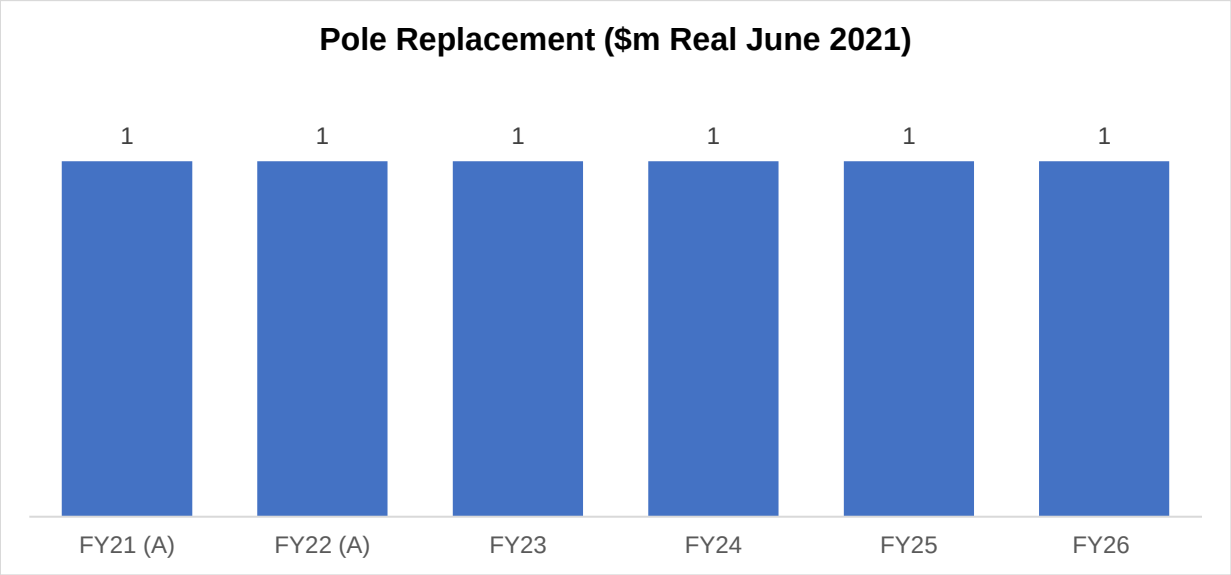


Figure 37 Pole Replacement ($m Real June 2021)

Pole Replacement is targeted for those limited parts of the network deployed aerially on NBN-owned poles. More commonly NBN leases poles owned by local electricity distribution network, with those costs falling under pole rental. The forecast Capex for pole replacement is $3m over the FRC (0.04% of the overall Capex spend).

The volume driver for pole replacement is:

- Number of Poles requiring replacement (i.e., Quality)

The cost driver for pole replacement is:

- Construction costs for each pole.

The key monitoring metrics for pole replacement include:

- Number of Poles replaced against forecast target,
- Cost per pole replacement, and
- Useful life of the poles.

The prudency of the expenditure is assessed to be **Yes**, as:

- BAU activity for maintenance of existing infrastructure to provide network availability.

The efficiency of the expenditure is assessed to be **Yes**, as:

- The costs provided appear to be reasonable, and this represents a small expenditure, dependant on location and nature of works.

[58] SAU Supporting Submission Part F, Chapter A.2, Capital Expenditure, Page 37, 38, 40, Chapter A.2.4, Maintaining Page 43-44

9. Maintaining - Long-Term Satellite Services[59]

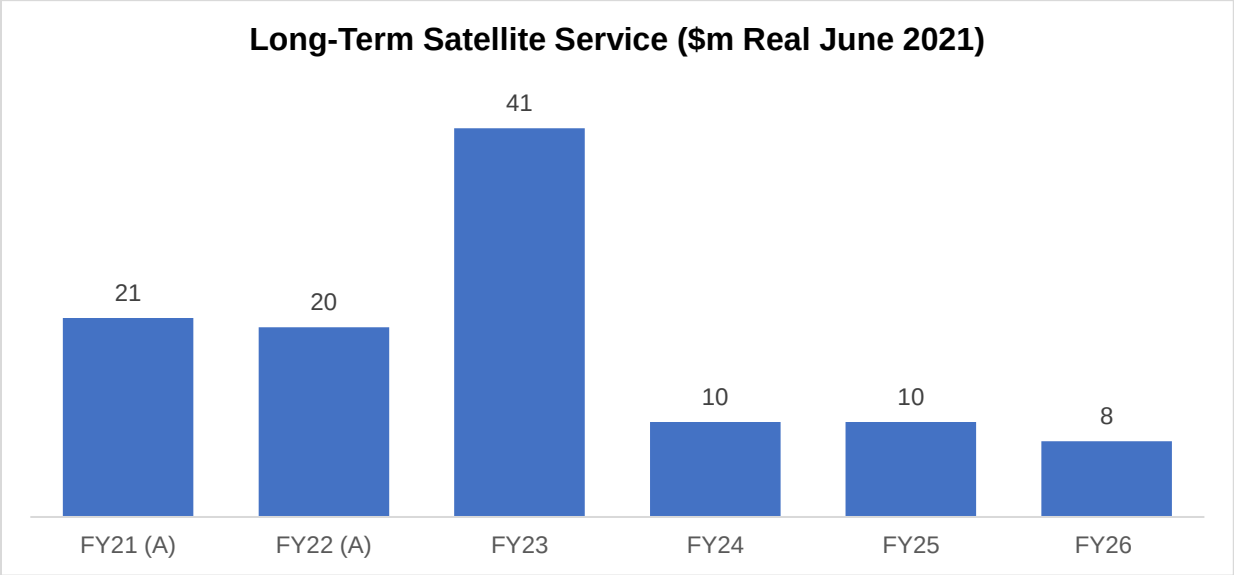


Figure 38 Long-Term Satellite Service ($m Real June 2021)

This initiative provides for minor upgrades (e.g., security patches), minor lifecycle replacements (from FY23) and ongoing capex on the Long-Term Satellite Service (LTSS) network.

This forecast is for $28m over the FRC (0.4% of the overall Capex spend).

Volumes for the long-term satellite is driven by:

- Number of upgrades, and
- Number of lifecycle replacements.

The key cost metrics for long-term satellite initiative include:

- Cost per upgrade, and
- Cost per lifecycle replacements.

The key monitoring metrics for long-term satellite initiative include:

- Number of satellites upgrades/replacements and cost for the program.

The prudency of the expenditure is assessed to be **Yes**, as:

- BAU activity for maintenance of existing infrastructure for upgrades and replacements

The prudency of the expenditure is assessed to be **Yes**, as:

- Based on the type of activity and the expected variability, and the information provided, and this represents a small expenditure related to upgrades and replacements.

[59] Refer to "007 nbn ACCC Briefing – IOP23 – Regional Upgrades - CONFIDENTIAL" and SAU Supporting Submission Part F, Chapter A.2, Capital Expenditure, Page 37, 38, 40, Chapter A.2.4, Maintaining Page 43-44

10. Capability - FTTN to P Upgrade and FTTN/C to P Connect[60]

FTTN to FTTP Network Upgrade and FTTN/C to P Connect are the two biggest initiatives in the FRC, accounts for ~31% & 13% of the total capital expenditure between FY24 and FY26. Together, they will enable ~3.5m FTTN premises and ~1.5m FTTC premises the ability to access higher speed and more stable FTTP services. Other benefits include reduced service assurance expenditure due to fewer incidents on FTTP network, and reduced copper remediation expenditure[68].

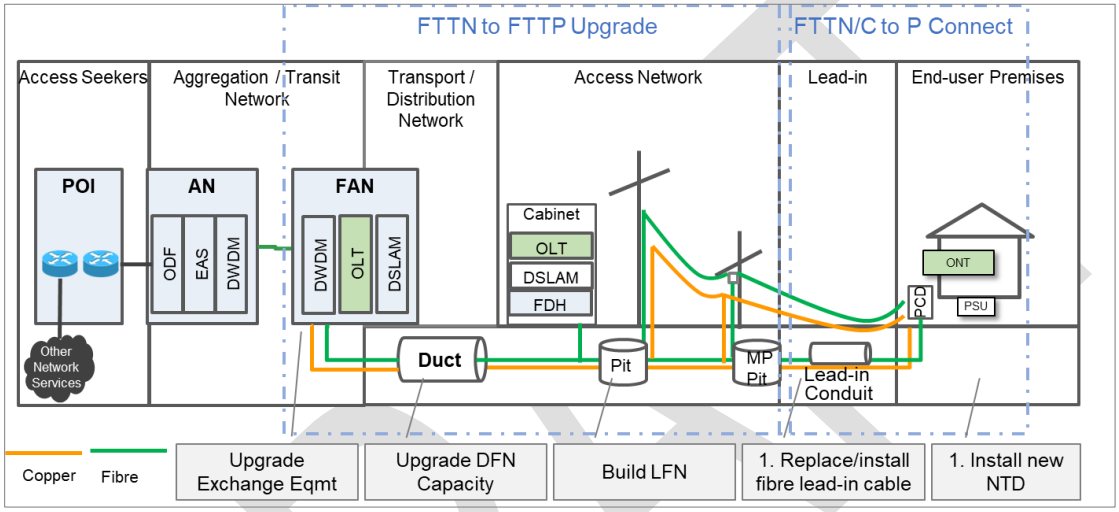


Figure 39 – FTTN to P Network Upgrade & N/C to P Connect Illustration[61,62]

[60] SAU Supporting Submission Part F, Chapter A.1.10, Key changes from the March Variation supporting submission, page 36 with further detail provided in 003 nbn ACCC Briefing – IOP23 – Fixed Line Upgrade – CONFIDENTIAL.
[61] 003 nbn ACCC Briefing - IOP23 - Fixed Line Upgrade - CONFIDENTIAL.pdf
[62] nbn Network Design Rules, June 2022

FTTN to P Network Upgrade

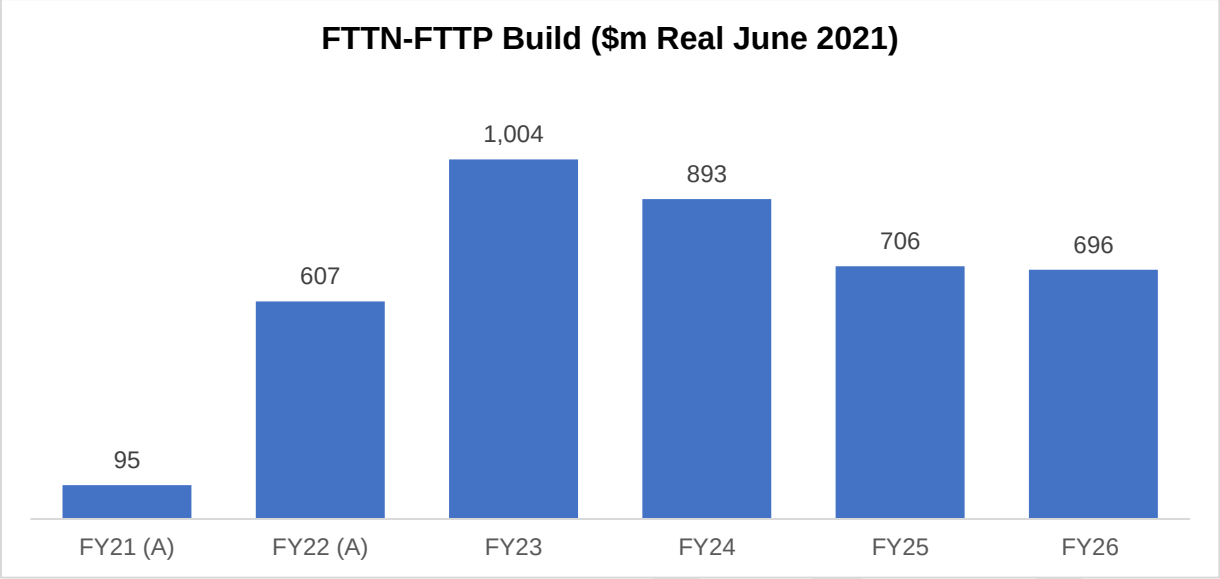


Figure 40 FTTN-FTTP Build ($m Real June 2021)

FTTN to FTTP Network Upgrade primarily involves the building of the local fibre network (LFN) in place of the original copper access network, and the upgrade of DFN capacity and Exchange equipment. NBN Co has described that the rollout is expected to be completed by FY26, with the first 2.0m premise passed to complete by end of 2023 and the remaining 1.5m premise passed to complete by end of 2025. Total forecast expenditure of the initiative is ~$2.3b in FY24-FY26 with the total program costing more than ~$4b[63]. Note there is no LFN upgrade required to support FTTC to P Connect. [redacted]

For FTTN-P build, the volume is largely dependent on the existing FTTN network footprint/areas to upgrade, with the target to complete all LFN build and capacity upgrade within the FY24-26 cycle. For specific area selections, NBN Co uses the following selection criteria[64]:

- Forecast cost per premises to upgrade in an area are lower,
- Anticipated higher demand for higher speed tiers,
- Deployment speed and agility,
- Maximum benefits to customers, and
- NBN Co has also described that to date thus denser ADAs have been prioritised (i.e., areas with an average of ~190 premise vs. national average of 150 premise per ADA).

[63] 019 ACCC RFI - nbn Response - tranche 5 _question 13_ - CONFIDENTIAL.xlsx
[64] 003 nbn ACCC Briefing - IOP23 - Fixed Line Upgrade - CONFIDENTIAL.pdf

The volume metrics being tracked and monitored by NBN Co are[65]: Design issued, Construction commenced, Construction completed, Premises ready for migration, Premises ready for order. These are reported at a national level at present. It is recommended that more granular reporting would be useful to provide more insights. This reporting could include the following additional data:

- state level or lower geographical level volume breakdown,
- volume of underperforming FTTN premises ready for migration, as 'proactive migration' of these services are listed as a mitigation strategy to speed up end-user take-up[66], and
- volume of new premises which can potentially connect to fibre, rather than legacy copper, as this is also a described mitigation strategy[66].

NBN Co has described in the document entitled "NBN Co Commentary 19 April" that it tracks metrics at the "SAM" level and regularly reports on the volume of underperforming lines available for migration[67]. This should enable state & regional level reporting, although evidence of such reporting has not been provided and sighted in the preparation of this Report.

The main cost drivers of this initiative are[64]: fibre distances of LFN, proportion of new build required and conditions of the build area.

FTTN/C to P Connect

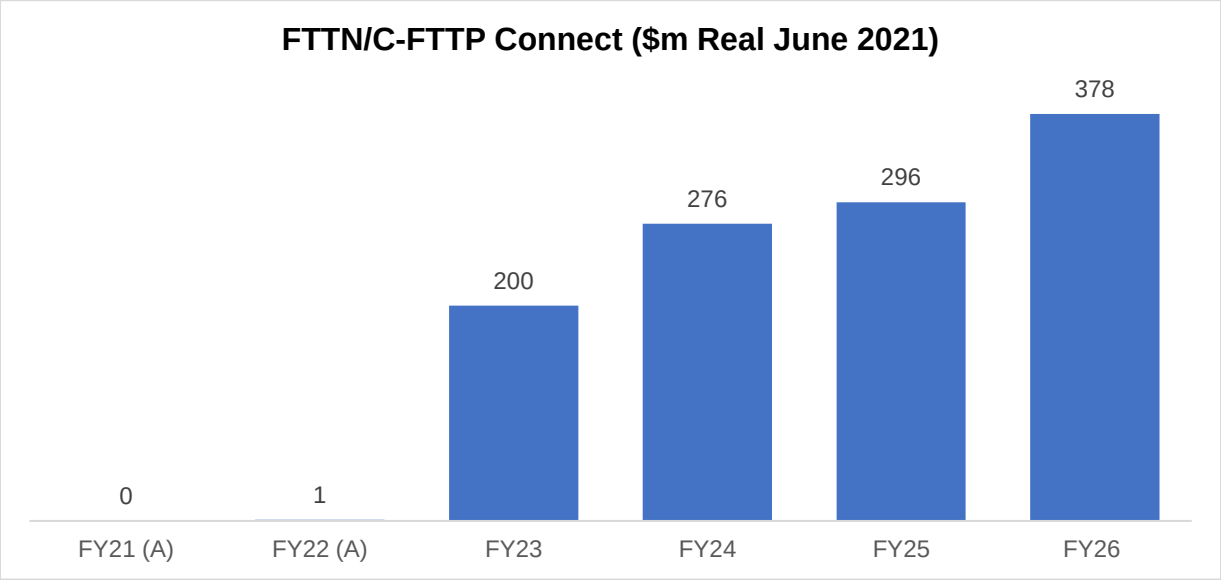


Figure 41 FTTN/C-FTTP Connect ($m Real June 2021)

[65] 013 ACCC RFI - FY23 Opco Report Jan-23 Final - CONFIDENTIAL.pdf
[66] 019 ACCC RFI - nbn Response - tranche 5 _question 13_ - CONFIDENTIAL.xlsx, 'KO Risk Update' worksheet
[67] "NBN Co Commentary 19 April"

The FTTN/C to P Connect initiative depends on the network being ready and end-users willing to migrate to higher-tiers (on-demand) [68,69]. It involves replacing the lead-in cable between the Muti-Port Pit and customer premise with fibre; and Installing new NTD device (ONT)[70].

NBN Co's forecasts for end-users to upgrade from FTTN/C to FTTP comprise:

- For FTTN to P upgrade, the forecast is based on end-users willing to take up 100/20 Mbps speed tier or higher, with a target of ~769k premises during FY24-FY26, bring the total forecast of FTTN to P migration to ~890k premises. For FY23, the target is ~125k[65].
- FTTC to P upgrade, the forecast is based on end-users willing to take up 250Mbps or higher speed tier, with a target of ~88k premises. It is expected that by end of 2023, the entire 1.5m premises will be available for the on-demand upgrade[71]. The FY23 target for FTTC to P upgrade is ~37k[65].

For FTTN/C to P Connect, volume metrics being tracked and monitored by NBN Co are[72]: FTTN to P upgrade orders & completed number of lead-ins, FTTC to P completed number of lead-ins & completed number of lead-ins. The main cost drivers are:

- Whether new lead-in conduit is required,
- If not, any remediation work may be required to fix the existing conduit, and
- Any remediation work may be required to enlarge FTTC pit to fit in additional equipment.

NBN Co's target unit cost per lead-in is between [redacted] during the FRC, with an average lead-in distance of [redacted], which results in a cost per metre of lead-in cable between [redacted]. Comparing with the initial 2m FTTN premise passed, the next 1.5m premises generally incur higher network build and connect cost as it includes more regional and complex premises with higher build distance[73]. With the network build completed within the FRC, and the relatively slow migration rate, the estimated payback period is approximately 17 years[74].

Expenditure Assessment

This network upgrade is expected to be completed by FY26 with a forecast end-user migration volume of approximately 25%* of homes passed by FY26 (forecast 890k cumulative lead-in by FY26 vs. 3.5m homes passed[74]), with actual volumes falling further behind forecast (i.e., as of Jan 2023, actual FTTN to P Service Order is 27.5k vs. budget of 66.6k, i.e., actual is ~40% of budget)[75].

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[68] 003 nbn ACCC Briefing - IOP23 - Fixed Line Upgrade - CONFIDENTIAL.pdf
[69] SAU Supporting Submission Part F.
[70] NBN Network Design Rules – June 2022
[71] SAU Supporting Submission Part F.
[72] 013 ACCC RFI - FY23 Opco Report Jan-23 Final - CONFIDENTIAL.pdf
[73] SAU Supporting Submission Part F.
[74] 019 ACCC RFI - nbn Response - tranche 5 _question 13_ - CONFIDENTIAL.xlsx, worksheet 'IOP.FTTN>P 3.5m'
[75] 013 ACCC RFI - FY23 Opco Report Jan-23 Final - CONFIDENTIAL.pdf, p3
* assume 890k includes FTTN to P migration only. Otherwise it is ~20% if 890k includes both N to P and C to P migration, as 890k / 4.5m premise passed = ~20%.

It is acknowledged that NBN Co is still in the early phase of the FTTN/C to P Connect program, and there is still the opportunity to implement measures that may accelerate and achieve the required run rate needed to meet the FRC target. However, whilst in the early phases, the slow take up of FTTP services by existing FTTN end-users introduces several risks:

- Achieving the forecast service assurance expenditure reduction (~72%) and copper remediation expenditure reduction are mostly attributed to N to P migration, and
- Achieving the forecast network assurance and network maintenance cost reduction, as the FTTN network needs to be supported for an extended period of time.

The timing of the proposed network upgrade and end-user take up described by NBN Co is illustrated below, showing a significant lag between network upgrade activity and end-user migration.

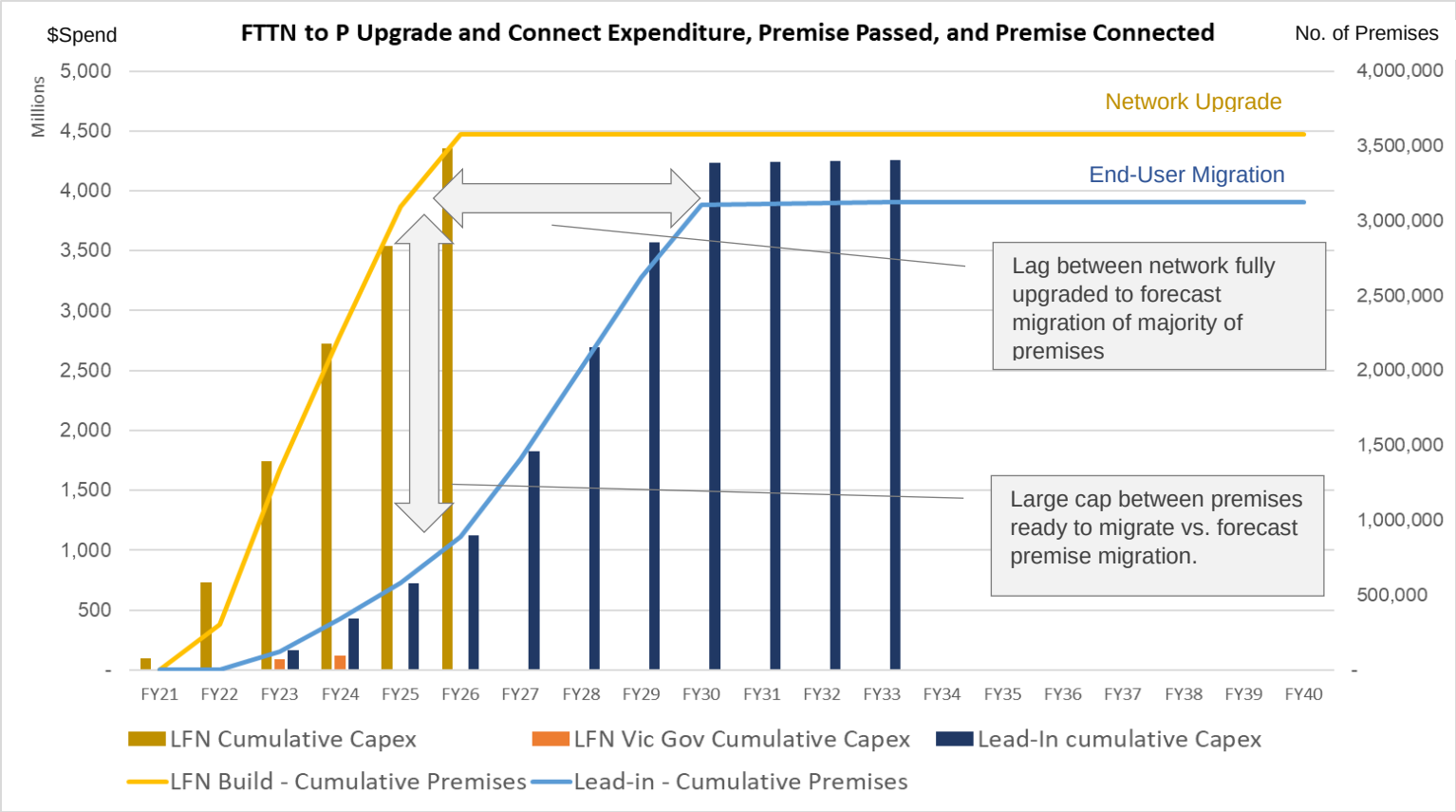


Figure 42: FTTN to P Network Upgrade and Connect: Expenditure and Premise Volume[76]

[76] 019 ACCC RFI - nbn Response - tranche 5 _question 13_ - CONFIDENTIAL.xlsx

In conclusion, for FTTN to P Network Upgrade and FTTN/C to P Connect:

- Prudency of the proposed expenditure across both the FTTN to P Network Upgrade and FTTN/C to P Connect is a **Qualified No** because:
  - The choice of upgrade technology (for both expenditure items) appears to be prudent because of the described forecast benefits of improved service assurance and reduced assurance costs.
  - However, the forecast completion of a national network upgrade by FY26 is mismatched against a slow migration forecast of ~25% of homes passed in the same period (forecast 890k cumulative lead-in by FY26 vs. 3.5m homes passed[77]). This results in an extended payback period of ~17 years[77], with actual migration rates even slower than the forecast based on data in NBN OpCo report of Jan 2023[78].
  - The drawn-out end-user migration has the potential to delay delivery of benefits associated with forecast service assurance and copper remediation expenditure reductions, as well as introducing uncertainty in network assurance and maintenance costs of the FTTN network which needs to be maintained with significant number of active users for an extended period of time.
  - There is no clearly articulated mitigation strategy to address the slow take up rate of FTTN to P. Although NBN Co has listed a few mitigation methods through the RFI Process, by their names only, to address the risk of 'underlying consumer interest in upgrades is lower than expected'[79], many of these are related to improving RSP engagement and marketing efforts. Proactive upgrades of under-performing FTTN services is one of the mitigation strategies mentioned. However, as there are about 110k underperforming FTTN services[80], the impact of proactive migration may be limited, to support the realisation of the proposed business benefits. In addition, as no supporting documentations have been provided with any of the mentioned mitigation strategies, it is difficult to assess their reasonableness and effectiveness.
  - It is recognised that the FTTC to P Connect activity is based on sound rationale (i.e., end-user demand driven expenditure). However, this activity forms part of the broader expenditure item described by NBN Co and so has been assessed as part of the broader initiative for prudency of expenditure.

- Efficiency of this expenditure is a **Qualified Yes**, as:
  - Based on cost per metre of LFN fibre deployed of [redacted] which is within normal industry range, and
  - Based on cost per metre of lead-in fibre deployed of [redacted] which is within normal industry range.

[77] 019 ACCC RFI - nbn Response - tranche 5 _question 13_ - CONFIDENTIAL.xlsx, 'IOP.FTTN>P 3.5m' worksheet.
[78] 013 ACCC RFI - FY23 Opco Report Jan-23 Final - CONFIDENTIAL.pdf, p3.
[79] 019 ACCC RFI - nbn Response - tranche 5 _question 13_ - CONFIDENTIAL.xlsx, 'KO Risk Update' worksheet
[80] 010 nbn ACCC Briefing - IOP23 - Capacity - CONFIDENTIAL.pdf, p11.

11. Capability – Fixed Wireless Upgrades[81]

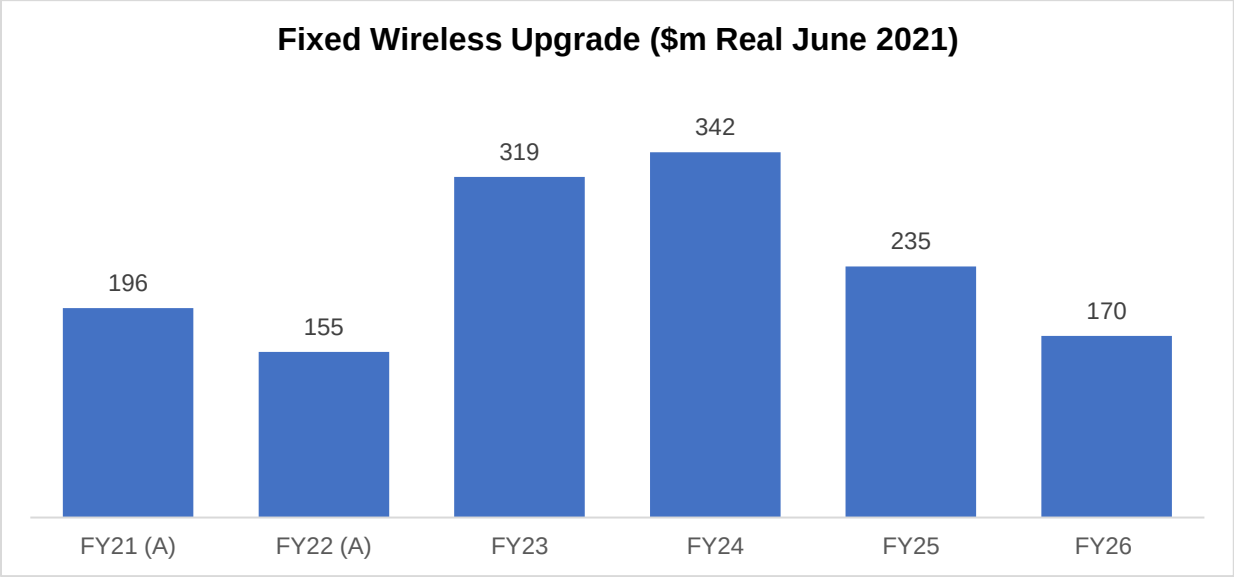


Figure 43 Fixed Wireless Upgrade ($m Real June 2021)

The fixed wireless network upgrade is the third largest capital expenditure initiative described by NBN Co in the ACCC Briefings, and accounts for ~10% of total capital expenditure. NBN Co has proposed that the primary intent is to increase the capacity of the whole fixed wireless network by a multiple of 2.5[84]. NBN Co has described that it aims to uplift busy hour (download) speeds of at least 6 Mbps to at least 50 Mbps[84,82], enabling high speed Fixed Wireless Home Fast with download PIR of 100 - 130 Mbps to all customers, and Fixed Wireless Superfast plans with download PIR of 200 - 325 Mbps to 85% customers[83].

However, Grex understands that, although both 6 Mbps and 50 Mbps metrics refer to end-user download speed, their definitions and calculations are different[83], where 6 Mbps is the minimum average download speed per user in the busy hour period[81], and 50 Mbps is the Typical Wholesale Download Busy Hour Speeds[81,84]. It is Grex's recommendation that NBN Co and ACCC work to refine the definitions of these baseline and target performance metrics so that their definitions are identical for the purpose of measurement and tracking of expenditure against targeted outcomes.

This upgrade will additionally provide an increase in the Fixed Wireless coverage area, by extending the reach of existing coverage areas[82] from 192,000 km^2 to 322,000 km^2, this will also indirectly improve satellite end-user experience by migrating 120k satellite end users to the fixed wireless network[84].

The initiative plans to achieve its objectives by:

[81] SAU Supporting Submission Part F, Chapter A.1.10, Key changes from the March Variation supporting submission, Page 36-37 with further detailed provided in 007 nbn ACCC Briefing – IOP23 – Regional Upgrades – CONFIDENTIAL.
[82] 023 ACCC RFI - BM 154 21 September 2021 - 11 Fixed wireless and satellite upgrades - CONFIDENTIAL.pdf
[83] NBN Co Commentary 19 April.
[84] 007 nbn ACCC Briefing - IOP23 - Regional Upgrades - CONFIDENTIAL.pdf

- Upgrading all 2,356 cell sites by increasing the number of cells from current 23k to 60k (i.e. increase of 37k cells) using new lens antenna technologies. A lens antenna can deliver multiple, independent, focused high-performance beams from a single antenna. It does so by transmitting tightly focussed RF signals, which target a very precise area without interfering with neighbouring zones,
- Deploying 5G spectrum and associated technology in addition to current 4G spectrum/technology. 5G spectrum can deliver x3 times the capacity of existing 4G spectrum,
- Upgrading all WNTDs (Wireless NTD) to WNTD4, and
- Upgrade select Microwave backhaul links as required.[85]

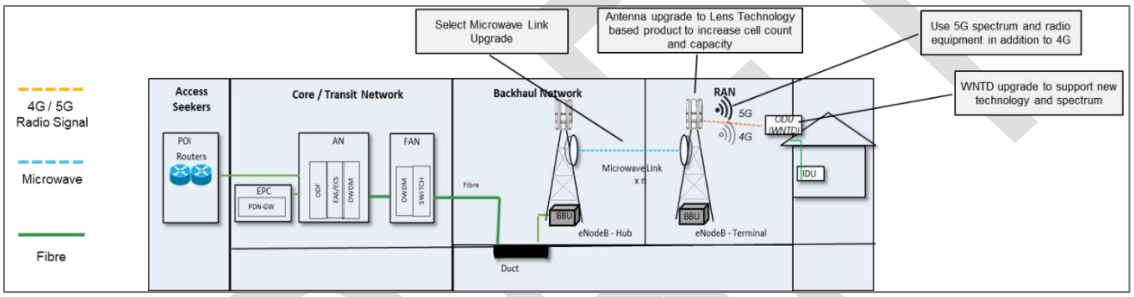


Figure 44: FW Network Upgrade Illustration[86]

NBN Co has described that it plans to upgrade all ~2,350 sites to the new 50 Mbps TWBPS by Dec-2024, with 1,568, 629 and 300 sites upgraded in each of FY24, FY25 and FY26 respectively, with site upgrade post Dec-2024 to maintain committed speeds[87].

The main unit cost metric used by NBN Co to track efficiency is cost per Mbps increase. The target is [redacted] for each of FY24 to FY26. It is understood that this metric is based on the total Capacity Upgrade cost, including Design, SAED, Build (HW and Services) and Core, divided by the increased capacity (Mbps) of the network. The network capacity increase used for calculation is a flat rate or 60Mbps/4G cell (aligning with 3bps/Hz for a 20MHz 4G cell). A similar methodology will be used for the Mbps capacity of 5G cells as they are deployed[87]. The second cost metric being tracked by NBN Co, is the cost per upgrade, which has an average of [redacted] to date.[88]

Potential risks related to this initiative include:

- New Lens based technology:
  - Mini lens technology is relatively new, with the original use case deployment in sporting stadiums to support a high density of end users. A lens antenna can deliver multiple, independent, focused high-performance beams from a single

[85] NBN Co Initiative Presentation and Discussion Meetings
[86] NBN Network Design Rules – Jun 2022
[87] 020 ACCC RFI - Grex consolidated - nbn Response 24 March.xlsx
[88] 020 ACCC RFI - Grex consolidated - nbn Response 24 March.xlsx

antenna. It does so by transmitting tightly focus RF signals, which target a very precise area without interfering with neighbouring zones.

- NBN Co has described that it has conducted trials and testing of the product[89]. Further understanding of the maturity of product/technology for outdoor macro use case would be required to assess the risks and associated mitigations, related to this relatively new technology.

- Increased requirements and expenditure for tower strengthening[87]:
  - More instances of tower structural strengthening are required to cater for additional antenna installation due to wind loading, than originally forecasted – NBN Co has indicated that this has become a significant cost driver.

- 5G mmWave signal limitations:
  - Signal propagation in mmWave band, while offering higher capacity, typically covers short distances only, and is susceptible to atmospheric absorption, reflection, and scattering from obstacles, thereby requiring Line of Sight (LoS) to the End-User premise antenna.
  - NBN Co has described that it is in the process of sourcing improved planning software that takes into account local clutter, terrain and other relevant information for more precise RF planning for the proposed 5G coverage[90].

- New WNTD maturity and availability:
  - A new generation of WNTD, WNTD v4 will need to be rolled out to replace the entire population of current WNTDs. This is a new product that has been recently[90] tendered. The availability, maturity and stability of the product is yet to be proven in the field.
  - NBN Co has described that mid-band 5G spectrum cannot be re-farmed until all WNTD 1/2/3 are upgraded to WNTD v4[91] – although it is not clearly documented what NBN Co's plan is regarding 5G mid-band and mmWave spectrum usage. They also described that WNTD replacement from v1/2 to v3/4 is required for high-speed tier orders[91].With 440k deployed WNTDs, and [redacted] per upgrade[91], the source and funding of any additional expenditure remains unclear.

In conclusion:

- Prudency of this expenditure is **Inconclusive**, as
  - A description of a documented process undertaken by NBN Co to assess alternative options has not been provided. As a result, an analysis of whether this expenditure item reflects the best course of action considering available alternatives is not supported by documented evidence,

[89] NBN Co initiative presentation and discussion.
[90] NBN IOP23 initiative presentation/ and discussion
[91] 020 ACCC RFI - Grex consolidated - nbn Response 24 March.xlsx, including email sent from NBN Co to ACCC on 28 March at 3.31pm with associated documentation entitled "023 ACCC RFI – BM 154 21 September 2021 – 11 Fixed wireless and satellite upgrades – CONFIDENTIAL" and "024 ACCC RFI – CR 12 14 June 2022 – Fixed Wireless and Satellite Upgrade Funding Agreement – CONFIDENTIAL".

- The combination of using new antenna technology and additional spectrum to increase capacity on existing sites makes technological sense. However no clearly documented strategy/approach has been provided to describe the use of the lens-based technology and 4G, 5G mid-band and 5G mmWave spectrum, and
- No clear, documented mitigation strategy has been provided for this assessment for risks such as new product/technology risks regarding new lens technology-based antenna and new WNTD, both of which are key components of the technology solution.

- Efficiency of this expenditure is **Inconclusive**, as
  - Technology upgrade and adding spectrum will naturally bring significant capacity increases. While the approach to calculating the unit cost target of $ per Mbps is understood, it is not clear how this can be used to perform an effective efficiency assessment,
  - There is an estimated cost of [redacted] per WNTD upgrade, to support capability upgrade or lifecycle replacement, which NBN Co has acknowledged does not factor into the cost per Mbps[92], and
  - Cost per site upgrade at [redacted] appears to be reasonable, however it is unclear how this cost factors in the possible upgrades due to the wind loading effect of upgraded antennas and equipment on the relevant sites.

12. Capability - SMB enablement (on-demand)[93]

[redacted]

[92] It remains unclear whether this cost is included in the forecast expenditure for this initiative as of 28 March 2023.
[93] SAU Supporting Submission Part F, Chapter A.2.3, Capability, pages 49 – 50, with more detail provided in 011 nbn ACCC Briefing – IOP23 – Business Upgrades – CONFIDENTIAL and through the RFI Process.

SMB Enablement Initiative (on demand) is an ongoing business as usual activity and involves building direct fibre connections to business premises on demand once an order is placed for NBN Co Enterprise Ethernet. It provides NBN Co's customers with the flexibility to meet end user requirements for higher speed services than would otherwise be available on NBN Co's multi technology mix. NBN Co deals directly with its RSP customers to understand end user needs and requirements. The capex for SMB Enablement includes direct fibre connections to meet growing demand from end users for access to higher speed business grade services and includes all build and connection costs for business fibre orders. The business grade services have symmetrical speeds and an option of additional service level support with a dedicated Business Operations Centre.

Volumes for SMB enablement activity is driven by end-user demand, with monitoring described by NBN Co to ACCC of number of premises and costs per premise. The cost drivers include build, design, activation, materials, NBN Co internal labour and delivery partner costs.

SMB Enablement capex is classed as a Competitive Service and is excluded from the Core Services ABBRR and the Core Services RAB and will not form part of the cost base relevant to the application of price controls[94]. Therefore, the key expenditure data is the competitive percentage of shared network and service infrastructure costs. The customer specific costs for SMB Enablement capex and opex (e.g., for the direct fibre connections) are not included in the RAB and ABBRR.

As the (large) majority of the SMB Enablement is a Competitive Service, no assessment has been made in this report of this component of forecast expenditure.

[94] "[CIC] NBN Co – SAU supporting submission – Efficiency of NBN's expenditure and demand forecasts – 16 December 2022 ("SAU Supporting Submission Part F"), Section A.2.5 Capability, Page 49-50"

13. Capability - Regional Co-Investment[95]

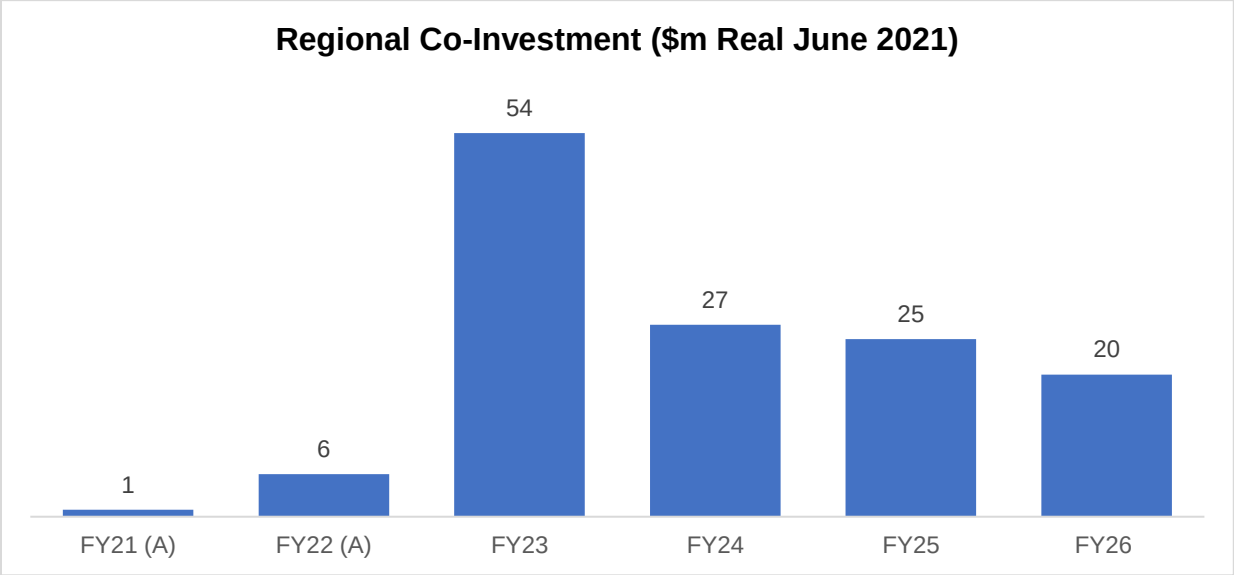


Figure 46 Regional Co-Investment ($m Real June 2021)

NBN Co'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. 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, resulting in the forecast level of capex on fibre upgrades in regional areas being lower.

The forecast is $72m over the First Regulatory Cycle (versus $61m for FY21-FY23).

Further detailed information on the unit costs of this initiative to qualify the assessment further was not available but this is understood as volumes for the Regional Co-Investment are driven by a number of external factors, such as:

- **Contracted upgrade programs**: where NBN co has a signed contract/grant agreement to upgrade a specific site/area to new technology, the total capex required in contract is planned in RCIF,
- **To be contracted nbn co-contribution**: allowance placed in plan for expected co-contribution programs run by federal/state/local authorities, and
- Demand for speeds higher than available technology in regional areas, coupled with federal/state/local government view for co-investment nationwide.

The key cost metrics for Regional Co-Investment initiative include:

- Network design,

[95] Refer to "007 nbn ACCC Briefing – IOP23 – Regional Upgrades - CONFIDENTIAL" and SAU Supporting Submission Part F, Chapter A.2, Capital Expenditure, Page 37, 38, 40, Chapter A.2.5, Capability Page 44-45, 50-51

- Construction,
- Transit network,
- Subscriber (fixed network only), and
- Connection cost (lead in and WNTDs).

The key monitoring metrics for Regional Co-Investment initiative include:

- All contracted programs are monitored against plan across technology and contract categories, and
- The cost per Mbps.

The prudency of the expenditure is assessed to be **Qualified Yes** as:

- Governments are co-investing with NBN Co to upgrade regional technology, meaning NBN Co's exposure to the costs is much more limited than the other upgrade and expansion projects identified throughout this expenditure review.

The efficiency of the expenditure is assessed to be **Qualified Yes**, as:

- The expenditure is handled as contracted programs that are planned as part of the RCIF process.

14. Capability – Other

[redacted]

There is a relatively small amount of capex allocated for two other initiatives[96]:

[96] SAU Supporting Submission Part F.

- Tech choice program: Ongoing Tech Choice program 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 network upgrade initiatives such as FTTN to FTTP upgrade.
- Business satellite service (BSS): proposed capex to enable the BSS product via beam expansion, Telemetry Tracking and Control, platform and network build, and transit readiness.

There is [redacted] allocated over the FRC for these initiatives.

- Tech Choice Program: Volume driven by demand for technology upgrades from end users,
- BSS: Volume driven by demand for business services.

The cost driver and monitoring metrics for these are related to the initiative characteristics: -

- Tech Choice Program: Cost per upgrade (depending on technology type).

The prudency of the expenditure is assessed to be **Qualified Yes**, as:

- This is ongoing BAU activity. Further detailed information on the activity to qualify the assessment further was not made available.

The efficiency of the expenditure is assessed to be **Qualified Yes**, as:

- The expenditure is customer led and predominantly funded by the end-user in most cases, and likely to be variable depending on the end-user requirements. Where there is upfront customer funding, this is expected to offset the capital expenditure included in the RAB.
- This represents a relatively small expenditure for NBN Co and is funded up-front (for Tech Choice). Further detailed information on the activity to qualify the assessment further was not made available.

15. Other - Systems Engineering and Operations[97]

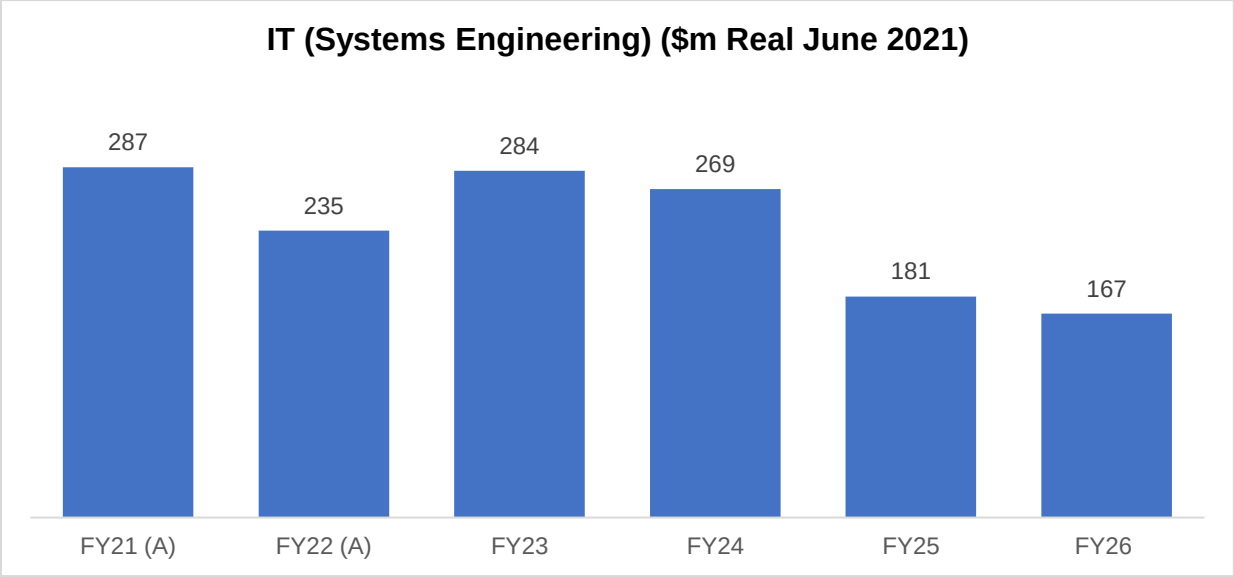


Figure 48 IT (Systems Engineering) ($m Real June 2021)

This initiative covers the IT Opex & Capex spend across the organisation (including effective management of vendors on key cost drivers). This is managed centrally through the Systems Engineering and Operations Business Unit (SEO) and includes capex (IT Systems Engineering) and operating expenditure costs (IT and software opex).

The Enterprise Simplicity program is the key initiative that underpins the cost savings across capex for IT (Systems Engineering) and opex for IT and software. This program represents a technologically prudent initiative to address the proliferation of multiple/duplicated applications that impact the cost base and the customer experience (including improved RSP availability, automation, APIs, and integration) and assurance processes. Some of the reduction in IT (Systems Engineering) capex is assumed to be attributed to the end of the Enterprise Simplicity program in FY25.

Most of the capex investment for this initiative is in FY21-FY23, so this is not expected to be a significant initiative in the FRC for the RAB and ABBRR, consequently, there is expected to be little impact to the cost base for application of price controls. Capex is forecast to be $45M in FY24-FY26.

Key volume drivers and monitoring metrics include number of applications, licenses, environments, incidents, devices, and labour (FTEs/TSAs and EWs). The cost drivers include labour costs, managed services (number of incidents), software licensing and maintenance, cloud managed services, application support and maintenance, IT hardware maintenance, telephony, and facilities.

The decommissioning of 166 applications highlights a technical debt with inefficient IT costs in the previous SAU period, with possible considerations for enterprise architecture and strategy,

[97] SAU Supporting Submission Part F, Chapter A.2.3, Capability, pages 49 – 50, with more detail provided in 004 nbn ACCC Briefing – IOP23 – SEO – CONFIDENTIAL and RFI Process (including nbn response to RFI dated 24 March 2023).

and/or technology governance in the operating model to monitor costs, allowing the multiple/duplicated applications across the IT platforms.

The main outcome from the initiative is [redacted] cost saving which represents both a prudent and efficient investment. However, there are no additional benefit/value metrics for improved service levels (such as customer experience and assurance).

This prudency of this expenditure is assessed to be **Qualified Yes**, as:

- It delivers costs savings across capex for IT (Systems Engineering) and opex for IT & Software Costs and represents a technologically prudent initiative to optimise, rationalise and modernise the existing applications that impact the cost base.
- Majority of capex investment for this initiative is in FY21-FY23, so this is not expected to be a significant initiative in the FRC in FY24-FY26.
- However, there is insufficient clarity on the extent of the overall net benefits delivered that consequently assist with the prioritisation of the expenditure on this program. There are no benefit/value metrics targeted including improved end-user experience and customer service assurance activities (e.g., service performance, willingness to pay, and possible revenue benefits for NBN Co).

The efficiency of this expenditure item is assessed to be **Qualified Yes** as:

- The main outcome is [redacted] cost saving of opex for IT & Software Costs for the FRC, i.e., comparison of IT and Software Costs (Opex) between FY21-23 and FY24-26. This justifies the business case for Enterprise Simplicity and is an efficient improvement.
- However, there are no benefit/value metrics targeted for improved service levels or committed due to an enhanced end-user experience (i.e., cost savings and benefits due to improved customer experience and customer service assurance).
- The break-even point (spend on program versus expected enterprise level savings) is likely to be beyond FY26 (6+ years).

Whilst the assumption in qualifying the findings around prudency and efficiency of this expenditure is that improvements in service levels will be delivered as part of the Enterprise Simplicity program, there has been no commitment to or transparent/discrete measures provided to achieve these outcomes, particularly in the areas of operational and customer experience. It is recommended that there are further measures implemented to track and measure IT costs related to business-as-usual activities so that they deliver (and preferably exceed) against the relevant industry service level metrics. IT Initiatives such as Enterprise Simplicity should improve on current service metrics baselines (e.g., improve delivery, assurance, customer experience). These service metrics, in the immediate term should align to the WBA4 and/or Module 4 of the SAU Variation, and it is expected that IT business as usual and expenditure for new initiatives should be reviewed, measured and tracked against these new metrics, as well as the WBA5, RKR or equivalent reporting that is introduced.

Reporting of IT capex and opex should be transparent with the detailed activities within Systems Engineering and Labour Costs made available to assess their prudency and efficiency of the programs they enable. For example, the Enterprise Simplicity initiative touched on System Engineering, IT & Software Costs and likely some Labour Costs which have not been fully transparent.

16. Other - Other Network[98]

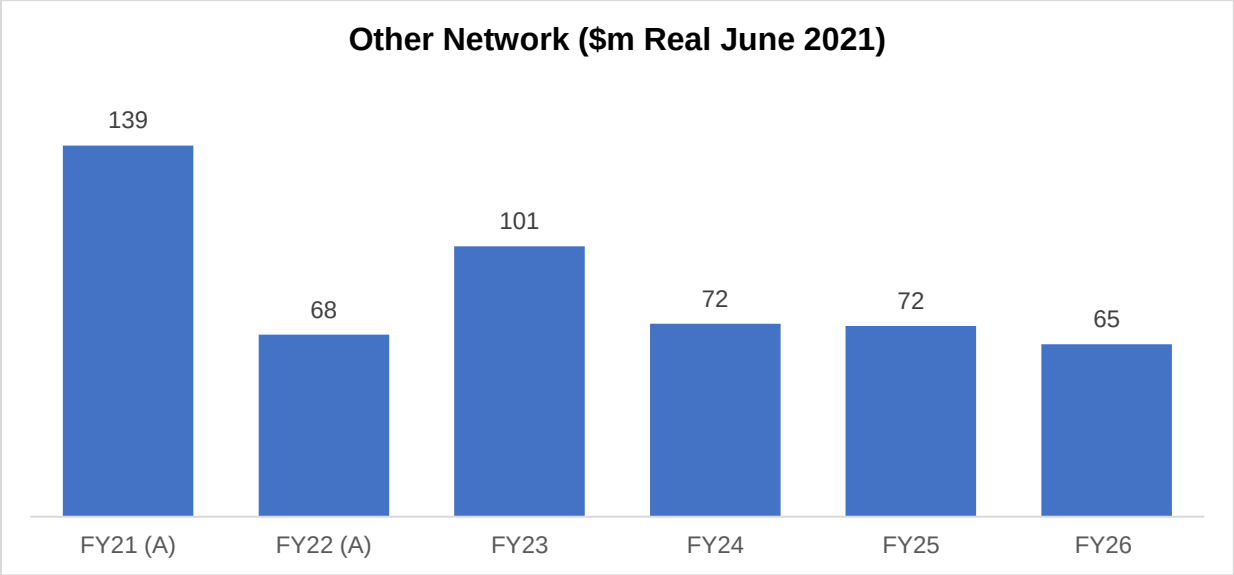


Figure 49 Other Network ($m Real June 2021)

Other Network within NBN Co's description of "Other" capex comprises capex proposed expenditure across network engineering & security (incl. the Aggregation Evolution program), Innovation Lab (testing equipment and new initiatives prior to implementation), manage ongoing cyber-sec risks, develop network efficiency improvements, undertake automation initiatives, internal field workforce tools capex.

There is $209m allocated over the FRC (2.8% of total capex).

The prudency of this expenditure is assessed to be **Qualified Yes**, as:

- This is an ongoing BAU activity. However, this is qualified as further detailed information on the activity to qualify the assessment further was not made available.
- Although this initiative addresses efficiency, automation and tools, there are no benefit/value metrics targeted including the overall benefits to the business and/or the end-user service experience (e.g., assurance, service performance, willingness to pay, and possible revenue benefits for NBN Co). This can assist with prioritisation of the program and its initiatives, and where relevant such as network efficiency introduce additional metrics for monitoring and tracking outcomes.

The efficiency of this expenditure is assessed to be a **Qualified Yes**, as:

- Expenditure breakdown assessed as high-level breakdown only. Further detailed information on the cost breakdown of this BAU activity to qualify the assessment further was not made available.
- Although this initiative addresses efficiency there are no benefit/value metrics targeted including the overall business benefits such as cost savings.

[98] SAU Supporting Submission Part F.

17. Other - Facilities[99]

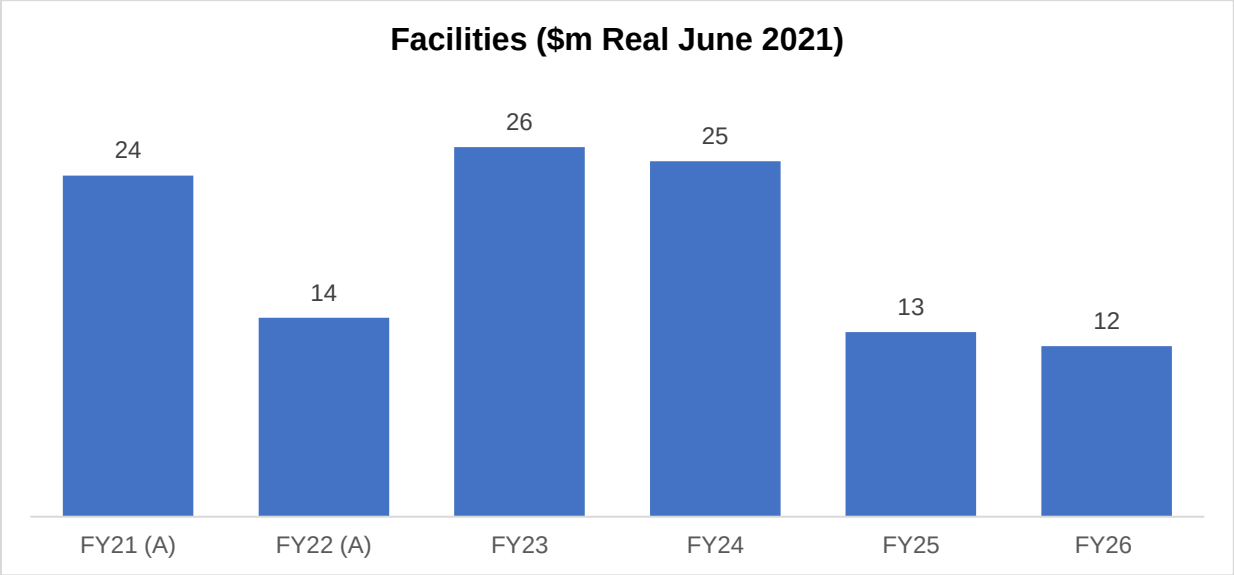


Figure 50 Facilities ($m Real June 2021)

This includes capitalised labour costs for business unit subject matter experts for time required to support various initiatives.

There is $50m allocated over the FRC (0.7% of total capex).

The prudency of the expenditure assessed to be **Yes**, as:

- Ongoing BAU activity.

The efficiency of the expenditure is assessed to be **Yes**, as:

- It is assumed that an appropriate process is followed to determine where and when this type of resources (appropriate expertise) is utilised within the business. Expenditure is related to upgrade/fit out works by third parties[100].

[99] SAU Supporting Submission Part F.
[100] 017 ACCC RFI - nbn Response - tranche 4 - CONFIDENTIAL.xlsx, Q5.2.6a

18. Other - Commercial Works[101]

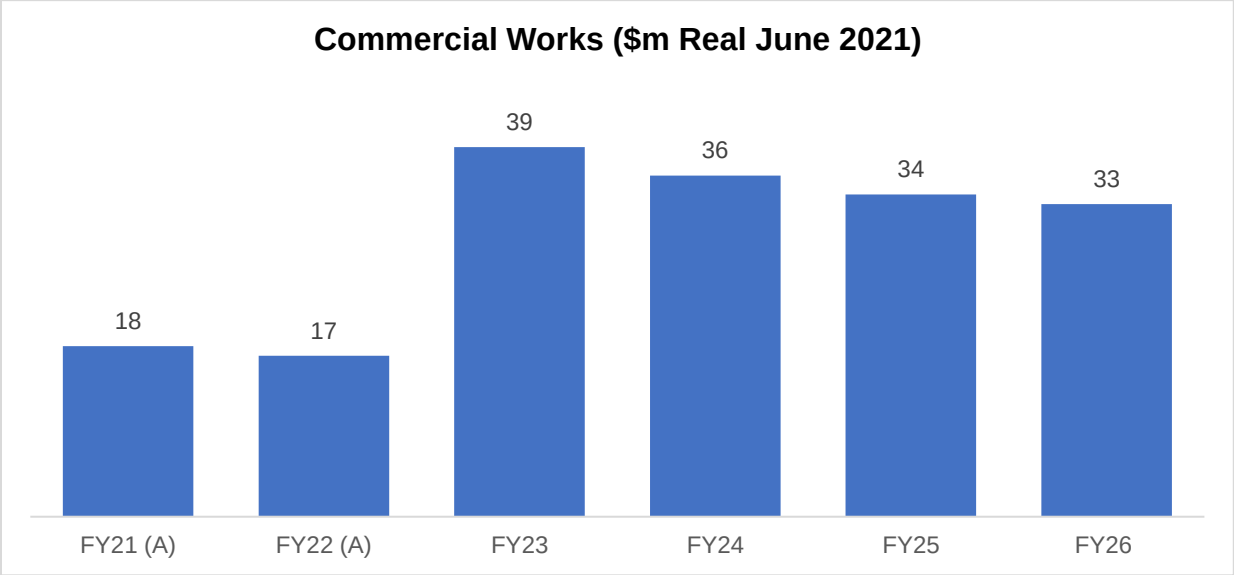


Figure 51 Commercial Works ($m Real June 2021)

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 Co infrastructure to allow for construction.

There is $103m allocated over the FRC (1.4% of total capex).

The prudency of the expenditure is assessed to be **Yes**, as:

- Ongoing business as usual activity.

The efficiency of the expenditure is assessed to be **Yes**, as:

- Delivered on a cost recovery basis.

[101] SAU Supporting Submission Part F.

19. OPEX - Infrastructure Payments[102]

[redacted]

Expenditure Item	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Infrastructure Payments	794	851	[redacted]	[redacted]	[redacted]	[redacted]

Table 6 Infrastructure Payments FY21-FY26 ($m Real June 2021)

The Infrastructure Payments is the largest operational expenditure [redacted] related to expense that provides for the use (under Telstra Arrangements) of ducts, exchanges and dark fibre that form part of the NBN Co network. Rates are set out under long-term contracts with Telstra. Expenditure is driven by network size, and volume of infrastructure to be leased.

Under the Telstra Arrangements, the amounts paid for each unit and type of infrastructure are CPI indexed so, in real terms, changes in the opex for Infrastructure Payments is related only to changes in the volume of relevant infrastructure used by NBN Co. Due to small additional volume of infrastructure in the near term, this cost is forecast to have a small increase. It represents a large component of the overall forecast operating expenditure.

The prudency and efficiency of this expense is related to NBN Co's enterprise function, i.e., procurement and financial management. As a long-term contract already negotiated with Telstra, this expense is not further considered in the context of the cost base for the FRC. Its prudency is assessed as **Yes,** as:

[102] SAU Supporting Submission Part F, Chapter A 3.1, A3.2, pages 53 – 55.

- Telstra infrastructure rental including ducts, fibres, and racks are required for BAU Activity.
- As a long-term contract already negotiated for Telstra infrastructure, there is no change regarding the FRC period. The cost is predictable, based on demand forecasts and contractual terms.
- The prudency and efficiency of this expense is related to NBN Co's enterprise function, i.e., procurement and financial management.
- It is assumed that NBN Co would be assessing the viability of the use of Telstra infrastructure under the agreement vs. other alternatives.

Its efficiency is also assessed as **Yes**, as:

- The cost is predictable, based on demand forecasts and contractual terms.
- This is a long-term agreement already in place between Telstra and NBN Co.

20. OPEX - Direct OPEX[103]

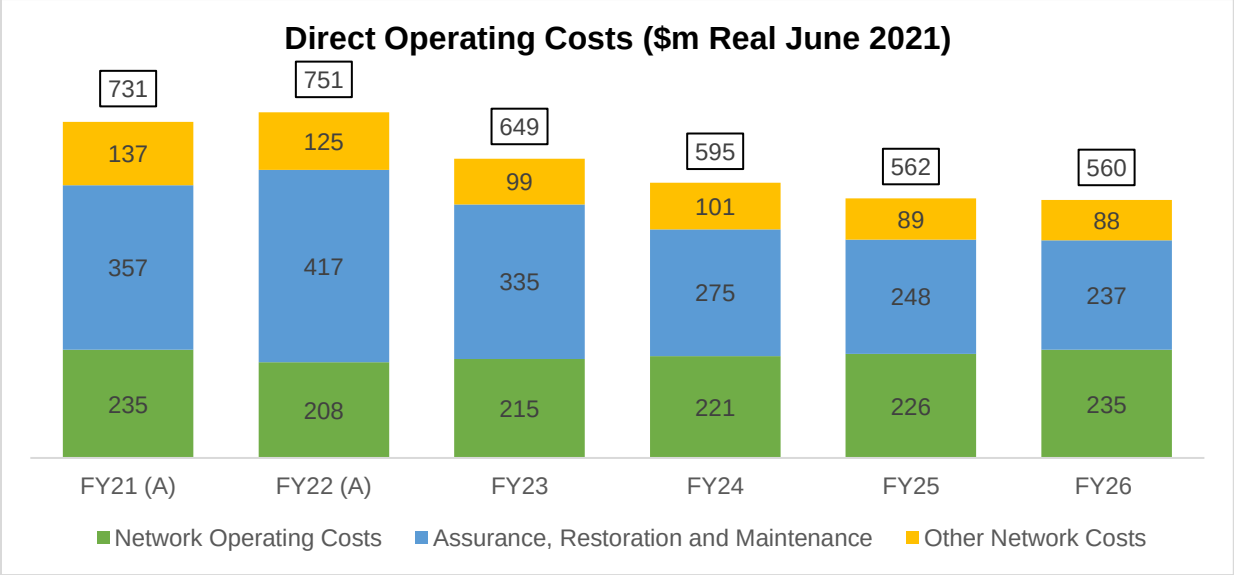


Figure 53 Direct Operating Costs ($m Real June 2021)

Direct Operating Expenditure relates to the opex required to physically operate and maintain the NBN network. It is the second largest opex expenditure, after Infrastructure Payments, accounts for ~23% of the total opex expenditure. It includes the following components:

- Network Opex: power, spectrum, site, and managed services (backhaul) costs.
- Assurance, Restoration and Maintenance: service assurance, network assurance and network maintenance
- Other Network Costs: freight and supply chain, vendor support contracts and more

[103] SAU Supporting Submission Part F, Chapter A 3.1, A3.3, pages 55 – 58.

Overall, the direct operating costs is forecast to reduce by 25.4% from FY22 to FY26, mostly due to forecast reduction in 'Assurance, Restoration and Maintenance' and 'Other Network Costs'.

Network opex:

Forecast total increase of 13% from FY22 to FY26 mainly due to forecasted rack power increase (23%). Due to lack of detailed supporting information through the ACCC Briefings and RFI Process, the impact of planned HFC outside plant modernisation and DAA roll out on network power consumption is unclear, as DAA nodes and amplifiers are both powered devices (i.e., active devices). Additionally, it is unclear if the impact the newly built FTTP network, as part of the FTTN to P upgrade program, has been factored into this expenditure category.

Prudency of this expenditure is **Qualified Yes**, as

- All the expenditure is required for BAU operation of the NBN network.
- Further detailed information on the activity to qualify the assessment further was not made available.

Efficiency of this expenditure is **Qualified Yes**, as

- The provided unit costs across various items appear to be reasonable.
- It is assumed that the impact of major network upgrade programs such as FTTN to P upgrade and HFC upgrade are already included in the forecast.

Service Assurance:

Forecast significant decrease of 43% from FY22 to FY26 due to forecast service assurance reduction (72%), network assurance reduction (11%) and network maintenance reduction (23%). It is described by NBN Co that, Truck Roll Efficiency Program and FTTN to P migration are the main contributing factors to the reduction in all three categories especially service assurance[104], which seems to misalign with the relatively slow migration forecast to FTTP from existing FTTN and FTTC end-users.

[104] SAU Supporting Submission Part F

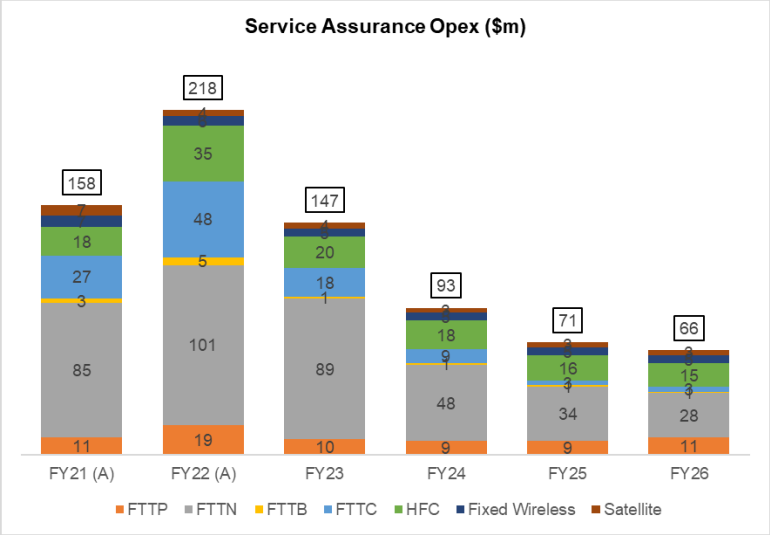


Figure 54: Service Assurance Expenditure: FY21-FY26[105]

Furthermore, NBN Co has forecasted a substantial reduction in service faults per 100 active premises across all the technologies[106]. NBN Co described that the key reasons for these reductions are[107]:

- For FTTN & FTTC specifically, better long-term weather conditions, compared with FY21 and particularly FY22 had more extreme weather incidents.
- A comprehensive and detailed Truck Roll reduction program which is focussed on reducing the volume of truck rolls as associated expenditure by: exploring opportunities to reduce the level of incidents by improving the performance of the network (i.e., upgrading equipment that may have been more weather prone with more robust equipment) and the efficiency of the truck rolls (i.e., reduced repeat truck rolls, not in attendance truck rolls etc).

[105] NBN Co SAU Submission
[106] 017 ACCC RFI - nbn Response - tranche 4 - CONFIDENTIAL.xlsx
[107] 020 ACCC RFI - Grex consolidated - nbn Response 24 March.xlsx

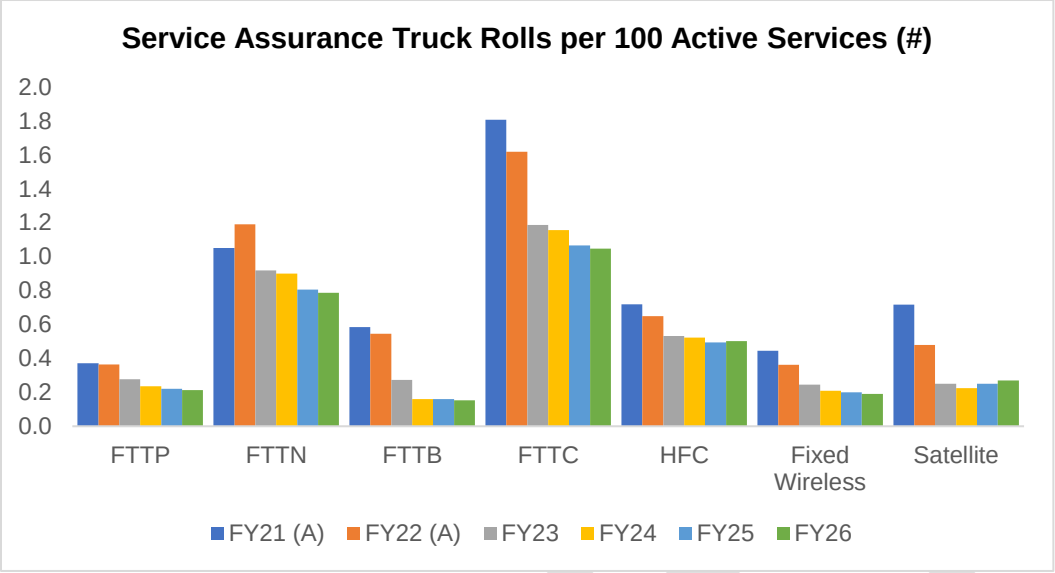


Figure 55 Service Assurance Truck Rolls per 100 Active Services (#)[108]

It can be deduced that the other contributing factors would be completion of the Initial Build and the reduction in new connects and network build program that results in a level of network stability (and reduction in fault rates) due to the reduced network change.

NBN Co is also undertaking a higher level of pro-active assurance, where NBN Co and its customer RSPs work together to identify faults and undertake activity to remediate before an incident occurs. Reduction in fault rates as a result of proactive assurance is not expected to accommodate the full-service assurance reduction forecast.

Prudency of this expenditure is **Qualified Yes**, as

- All the expenditure is required for BAU operation of the NBN network and maintenance of service levels & performance.
- Further detailed information on the activity to qualify the assessment further was not made available.

Efficiency of this expenditure is **Inconclusive**, as

- Lack of detailed information on Truck Roll reduction program that is supposed to drive down service incident volume. Service assurance incident volume per 100 active premise is proposed by NBN Co to gradually decrease from FY24 to FY26, predicated on a significant reduction from current year to the start of the period.
- FTTN to P migration is a major contributor to the overall volume and expenditure reduction[109]. However, this may be impacted significantly by the slow actual end-user migration rate as described earlier in this report. As no detailed models, calculations and assumptions were provided to support the forecast expenditure reduction, it is difficult to assess its accuracy and impact by the slow FTTN to P migration.

[108] 017 ACCC RFI - nbn Response - tranche 4 - CONFIDENTIAL.xlsx
[109] SAU Supporting Submission Part F

- It is also noted that the there is a significant expenditure reduction from FY23 to FY24, while the reduction over the FRC period is more gradual.

Other Network:

This includes miscellaneous direct network related costs such as: freight distribution & supply, vendor support contract and others such as fleet vehicle and security.

Prudency of this expenditure is **Yes**, as

- All the expenditure is required for BAU operation of the NBN network, and
- It is assumed that NBN Co is adhering to its procurement & governance framework (as described in the SAU Variation).

Efficiency of this expenditure is **Yes**, as

- Although no volume and unit cost information is provided, it is assumed there would be large degree of logical variation in both due to the type of activity included in this expenditure.

21. OPEX - Labour[110]

[redacted]

Expenditure Item	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Total Labour Costs (Opex Only)	831	665	[redacted]	[redacted]	[redacted]	[redacted]

[110] SAU Supporting Submission Part F, Chapter A 3.4, pages 59 – 60, with additional information from 006 nbn ACCC Briefing - IOP23 - Labour Costs - CONFIDENTIAL.pdf

Table 7 Labour Costs FY21-FY26 ($m Real June 2021)

Labour refers to the opex required for NBN Co's internal workforce, which is comprised of a mixture of Full Time Equivalents (FTEs) and Temporary Staff Arrangements (TSAs) across Ops (incl. internal field workforce), network engineering & security, regional development & engagement, SEO (incl. IT), customer products & marketing, corporate (incl. finance, people and culture, and other corporate teams).

There has been a steady decline in Labour operating expenditure since 2019's peak initial build period. Labour opex is reducing annually over the FRC, related to the tapering down of customer connect volumes following the completion of the initial build, partially offset by the headcount required to facilitate the delivery of the forecast volumes of work under the Network Upgrade Initiative, SMB Enablement Initiative and Regional Co-Investment Initiative, particularly with respect to the expanded scope of the FTTN to FTTP and fixed wireless upgrades.

Capitalisation is reflected against various capex programs based on Labour activity, and the Labour forecast is net of capitalisation. The real forecast includes nominal growth of 2.5% over the FRC for salaries for the whole internal workforce.

NBN Co has a number of initiatives to deliver headcount reductions within the range of [redacted] progressively to FY26. Capex efficiencies are expected through NBN Co's "Mega Processes", which are expected to reduce total headcount by [redacted] through:

- Process Simplicity Programme [redacted]
- Enterprise Simplicity Programme [redacted]
- Reduction in capex investment and build activity [redacted], and
- Op model optimisation [redacted]

The workforce plan includes recruitment in FY23 and FY24 for planned initiatives which include the FTTN to FTTP Network Upgrade and the Internal Field Workforce. [redacted] The IWF details have not been made available, except that in FY26 this will reach a Delivery Partner (DP)/IWF mix for Service Assurance Truck Rolls of 89% for FTTP, 60% for FTTN, 78% for FTTB, and 96% for HFC.

During FY24-26, Opex Labour costs are forecast to decrease [redacted] and appear to be driven by optimisation and planned reduction in the overall headcount. As such, the Labour cost reductions represent a **Qualified Yes** for both prudency and efficiency, as

- Labour cost reduction is a consequence of reduced headcount and maintaining average TFR flat across the FRC period.
- It is assumed the optimisation of the workforce will support the initiatives and on-going business activities of NBN Co, however, this would require further detailed analysis and additional breakdown of labour resources to confirm without any qualification. Further detailed information on the breakdown of this activity to qualify the assessment further was not made available.

22. OPEX - Other Operating Expenditure

[redacted]

Other Operating Costs Expenditure Items	FY21 (A)	FY22 (A)	FY23	FY24	FY25	FY26
Outsourced Services	118	97	[redacted]	[redacted]	[redacted]	[redacted]
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	503	[redacted]	[redacted]	[redacted]	[redacted]

				[redacted]			

Table 8 Other Operating Costs ($m Real June 2021)

This component refers to the support of all other aspects of NBN Co's operations – including non-network facilities, IT and software costs, outsourced functions, and insurance. The individual line items comprise the following:

1. Outsourced services: Outsourced services e.g., IT helpdesk, extended workforce arrangements,
2. Advisory & corporate costs: Legal, consulting, etc.,
3. IT & software costs: BAU (reductions expected through Enterprise Simplicity Initiative, this is already described in section 6 of this appendix.
4. Marketing & product costs: Advertising & media, customer marketing program, direct marketing & partnerships, other marketing, product costs,
5. Facilities costs: Office accommodation & other non-network facilities. Expected to reduce in line with internal workforce reduction,
6. TUSMA levy: Telecommunications Universal Service Management Agency: as NBN Co's share of industry eligible revenue increases, the amount NBN Co needs to pay towards the TUSMA Levy will increase,
7. Insurance: This covers insurance to protect NBN Co 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, and
8. Other internal expenses which include accounting, tax and audit fees, recruitment costs, training and development, corporate communications, office supplies and subscriptions, travel and entertainment, and other.

These are driven by a range of factors, including ongoing transformation and the level of required support for capital works.

The prudency of the expenditure is assessed to be **Qualified Yes**, as:

- Ongoing BAU Activity

The efficiency of the expenditure is assessed to be **Qualified Yes**, as:

- Expenditure breakdown assessed as high-level breakdown only.

23. OPEX - Service Level Rebates

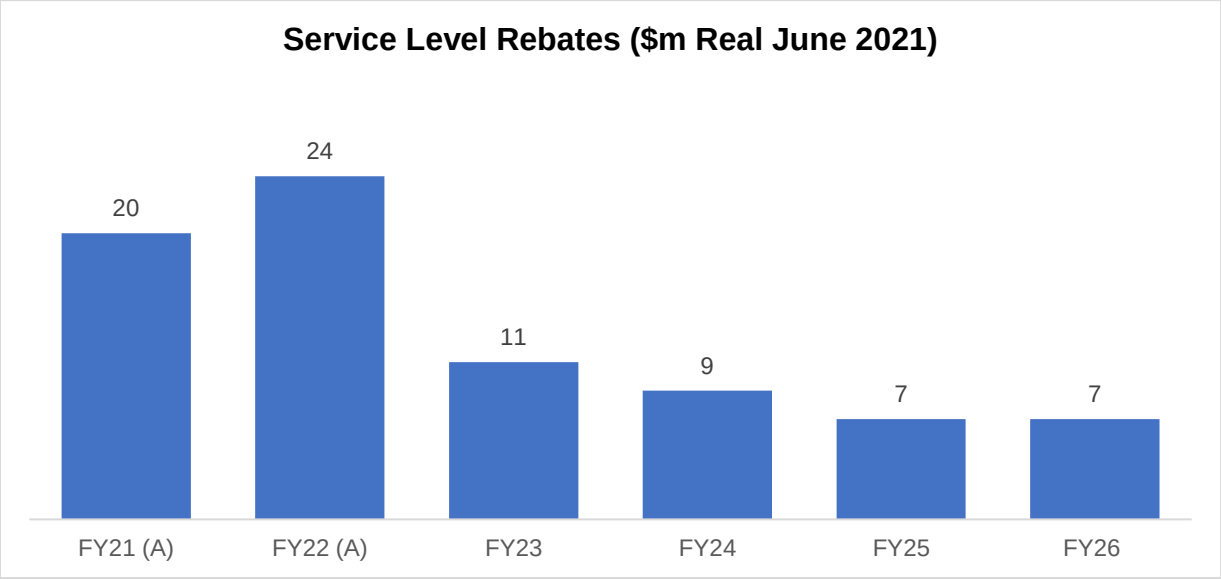


Figure 58 Service Level Rebates ($m Real June 2021)

NBN Co provides RSPs with rebates where NBN CO fails to meet the applicable Service Level. NBN Co has forecasted a significant reduction in the service rebate expenditure in the FRC.

The prudency of the expenditure is assessed to be **Qualified Yes**, as:

- This is related to the penalties regime included in the WBA and is forecast against NBN Co's perceived inability to meet the contracted service performance target(s).
- Further detailed information on the drivers and metrics that improve the end-user experience and service levels (including related current and roadmap IOP performance and assurance initiatives and activities) to qualify the assessment further was not made available. The introduction of new customer service metrics and reporting to monitor and enhance decision-making related to the end-user experience is assumed to play a key role in the improvements.

The efficiency of the expenditure is assessed to be **Qualified Yes**, as:

- This is forecast to decrease during the FRC relates to the continued stability and maturity of the network, and the proposed improvement in performance and capability provided by the current IOP23 initiatives, as well as future IOP initiatives.
- Further detailed information on the drivers and metrics for the improved service performance that reduces the rebates costs (including related current and roadmap IOP performance and assurance initiatives and activities) to qualify the assessment further was not made available.

24. OPEX - Subscriber Payments

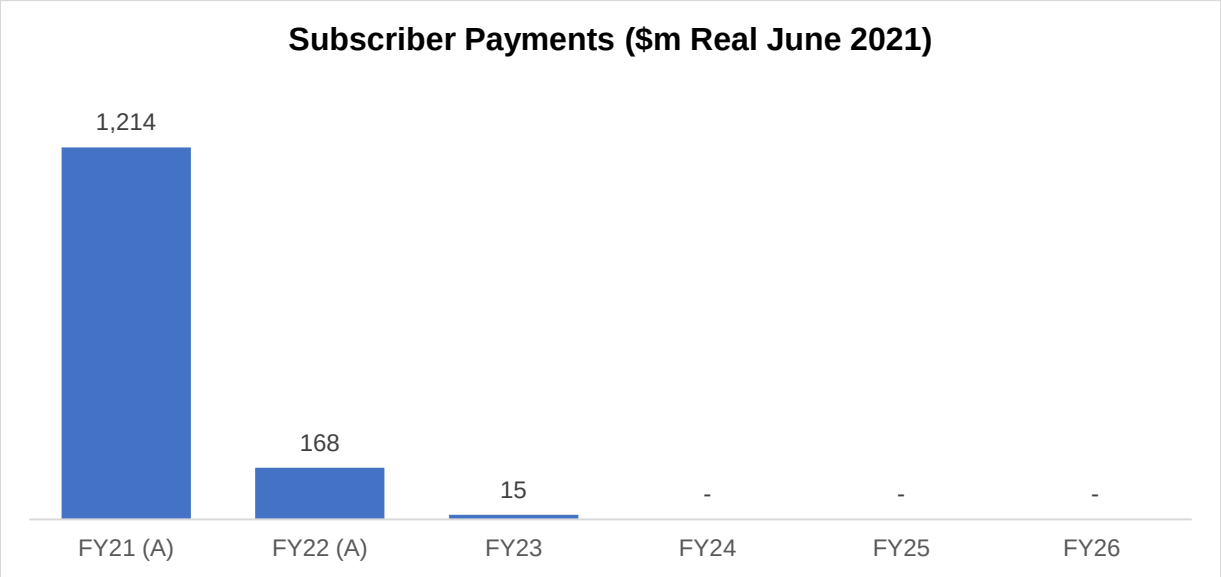


Figure 59 Subscriber Payments ($m Real June 2021)

This refers to the opex required to pay for disconnections from legacy networks under the Telstra Arrangements and migrations from legacy networks under the Optus Arrangements. NBN Co has forecasted no such expenditure in the FRC.

The prudency of the expenditure is assessed to be **Not Applicable**, as:

- There is no expenditure forecast.

The efficiency of the expenditure is assessed to be **Not Applicable**, as:

- There is no expenditure forecast.

Attachment A List of documents provided to Grex and used in preparing this Report (outside of RFI process)

Document received from	Date received	Document title (with reference used in this Report where relevant)
DLA Piper	22/12/2022	[CIC] NBN Co – SAU supporting submission – Efficiency of NBN's expenditure and demand forecasts – 16 December 2022 (***"SAU Supporting Submission Part F"***)
DLA Piper	22/12/2022	[CIC] NBN Co – SAU – Forecasts in support of SAU Variation November - 16 December 2022 (***"Supporting Forecasts – Confidential Version"***)
DLA Piper	22/12/2022	[Confidential] – 2009 – 2023 Building Block Model 2 December 2022 (***"BBM 2009 - 2023"***)
DLA Piper	22/12/2022	[Confidential] – 2009 – 2023 Building Block Model 2 December 2022 (***"BBM 2024 - 2040"***)
NBN Co	15/12/2022	001 nbn ACCC Briefing – IOP23 Expenditure Overview – CONFIDENTIAL
NBN Co	17/01/2023	002 nbn ACCC Briefing – IOP23 – Network Roadmap - CONFIDENTIAL
NBN Co	17/01/2023	003 nbn ACCC Briefing – IOP23 – Fixed Line Upgrade - CONFIDENTIAL
NBN Co	13/01/2023	004 nbn ACCC Briefing – IOP23 – SEO - CONFIDENTIAL
NBN Co	13/01/2023	005 nbn ACCC Briefing – IOP23 – Demand Forecast Methodology - CONFIDENTIAL
NBN Co	18/01/2023	006 nbn ACCC Briefing – IOP23 – Labour Costs - CONFIDENTIAL
NBN Co	18/01/2023	007 nbn ACCC Briefing – IOP23 – Regional Upgrades - CONFIDENTIAL
NBN Co	19/01/2023	008 nbn ACCC Briefing – IOP23 – Truck Rolls - CONFIDENTIAL
NBN Co	19/01/2023	009 nbn ACCC Briefing – IOP23 – New Developments - CONFIDENTIAL
NBN Co	19/01/2023	010 nbn ACCC Briefing – IOP23 – Capacity - CONFIDENTIAL
NBN Co	19/01/2023	011 nbn ACCC Briefing – IOP23 – Business Upgrades - CONFIDENTIAL
NBN Co	15/02/2023	012 ACCC RFI – FY23 Opco Report Dec-22 Final - CONFIDENTIAL
NBN Co	15/02/2023	013 ACCC RFI – FY23 Opco Report Jan-23 Final - CONFIDENTIAL
NBN Co	6/3/2023	018 nbn ACCC Briefing – IOP23 – Risk Management Framework – CONFIDENTIAL
NBN Co	24/3/2023	021 ACCC RFI – IT Investment Business Case – CONFIDENTIAL
NBN Co	24/3/2023	022 ACCC RFI – Project Risk Guidelines – CONFIDENTIAL
NBN Co	28/3/2023	023 ACCC RFI – BM 154 21 September 2021 – 11 Fixed wireless and satellite upgrades – CONFIDENTIAL
NBN Co	28/3/2023	024 ACCC RFI – CR 12 14 June 2022 – Fixed Wireless and Satellite Upgrade Funding Agreement - CONFIDENTIAL
ACCC	13/1/2023	IOP23 – Exco documents – for ACCC – CONFIDENTIAL

Document received from	Date received	Document title (with reference used in this Report where relevant)
ACCC	13/1/2023	Folder of documents provided: • IOP23 Exco Overview Strategic and Operational Guidance – Exco – 20220119 • IOP23 Top Down Financial Guidance – Exco - 220202 • IOP23 IAP Build Profile - Exco – 220209 • IOP23 Business Products - Exco – 220209 • IOP23 New Developments - Exco – 220209 • IOP23 Usage & Demand Profile - Exco – 220209 • IOP23 Network Capacity Management - Exco – 220223
ACCC	13/1/2023	Folder of documents provided: 1. IOP23 TC4 Base Management and IAP Take Up – Exco 220302 2. IOP23 WFP Initial Submission – Exco – 220302 3. IOP23 Network Lifecycle Planning - Exco – 220309 4. IOP23 WFP [Final Submission] - Exco – 220323 5. IOP23 TC4 Base Management and IAP Take Up - Exco – 220323 6. IOP23 C&A Optimisation (Trucks Rolls Reduction Initiatives) - Exco – 220330 7. Update on Initial FY23 Financial Position – ExCo – 220413
ACCC	13/1/2023	Folder of documents provided: 8. IOP23 IER Prioritisation – Exco 220413 9. RTC & Activations Changes – Exco - 220413 10. IOP23 CX Update - Exco – 220427 11. IOP23 Finance Overview & Kick Off - Exco – 220510 12. IOP23 Key nbn strategic priorities + metrics - Exco – 220510 13. IOP23 Customer Products & Marketing- Exco – 220510 14. IOP23 Operations- Exco – 220510
ACCC	13/1/2023	Folder of documents provided: 15. IOP23 Regional Development & Engagement [RDE] – Exco 220511

Document received from	Date received	Document title (with reference used in this Report where relevant)
		16. IOP23 Network Engineering & Security [NES] – Exco 220511 17. IOP23 Systems Engineering & Operations [SEO] – Exco 220511 18. IOP23 Risk Profile – Exco - 220511 19. Corporate Business Units - Exco – 220511 [For Reading – not presented at meeting] 20. Integrated Operating Plan FY22-26 Draft 10 – ExCo - 220518 21. Future Workforce update – ExCo 220518
ACCC	19/04/2023	Expenditure review – draft report – nbn comments on confidentiality and factual accuracy (***"NBN Commentary 19 April"***)

RFI Process

The RFI process (referred to throughout this document as “RFI Process”) was an important step within the overall process of the expenditure review and assessment. Following the review of the initial information and workshops provided by NBN Co, the ACCC submitted a RFI Excel spreadsheet containing 41 individual questions on 30 January 2023.

Questions 1-12 related to capital and operating expenditure and sought information such as purpose of expenditure, metrics (volume and unit costs), and risks and governance information. Question 13 requested detailed business cases for the expenditure items deemed significant by NBN Co. Questions 14-41 covered a range of topics across IOP expenditure items as well as BBM and RAB items.

The questions were answered over a ~6-week period across 5 ‘tranches’ of responses. The tranches of information were provided by NBN Co to ACCC and then through DLA Piper to Grex on the following dates:

- Tranche 1: 16th February 2023,
- Tranches 2 and 3: 21st February 2023,
- Tranche 4: 3rd March 2023, and
- Tranche 5: 15th March 2023.

Examples of the information received from NBN Co for each Tranche are shown below.

RFI No.	RFI	Response
17	What is the mechanism to remove Shared - FL capex from non fixed-line components of competitive services within the cost allocation process illustrated on Page 8 of NBN Co - Initial cost allocation manual - 2 December 20222	Fixed line, Fixed wireless and Satellite services, form part of the Core services BBM, which [noting the response to RFI No. 15] does not allocate between technology types.
18	What specific initiatives, or technology is in place, to integrate network and service data and analytics with the Financial Management systems? For example, to what extent are the enterprise financial systems integrated with network and service assurance systems, for analysis of network/service metrics and data? Billing systems would be another example, where I expect there is some level of integration of data in place. a. What level of automation is used in generating dashboards, and decision-making? b. What are the future plans?	Specific initiatives include: Rollout Automation - For activations, orders come in Fulfillment systems which then talk to Workforce/operational domain. Once the actions are completed, the details go back to Fulfillment which then sends an order update [completed] for Billing activations. These are fully automated, and failures are managed manually. Assurance assures that all orders coming through the various domains in remove network, Fulfillment, order and billing data are all aligned. Billing systems were modernised as part of ESES program. There is a program now underway which will further uplift the Fulfillment systems. WFM management - all orders/assurance data is fed into CEDM [data and analytics platform] which has all the logic to check where SLAs were not met. This is then integrated with Billing to pay rebates. The info is also used in Finance for financial accounting treatment. The solution is automated but provided CDO [Control Data Officer] to view data and finalise before this data is used in Billing. All manufacturer [illegible] data is used into Peoplesoft/Workbench where payments are verified against contractual obligations. This is then integrated with the Finance system [EDS] for payment.
38	Is there network and service model and topology maintained for correlation of incidents, in assist with network and service assurance activities? a. What level of manual and automated processes are used for correlation of incidents, or are planned? b. Are you able to assist the RSPs in correlate incidents in their environment, or only in identify the RSP? c. How are the inventory databases integrated and/or planned to be enhanced	Correlation of Service incidents to Network incidents and customer analysis of network incidents in operating at a basic level of capability and effectiveness at this time, the main source of limitation being the fragmentation of some of the underlying who data sources. There is a program now underway which will implement a centralised Configuration Management Database ["CMDB"]. Once completed it will remove more of these limitations and provide a more complete and accurate correlation. a. To improve the efficiencies of the network incident process, basic automations capabilities have been implemented to support the correlation of network events to network incidents. There is a program underway to further uplift the network incident process through automation. Once completed it will remove a significant volume of manual interactions within the network management process. b. If it is reported that services impacted will have incident information provided on an AVC basis to relevant RSPs. RSPs would need to translate AVC information to customer details. c. A program to implement a CMDB that will contain a centralised view of Network and Service topology is currently in flight. This will be based on the ServiceNow platform, an application commonly used within the industry.
31	For assurance and customer service activities, are there access/functional teams set up to resolve hardware between L1, L2, etc. support levels? a. Are there plans in the SEO updates roadmap for the use of AI [or equivalent] in network and service assurance activities, such as Intelligent Automation? b. Do the insular end-users, partners, RSP in the process re-engineering where applicable [e.g. DesignWorkshops or equivalent]	Yes - see response to Question 29 above also works with RSPs on the development and deployment of solutions, and end users.
35	In 'Capex Compressed', 'Input', 'Depreciation' and other worksheets, please provide a unit breakdown by Core Services [FTTP/C/B/H, HFC, FW, Sat], and input by asset type	As noted in our response to RFI No.15, the Core Services BBM does not allocate between technology types. Although this was a basis of allocation in earlier versions of the Core Services BBM, the allocation was not carried through in successive iterations of the Core Service BBM and is not needed to meet the proposed SAU. Given the multiple model iterations since technology type allocations were a feature of the Core Services BBM, it would not be a trivial matter to generate an additional standalone Core Services BBM based on technology type allocations.

Figure 60 NBN Co Tranche 1 Response

RFI No.	RFI	Response
22	As FTTB upgrade path (to FTTP) is still being investigated, are all the Capex costs associated with FTTB BAU costs using current technology (VDSL/VDSL2)?	nbn does not intend to install new FTTB cabinets into new MDUs, however capacity management of existing FTTB brownfield sites will be through augmentation of additional VDSL2 cards where required
23	Can nbn please provide documentation detailing the process of approving and undertaking upgrades that are pre-EOL and not due to EOL/EOS considerations?	
24	Given its dynamic nature, how does nbn propose to monitor changes to the Network Roadmap and report in a clear manner changes to past KADs and other Roadmap components?	nbn has an established process on making long term technology decisions as outlined in slide 5 of the pack. This is a yearly process of ensuring key architecture decisions and associated high level business cases are kept up to date and we are using the most cost-efficient technologies in the nbn network, and an approval mechanism is in place to ensure plan of record is kept.
25	Similar to the content on slide 8, please provide equivalent network performance metrics (such as Speed, Latency, MBHT, total capacity) for upstream traffic.	With reference to the long-term technology plan, the key network performance metrics for upstream traffic are MBHT, total traffic and network latency. Traffic & MBHT - June 2022: Traffic 1.5Tbps, MBHT 0.17Mbps - June 2032 - 1.7Tbps, 0.22Mbps Latency reference provided on slide 8 is a round trip measurement so already includes upstream.
26	Have the systems impact and costs been estimated for FTTP upgrade? - Please confirm if costs presented include any systems costs (i.e. only related infrastructure build costs) - If systems costs have been included, please provide assumptions, details and breakdown	The system costs of the Fixed Line upgrade to FTTP were considered. The costs presented in the Fixed Line upgrade briefing material were only the build and connect costs. System costs are included within the SEO financials. In IOP, $67m* was allocated to support the fixed line upgrade program SEO requirements ($40m* in FY24-26 period). This is to support product classification, build and connection fulfillment requirements etc. (*) Assumes Real $ (June 21)
27	The build costs have been estimated for FTTP upgrade in the Fixed Line Upgrade document. Systems savings are also included in the SEO document. a. Have there been any systems connect/assurance/support savings estimated as a result of the FTTP upgrade? If so, are they covered by the SOE document, or any other document such as Truck Rolls? b. It is expected that FTTN to FTTP will provide some improvements in connect, assurance, etc. which together with the enterprise simplicity program may see a significant improvement. It would be helpful to understand the breakdown in percentages across these programs, and cross-impacts if any.	The (on-demand) migration of premises from FTTN to FTTP under the Network Upgrade is forecast to result in structural reductions in opex costs that are expected to become more significant once all customers have fully migrated from the FTTN network. Minimal cost savings are forecast in the first regulatory Cycle and primarily relate to the reduced assurance costs because of the lower fault rates of the FTTP technology compared to FTTN. These cost reductions were embedded in the figures presented in the Truck Roll briefing. There were no SEO cost savings assumed because of the upgrade The assurance cost reductions are predicated on the migration profile. In FY24 the assumed savings equate to 4% of assurance costs and grow to 12% by FY26.
28	The SEO document includes costs associated with the Roadmap, especially the ES25 program. It is not clear how this high level roadmap (e.g. SaaS, Data & Analytics) maps to the BBM data/costs and how it is represented in the BBM. a. Is there further breakdown as to how this roadmap maps to the BBM data, i.e. item and percentage breakdown of the costs included - if so please provide further details and documentation b. Related to the roadmap, what is the current baseline of the key technology items and metrics you are looking to improve on? (This will help with understanding the amount of change that is required, and value delivered over time to meet the target state and savings (e.g., a data platform is often a multi-year program, with significant costs and change management requirements).	
29	Moving to industry standards/directions around modern architectures is a key part of the system evolution, such as moving to a loosely coupled, data driven, intelligent automation, self-serve architecture. a. It appears that this is governed by the Enterprise Architecture capability in nbn, please confirm. Is this organisational capability handled as a centralised capability? Are there any communities implemented across the organisation, e.g. CoP (Practice), CoE (Excellence)? b. Have any key weaknesses in current systems architecture been identified? Please provide details. Apart from decommissioning and shutdown, are there any expected efficiency and/or process improvement savings from the initiatives. For example: i. data & analytics, ii. moving tightly coupled (P2P) to modular API-driven architecture using integration platforms, and iii. automation. c. What are the key data & analytics and integration platforms in place, and their relative maturity with regard to the system processes currently implemented? What is the target state likely to look like, especially with regard to data/analytics and automation?	a. This capability is both centralised and distributed depending on the timeframe. The CTO sets the 2 to 10-year systems strategy and executes via KADs (Key Architectural Decisions). Enterprise Architecture then incorporates these decisions into the nbn-wide reference architecture in discussion with domain-based Architecture communities (data and analytics, security, infra, digital integration). The Solution Architecture domain teams build target domain architectures, that transform and reduce costs as we deliver business outcomes and take the reference architecture into account when designing solutions. b.i. Data simplicity will deliver a 50% reduction in reports (~12k) and reduce applications from 67 to 37. For example, SharePoint migration is now complete moving from 3 different versions of SharePoint to one strategic solution. SharePoint Online (SPO) with decommissioning of infrastructure saving $3.5m OPEX p.a. by FY24, uplifting user experience and capability by integrating MS Teams and Planner. b.ii. Moving to an API enabled architecture will reduce costs for both partners and nbn. Partner simplicity will deliver seamless integration into nbn processes allowing for direct pass through of requests from partner systems using APIs. This is complemented by a simplified and common portal framework that allows partners to use bots if desired, while reducing cost of change for nbn and increasing speed to market. Similarly, using APIs internally allows reuse of data patterns and reduces the need for custom integrations and bespoke development. b.iii. Automation is enabled by the simplification of systems and processes delivered by ES25. This programme enables self-serve automation capabilities for many processes when complete. Consolidated and simplified business processes, accurate and reliable centralised data, business self-service as well as deploying AI/Machine Learning capability onto real time data streams. c. Consolidating to a single data warehouse and data lake will remove 3 data warehouses, 4 data lakes and 30 Data Discovery Environments. This simplified architecture, along with data visualisation tools and data virtualization capability, as well as proactive monitoring to reduce inconsistencies and errors, allows self-service configuration of reporting. This capability will also allow data to be accessible to other systems more easily. The long-term strategy for autonomous networking that aligns to the Open Digital Architecture TMForum standards with reusable

Figure 61 NBN Co Tranche 2 Response

RFI No.	RFI	Response
14	Please describe and provide information on how the capacity model (e.g. Network Engineering Capacity Model) is utilised and implemented across the organisation (e.g. design processes) and technology (e.g. activation, assurance and operations) particularly to assist with planning purposes, e.g. a. How does the capacity model correlate and/or map to network assurance metrics on usage, etc.? b. How does the capacity model correlate and/or map to network & service model/inventory for service management?	Network Engineering Capacity Modelling develops an associated capacity upgrade path and augment plan for right time implementation by leveraging inputs from various nbn business units. The Network Engineering Capacity model ingests inputs from organisation wide data to determine capacity requirements. This data includes: a) Current network usage, b) Forecasted usage growth, c) residential and business service activations forecast, d) new product introductions, e) network assurance considerations on availability, resiliency etc. f) service assurance considerations on performance etc. g) network roadmap, including lifecycle plan. Network Engineering Capacity Model generates Augmentation Plan, which sets out the design, build, augmentation, and migration works required to ensure the network continues to have sufficient capacity to meet end user needs into the future. This then helps develop a Deployment Plan factoring labour, material and design and build process requirements. Key leading and lagging metrics also support the monitoring & maintenance of network capacity and course correct deployment plan as required. Capacity process regularly monitors network usage and forecasted growth, comparing against capacity thresholds, nbn design guidelines resulting in capacity upgrade trigger flowing to design and build teams for implementation. Regular governance forums track deployment and spend actuals compared to forecasted budget, as well as network metrics on usage, utilisation and performance.
19	The handling of EOL/EOS of product lifecycle is a typical process for all technology organisations and individuals. a. Does nbn face a specific challenge with the handling of EOL/EOS of the infrastructure and systems? b. Does nbn need to put in place any specific measures to manage the EOS/EOL products, or is this a financial consideration? c. Due to maturity of the nbn business and platforms, is the EOS/EOL only now impacting the business and operational costs? d. How is EOS/EOL handled in nbn's Operational Model, i.e. governance forums, roadmaps, metrics used, tools?	a.The main challenge has centred around global shortages that have resulted in unplanned EOL notifications. The most notable was the global chip set shortages which affect our HFC Modems and FTTC DPU's. As nbn holds strong relationships with each of our equipment suppliers, notifications of this type are address with suppliers to operationalise suitable replacements. b.Both are relevant and considered as part of the nbn Lifecycle management and Transition Planning process, considers the risk appetite of the network, cost to upgrade and maintain, assets to sweat, management of technical debt, and requirements of long-term product & technology strategy to determine the network upgrade plan. c.nbn has been managing EOL/EOS on platforms from the beginning, noting that we have always included appropriate EOL/EOS arrangements as part of our contracts with vendors. In the past few years, larger Network Evolution programs have been initiated to mitigate EOL/EOS on the ageing Network. d.As part of the overall Network Roadmap - Lifecycle management is delivered through processes, systems (and databases), transition planning, governance, IOP funding and capability delivery as outline in Network Roadmap briefing document
20	Slide 10 "Network simplification: simplify and secure our network for customers" provides an excellent overview of the network simplification program. a. This program is assumed to have been incorporated into the BBM (Building Block Modelling) and the costing. Can you confirm? b. It would be helpful to understand the next level of detail and how it maps to the data in the BBM. For example: the percentage each program/initiative contributes to the costs and data presented in the BBM. c. As programs can change over a 10 year cycle, due to many valid factors, what robustness is there in the roadmap, operating model, and BBM model to absorb the changes, and stay aligned on the value outcomes for the end-customers, RSPs and stakeholder.	a. The network simplification programs, based on current IOP planning are included in our overall capex expenditures use for the calculation of BBM forecast capex expenditure. However, any further FTTP upgrade opportunities of the Copper network are not specifically included. b. Minimal cost are forecast in the first regulatory cycle and primarily relate to the building of capability. The costs are expected to become more significant as deployment scales into FY26+ c. nbn typically plans its long-term technology roadmap over a 10 year period combined across access, aggregation, transit and associated systems. The input to this model is the traffic and speed forecasts, corporate plan, and user capability needs and operational needs of nbn to maintain an efficient network that meets the digital capabilities for all Australia. Over that 10 year period there can be many technology shifts, changes and innovations that change that roadmap and associated costs to deliver; these costs are managed as an overall capex profile.
21	The information presented is specifically on the strategy and planning aspects. A key risk is understanding the organisational ability to deliver on the Network Roadmap, and putting in place any mitigation. a. Does nbn have any specific plans to enhance the overall enterprise agility in the area of delivery, to meet the end user experience, and achieve the customer experience and business KPIs/targets/outcomes. b. If there are specific plans to enhance delivery, can nbn elaborate further on what those plans are?	
23	Can nbn please provide documentation detailing the process of approving and undertaking upgrades that are pre-EOL and not due to EOL/EOS considerations?	nbn applies the same Technology Strategy Management process for upgrades driven by capacity and performance. Slide 5 (Technology Strategy Management) of the Network Roadmap briefing document (as presented to the ACCC/Grex on 17 January 2023) sets out the process for any capacity and performance upgrade considerations.

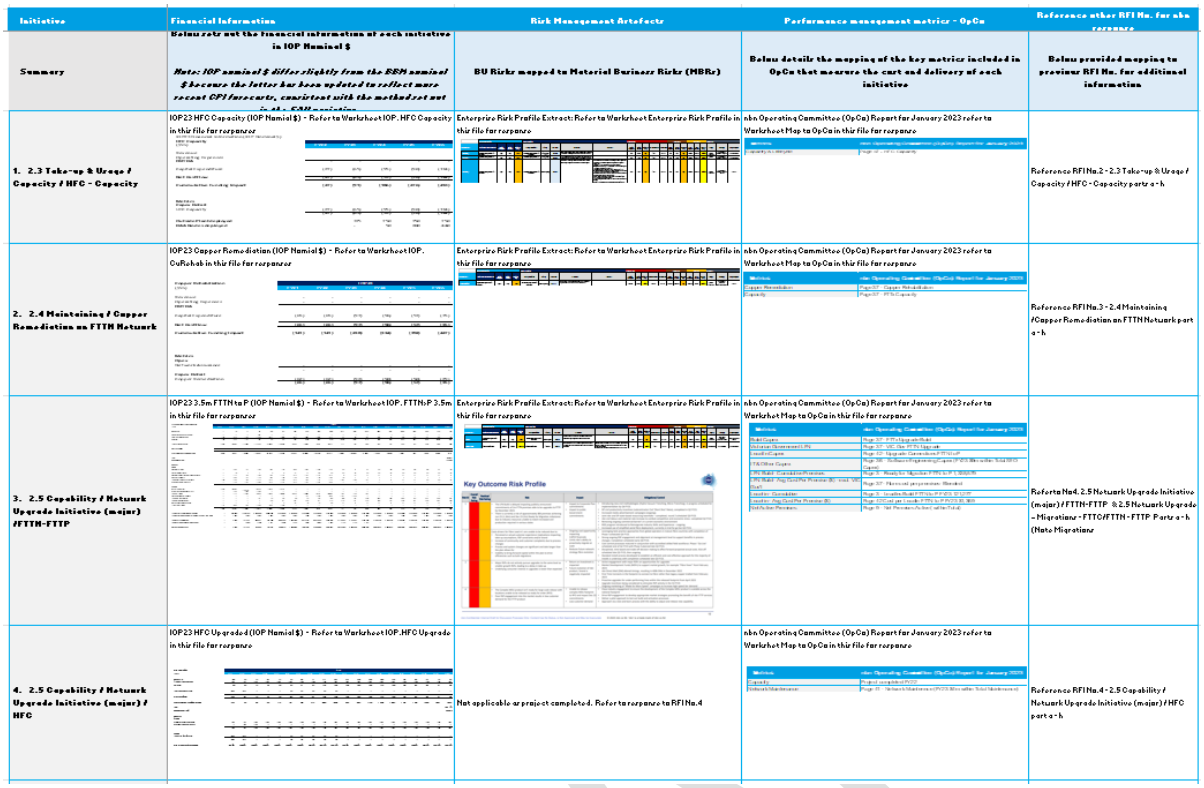
Figure 62 NBN Co Tranche 3 Response

NBN Co responded to RFIs 1-12 in Tranche 4 and as such the questions were responded to in an additional sheet by NBN Co. This is due the large number of questions within each question, which NBN Co responded to by using a matrix format with the initiative/spend item across the column headings and the individual questions across the row headings. This was repeated for each RFI question. Snapshots are pictured below.

RFI No.	RFI No. 7 Descriptions	A.3.7 Subscriber Payments
12	a. Please provide details and description of the key drivers and unit cost assumptions used to forecast and plan the allocation (e.g. events, quantities, location) - historic and forecast	Payments for disconnections from legacy networks under the Telstra Arrangements and migrations from legacy networks under the Optus Arrangements not forecast beyond FY22 following the completion of the initial build. Relatively minor opex is forecast in FY23 related to the Medical Alarm Subsidy Scheme and Unconnected Families.
	b. Please provide details and description of the key metric(s) used to track and measure performance and/or service delivery (targets and actual) - historic and forecast	Subscriber Payments are not forecast to be incurred in the First Regulatory Cycle. IOP Real $ FY21 (A) FY22 (A) FY23 FY24 FY25 FY26 Subscriber Payments ($'m) 1,226 165 15 - - -
	c. Please outline the any critical dependencies and assumptions for the ongoing delivery, management and performance of the area (e.g. other projects, capabilities, 3rd parties, other)	Not applicable, refer item b above
	d. Please confirm cost allocation outlined in documentation (see reference) - opex (historic / forecast). Please confirm progressive spend for FY23 forecast budget and updated forecast if changed	Not applicable, refer item b above
	e. Please provide details and description of cost allocation contingency (historic / Forecast)	Not applicable, refer item b above
	f. Please provide governance and risk framework used to manage and ensure program/project delivery, performance and cost management	**nbn** applies the same governance process across all expenditures. Slide 10 (Expenditure Governance Progress) of the IOP23 Expenditure Overview briefing document (as presented to the ACCC/Grex on 16 December 2022) sets out the process.
	g. Please provide all governance and/or programme reporting documents /presentation for the past 12 months.	Provided the **nbn** Operating Committee (OpCo) Reports for January 2023 and December 2022 on 15 February 2023
	h. Please provide Risk Register(s) (if not already provided in g.) - key risks (risk description / status / rating / date - current and historic past 12 months)	Not applicable, refer item b above

Figure 63 NBN Co Tranche 4 Response

NBN Co responded to RFI 13 in Tranche 5, which requested business case information across 7 initiatives. NBN Co responded to this question using a matrix that consisted of column headings for financial information, risk management activities, performance management metrics, and references to other RFI responses. Row headings comprised the initiatives of which business case information was sought. The information shown in the summary matrix was provided in the form of further sheets within the Excel workbook. A snapshot of the summary matrix is pictured below.



Initiative	Financial Information	Risk Management Artefacts	Performance management metrics - OpCo	Reference other RFI No. for the response
Summary	Below sets out the financial information of each initiative in IOP Nominal $ *Note: IOP nominal $ differ slightly from the SSM nominal $ because the latter has been updated to reflect more recent CPI forecasts, consistent with the methodology set out*	BU Risks mapped to Material Business Risks (MBRs)	Below details the mapping of the key metrics included in OpCo that measure the cost and delivery of each initiative	Below provided mapping to previous RFI No. for additional information
1. 2.3 Take-up & Usage / Capacity / HFC - Capacity	IOP23 HFC Capacity (IOP Nominal $) - Refer to Worksheet IOP. HFC Capacity in this file for response	Enterprise Risk Profile Extract: Refer to Worksheet Enterprise Risk Profile in this file for response	nbn Operating Committee (OpCo) Report for January 2023 refer to Worksheet Map to OpCo in this file for response	Reference RFI No.2 - 2.3 Take-up & Usage / Capacity / HFC - Capacity parts a - h
2. 2.4 Maintaining / Copper Remediation on FTTN Network	IOP23 Copper Remediation (IOP Nominal $) - Refer to Worksheet IOP. CuRehab in this file for response	Enterprise Risk Profile Extract: Refer to Worksheet Enterprise Risk Profile in this file for response	nbn Operating Committee (OpCo) Report for January 2023 refer to Worksheet Map to OpCo in this file for response	Reference RFI No.3 - 2.4 Maintaining / Copper Remediation on FTTN Network part a - h
3. 2.5 Capability / Network Upgrade Initiative (major) / FTTH-FTTP	IOP23 3.5m FTTN to P (IOP Nominal $) - Refer to Worksheet IOP. FTTNtP 3.5m in this file for response	Enterprise Risk Profile Extract: Refer to Worksheet Enterprise Risk Profile in this file for response Key Outcome Risk Profile	nbn Operating Committee (OpCo) Report for January 2023 refer to Worksheet Map to OpCo in this file for response	Refer to No4. 2.5 Network Upgrade Initiative (major) / FTTH-FTTP & 2.5 Network Upgrade - Migrations - FTTC/FTTN - FTTP Parts a - h. (Note Migrations
4. 2.5 Capability / Network Upgrade Initiative (major) / HFC	IOP23 HFC Upgraded (IOP Nominal $) - Refer to Worksheet IOP. HFC Upgrade in this file for response	Not applicable as project completed. Refer to response to RFI No.4	nbn Operating Committee (OpCo) Report for January 2023 refer to Worksheet Map to OpCo in this file for response	Reference RFI No.4 - 2.5 Capability / Network Upgrade Initiative (major) / HFC part a - h

Figure 64 NBN Co Tranche 5 Response

The process also involved 3 meetings to discuss components of the RFIs, as follows:

- Meeting 1, 8th February 2023, 1:30-2:30pm: meeting subject “ACCC – request for information discussion (Ben/David only for first half hour)”: No presentation or other materials were provided by NBN Co,
- Meeting 2, 28th February 2023, 4-5pm: meeting subject “CONFIRMED - SAU Variation – nbn/ACCC meeting – discussion on network prioritisation”: No presentation or other materials were provided by NBN Co,
- Meeting 3, 8th March 2023, 2-3pm: meeting subject “CONFIRMED – SAU Variation – nbn briefing to ACCC on corporate risk framework”: Presentation pack entitled “018 nbn ACCC Briefing - IOP23 - Risk Management Framework” was provided on the 7th March 2023.

Following receipt of responses to all RFIs, further clarifications were sought where it was determined that the initial questions were not answered sufficiently. These clarifications were present throughout the various component questions of questions 1-13, as well 8 of the remaining questions 14-41. 20 questions were answered to a sufficient level of detail.

The RFI Process was completed with the receipt of clarification responses from NBN Co on 24 March 2023 (with a further response sent on 28 March 2023 but not reviewed for the purposes of this draft Report). The information received is discussed further in the following section.

Results of RFI Process – data and information to be incorporated into recommended process under Part D of this Report

As described in Part B - NBN Co Expenditure Process, NBN Co has conducted an IOP process for FY23 led by NBN Co's Finance & Strategy teams, from a bottom-up perspective to develop a detailed operational and financial plan for the coming four financial years (i.e., FY23 to FY26), in a manner that has been described as best meeting NBN Co 's corporate objectives and stakeholder needs.

This process was presented by NBN Co in the ACCC Briefings and sought to provide detail on the various capital expenditure initiatives (and programs) and operational expenditure items and their relevant drivers, risks, objectives, and governance frameworks.

NBN Co advised ACCC that each initiative or spend item is monitored closely using a range of metrics such as volumes, unit costs, and overall cost.

As part of the RFI process, further information was requested, including internal metrics, business cases, and further detail regarding spend for all capital expenditure and operating expenditure items, as already categorised by NBN Co within SAU Supporting Submission Part F. *The extent to which documentary evidence and answers have been provided by NBN Co through the RFI Process is incorporated into the assessment of prudency and efficiency of the expenditure items in this Part C.*

Moving forward, it is clear from an initial review of the PowerPoint presentations provided by NBN Co to the ACCC in the ACCC Briefings together with the various snapshots and links to other documents such as OpCo reports provided by NBN Co as an attempt to answer the questions under the RFI Process that there is an abundance of information and data that could be used to track the progress of expenditure.

As an example of the detailed internal processes NBN Co undertakes, for the most recent IOP the ExCo Kickoff presentation makes clear reference to the extensive process carried out to collect submissions from the business units for proposed initiatives. It appears as if a consolidation exercise was commenced as part of IOP23's ExCo Kickoff presentation to the NBN Co ExCo as there are references throughout the presentation to the business case preparation for the "Top 50 Initiatives by end Feb" (which was early in the process). ExCo support was required for all of the Top 50 "Initiative Plans" and whilst some initiatives may have only needed "1 – 2 pages", detailed business cases (using a simplified business case template) were required for those initiatives that were "most material for the IOP".

These processes then appear to have culminated in a proposed set of key outcomes, initiatives and metrics for IOP23, as set out in Exco presentation "Key nbn outcomes for FY23 and metrics – 10/5/2022".[111]

[111] Document 19 in folder 3 of Exco documentation provided to ACCC by NBN Co.

Exco presentation "Key nbn outcomes for FY23 and metrics – 10/5/2022"

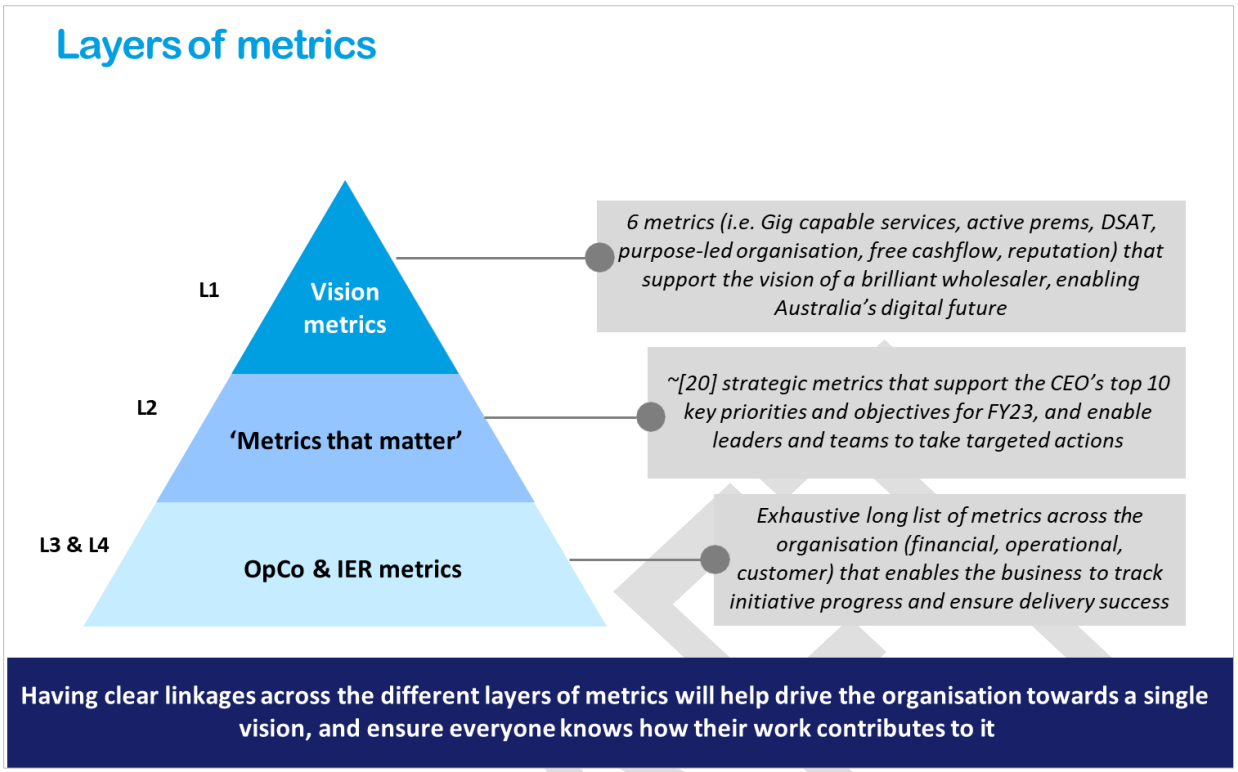


Figure 65: Key outcomes for FY23 and metrics from IOP23 process[112]

This approach to detailed metrics and the extrapolation of drivers for expenditure also appears to form a significant portion of the regular monthly reporting NBN Co's finance area undertakes.

Regular management reports – for example OpCo (monthly)

In its briefings to ACCC and the Request for Information (RFI) process carried out in late February/early March 2023 NBN Co has provided examples of the operational reporting provided to NBN Co's Exco through what is referred to as the "OpCo reports", copies of which have been provided for December 2022 and January 2023.[113]

Metrics used include items such as:

- Capex – Key Upgrade and Capacity Capex Driver Metrics,
- Fixed Wireless Driver Metrics (Jan-23 Opco report), and
- Upgrade Connection Driver Metrics.[114]

[112] 001 nbn ACCC Briefing – IOP23 Expenditure Overview – CONFIDENTIAL, slide 8 and used for further ACCC briefings.
[113] 012 ACCC RFI – FY23 Opco Report Dec-22 Final – CONFIDENTIAL and 013 ACCC RFI – FY23 Opco Report Jan-23 Final - CONFIDENTIAL
[114] 013 ACCC RFI – FY23 Opco Report Jan-23 Final – CONFIDENTIAL.

It is these overall key outcomes, initiatives, and metrics for IOP23 that have been presented to ACCC for this expenditure assessment, as opposed to any underlying documents outside of a copy of the original business case for IT Investment[115] and a collation of the documents supporting the grant application for the Fixed Wireless Upgrades.

As NBN Co has described in its most recent (24 March 2023) response to RFI question 13:

"nbn's business case information for each (discretionary) initiative is not contained within a single document, such as those commonly prepared by network operators when making periodic revenue/pricing proposals in other regulated sectors….[and][116]

"Looking ahead, nbn intends to enhance its processes for application from FY24 on such that the form in which business case information is prepared and recorded is better aligned to subsequent use in SAU regulatory processes."

The expenditure assessment should include detailed data and information to the ACCC, acquired through a transparent reporting process.

For the most recent process of expenditure review, described in this Part C, a formal business analysis, reporting and monitoring process was not established:

- The documents prepared by NBN Co describe IOP initiatives and activities but do not link clearly to the process of prudent and efficient expenditure assessment that needs to be carried out by the ACCC under the statutory criteria.
- Multiple individual (mutually exclusive) reports exist and are used for internal purposes by NBN Co (detail of these mainly internal documents is set out in Part C). Whilst these reports contain some pertinent and useful data and information (particularly for reporting on capital expenditure progress), there do not appear to be clear mechanisms in place for an external party such as ACCC to track changes and developments from the previous years, and/or to inform the ACCC of any significant changes to existing or existing initiatives.
- Additionally, a formal, documented process has not been described to ACCC whereby NBN Co has undertaken a detailed business case process to establish why the expenditure item was the best option (to support an assessment of prudent expenditure as that which reflects the best course of action, considering available alternatives), and a consistent, tangible, documented process to enable ACCC to assess that each item of expenditure results in the lowest cost to consumers over the long term (to support an assessment of the efficiency of expenditure, with for example, targeted benefits tracked over time in a consistent way project by project and initiative by initiative).

The recommended process in Part D of this Report seeks to leverage this information and data so that it can be combined with the other elements described to support ACCC's decision-making for prudent and efficient expenditure moving forward beyond this current assessment.

[115] 021 ACCC RFI – IT Investment Business Case (provided Friday 24 March 2023).
[116] Grex edit to fuller response from NBN Co.

Further documents relied upon in preparing this Report

Document published by:	Date	Document title (with reference used in this Report where relevant)
ACCC	13 January 2023	Proposed variation to the NBN Co Special Access Undertaking – Consultation paper (**"ACCC January 2023 Consultation paper"**)
Ofcom	© 2023	1. https://www.ofcom.org.uk/ 2. https://www.ofcom.org.uk/phones-telecoms-and-internet/information-for-industry/telecoms-competition-regulation/the-openreach-monitoring-unit 3. https://www.ofcom.org.uk/phones-telecoms-and-internet/advice-for-consumers/costs-and-billing/automatic-compensation-need-know ; https://www.ofcom.org.uk/__data/assets/pdf_file/0026/107693/Statement-automatic-compensation.pdf 4. https://www.ofcom.org.uk/__data/assets/pdf_file/0018/216090/wftmr-statement-volume-6-bt-rfr.pdf
OpenReach	© 2023	1. https://www.openreach.co.uk/cpportal/services/product-services/service-level-commitments 2. https://www.ofcom.org.uk/phones-telecoms-and-internet/advice-for-consumers/costs-and-billing/automatic-compensation-need-know
Commission for Complaints for Telecom-Television Service (CCTS)	© 2023	1. https://www.ccts-cprst.ca/for-consumers/resources/government-and-regulatory/
Canadian Radio-television and Telecommunications Commission (CRTC)	© 2023	1. https://crtc.gc.ca/eng/archive/2021/2021-181.htm 2. https://crtc.gc.ca/eng/internet/role.htm#:~:text=The%20CRTC%20regulates%20the%20wholesale,providers%20to%20their%20retail%20customers 3. https://crtc.gc.ca/eng/ce/actions.htm 4. https://crtc.gc.ca/eng/publications/reports/PolicyMonitoring/
AER	© 2023	1. https://www.aer.gov.au/about-us/our-role 2. https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/efficiency-benefit-sharing-scheme-ebss-–-november-2013

Document published by:	Date	Document title (with reference used in this Report where relevant)
Justice Laws Website	© 2023	1. https://laws-lois.justice.gc.ca/eng/acts/t-3.4/
Chorus	© 2023	1. Chorus Annual Report 2022
Commerce Commission	© 2023	https://comcom.govt.nz/regulated-industries/fibre/projects/fibre-price-quality-path-and-information-disclosure

Letter of instruction – DLA Piper

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KZS/KZS/3010528/638110
AUM/1228291083.3

1 May 2023

Dear Michael

Letter of Instruction - ACCC assessment of NBN Co proposed variation to Special Access Undertaking

1 We act for the Australian Competition and Consumer Commission (**ACCC**).

2 The purpose of this letter is to instruct you to provide the ACCC with expert advice in relation to its statutory decision on whether to accept or reject a variation proposed by NBN Co Limited (**NBN Co**) to its special access undertaking (**SAU**) that was submitted to the ACCC by NBN Co on 29 November 2022 (**November 2022 Proposed Variation**). Specifically, your expert advice is sought in relation to:

2.1 the appropriateness of the expenditure forecasts proposed by NBN Co in the November 2022 Proposed Variation for the first regulatory cycle following its acceptance being 1 July 2023 to 30 June 2026 (**First Regulatory Cycle**); and

2.2 the systems and processes NBN Co would need to implement in order to provide the information required by the ACCC for the purpose of the ACCC's review and determination of NBN Co's expenditures in the Replacement Module Application / Determination processes for subsequent regulatory cycles in the period from 1 July 2023 to 30 June 2032 (**Subsequent Regulatory Period**) as provided for by the Variation.

3 You are instructed to undertake analysis and provide advice in relation to the particular matters set out below.

4 Please find enclosed with this letter a brief of relevant documents. Tab references in this letter correspond with the index of documents set out in Annexure A.

Background

5 NBN Co (an Australian Government owned corporation) owns and operates Australia's national broadband network (**NBN**).

6 Part XIC of the *Competition and Consumer Act 2010* (Cth) (**CCA**) establishes a regime for third party access to telecommunications infrastructure services. Under that regime, NBN Co has previously submitted to the ACCC an undertaking, referred to as a 'special access undertaking', to govern third party access to NBN Co's infrastructure services provided by means of the NBN until 2040.

7 On 13 December 2013, the ACCC accepted the SAU from NBN Co, which governs the principles for the regulation of wholesale access to the National Broadband Network (**NBN**) until June 2040 **[Tab 1]**.

8 On 9 April 2021, the ACCC accepted a variation to the SAU which (among other things) extended the expiration date of three non-price provisions from 30 June 2019 to 30 June 2023 (**April 2021 Variation**) **[Tab 2]**.

9 In the second half of 2021, the ACCC held an industry roundtable and a series of working groups and consultations to discuss various proposals for a further variation of the SAU. Subsequently, on 22 December 2021, the ACCC released a summary paper **[Tab 3]** which detailed the key issues discussed during this process, including the following five key outcomes:

9.1 NBN Co has the opportunity to earn the minimum revenues it needs to meet its legitimate financing objectives, including to transition to a stand-alone investment grade credit rating;

9.2 NBN end-users are protected from price shocks and from prices that are higher than necessary in later years;

9.3 the regulatory framework provides incentives for NBN Co to operate efficiently and promote use of the NBN;

9.4 NBN access seekers have greater certainty over the costs that they will face when using the NBN; and

9.5 there is a clear and robust quality of service framework so access seekers and end-users know what to expect from NBN services, including a review mechanism so that service standards remain fit for purpose.

10 On 29 March 2022, NBN Co submitted a variation to the ACCC which (among other things) sought to include significant changes to its product and pricing commitments, the framework for its cost recovery, and rules for how the ACCC assesses network expenditure (**March 2022 Proposed Variation**) **[Tab 4]**. On 23 May 2022, the ACCC released a consultation paper in relation to the March 2022 Proposed Variation and invited stakeholder submissions as part of that process **[Tab 5]**. However, on 27 July 2022, NBN Co wrote to the ACCC and withdrew the March 2022 Proposed Variation **[Tab 6]**.

11 NBN Co subsequently submitted the November 2022 Proposed Variation to the ACCC on 29 November 2022 **[Tab 12]**, which included a revised framework for the determination of required revenues and price controls for the Subsequent Regulatory Period (other than the First Regulatory Cycle), and updated forecasts of expenditure (including capital expenditure and operating expenditure), required revenues and price controls for the First Regulatory Cycle. For present purposes, the key elements of the November 2022 Proposed Variation include the following.

11.1 It seeks to govern the terms and conditions relating to access to the NBN in the Subsequent Regulatory Period. In particular, it provides for the periodic review and determination of expenditure forecasts, the rolled forward value of the regulatory asset base, the annual building block revenue requirement for each financial year and required revenues for the forthcoming 'regulatory cycle' using a building block cost approach.

11.2 It specifies detailed proposed terms of access, including expenditure forecasts, required revenues and resultant price controls, for the First Regulatory Cycle.

12 On 13 January 2023, the ACCC released a consultation paper in relation to the November 2022 Proposed Variation and invited stakeholder submissions as part of that process **[Tab 13]**. Section 4 of the paper provides an overview of NBN Co's proposal. The general

regulatory framework and modular structure proposed by NBN Co is discussed at section 5.1. A discussion of the expenditure criteria proposed by NBN Co, is set out at section 5.7 and a discussion of the proposed reporting requirements is set out at section 5.12.

Instructions

13 You are instructed to prepare a report setting out an expert opinion on:

13.1 the appropriateness (in particular, the efficiency and prudency) of NBN Co's proposed capital and operating expenditure forecast for the First Regulatory Cycle (i.e., 1 July 2023 to 30 June 2026);

13.2 the systems and processes NBN Co would need to implement in order to provide the information required by the ACCC for the purpose of performing its expenditure review role in the context of the Replacement Module Application / Determination process provided for in the Variation for the subsequent regulatory cycles in Subsequent Regulatory Period, which may include:

(a) the type and format of information NBN Co should keep, maintain, and provide to the ACCC;

(b) appropriate assurance measures in respect of that information; and

(c) appropriate processes for the collecting of this information by NBN Co.

14 In providing your expert opinion on the question set out at paragraph 13 please consider:

14.1 Any information provided by NBN Co in response to any requests you make for the purpose of preparing your report, including in any conferences with NBN Co that you attend for this purpose.

14.2 The objective of the telecommunications access regime in Part XIC of the *Competition and Consumer Act 2010* (Cth) to promote the long-term interests of end-users of carriage services or of services provided by means of carriage services.

14.3 Relevant government policies and directives relevant to NBN Co, the implication of those policies and directives on forecast expenditure.

14.4 The approaches and methodologies adopted by NBN Co in determining its forecast expenditure and whether those approaches and methodologies reflect sound industry and regulatory practice.

14.5 Whether the materials or methodologies contained in the materials provided by NBN Co in support of its expenditure forecast (e.g. demand forecasting, forecast input costs including wages, and proposed service levels etc.) are based on sound technological, economic or financial logic, and reflect sound industry and regulatory practice.

14.6 NBN Co's proposed cost allocation approach to allocating costs between its 'core' and 'competitive' services.

14.7 Sound regulatory approaches to expenditure reviews.

14.8 Any other matters you consider relevant.

Federal Court of Australia Expert Evidence Practice Note

15 As this matter may become litigious, we enclose a copy of the Federal Court of Australia's *Expert Evidence Practice Note (GPN-EXPT)* (**Practice Note**), which includes the *Harmonised Expert Witness Code of Conduct* and the *Concurrent Expert Evidence Guidelines*.

16 Please carefully read the Practice Note and ensure that any report you provide in this matter complies with it. You are required to act impartially, and not as an advocate for the case of the ACCC.

17 Further, in providing any report, you should also:

17.1 expressly confirm that you have read and agree to be bound by the Practice Note;

17.2 include a curriculum vitae setting out full details of your relevant qualifications, experience and expertise;

17.3 include a copy of these instructions;

17.4 set out a list of all documents and the information that you have relied upon in preparing your report;

17.5 expressly state all assumptions that you have made in preparing the report and the reasons for making those assumptions;

17.6 give reasons for each opinion that you express in the report;

17.7 qualify any opinion expressed in the report if you consider your report may be incomplete or inaccurate without the qualification;

17.8 qualify any opinion expressed in the report if you are unable to form a conclusive opinion because of insufficient research, insufficient information, or for any other reason; and

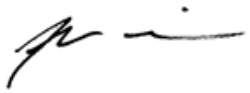
17.9 at the end of the report, include a declaration in the following terms:

> 'I have made all the enquiries that I believe are desirable and appropriate. No matters of significance that I regard as relevant have, to my knowledge, been withheld from the Court.'

18 If you change your opinion after giving us any report in this matter, you must provide a supplementary report.

Please feel free to contact us to discuss. We look forward to working with you.

Yours sincerely



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Annexure A: Brief of Documents

Tab	Document	Date
1.	NBN Co Special Access Undertaking (including all variations)	13 December 2013
2.	ACCC Decision regarding NBN Co Special Access Undertaking Variation	9 April 2021
3.	ACCC Summary Paper – Industry Roundtable Discussions	22 December 2021
4.	NBN Co March 2022 Proposed Variation and supporting documents	Various
5.	NBN Co Letter to ACCC withdrawing March 2022 Proposed Variation	27 July 2022
6.	NBN Co Confidential BBM Model (provided to you by separate file transfer link)	29 March 2022
7.	NBN Co BBM Handbook	March 2022
8.	Summary of NBN Co updated integrated operating plan (IOP) information	Undated
9.	Updated NBN Co Confidential BBM Model (provided to you by separate file transfer link)	8 August 2022
10.	Castalia memo titled 'ICRA Adjustment Concept'	18 July 2022
11.	NBN Co November 2022 Proposed Variation and supporting documents	29 November 2022
12.	ACCC Consultation Paper re November 2022 Proposed Variation and supporting documents	13 January 2023
13.	NBN Co Confidential BBM Model (provided to you by separate file transfer link)	2 December 2022

14.	Papers presented over period January to May 2022 to NBN Co's executive committee regarding the progressive development of IOP23, comprising: • IOP23 Exco Overview Strategic and Operational Guidance – Exco – 19 January 2022 • IOP23 Top Down Financial Guidance – Exco – 2 February 2022 • IOP23 IAP Build Profile - Exco – 9 February 2022 • IOP23 Business Products - Exco – 9 February 2022 • IOP23 New Developments - Exco – 9 February 2022 • IOP23 Usage & Demand Profile - Exco – 9 February 2022 • IOP23 Network Capacity Management - Exco – 23 February 2022 • IOP23 TC4 Base Management and IAP Take Up – Exco 2 March 2022 • IOP23 WFP Initial Submission – Exco – 2 March 2022 • IOP23 Network Lifecycle Planning - Exco – 9 March 2022 • IOP23 WFP [Final Submission] - Exco – 23 March 2022 • IOP23 TC4 Base Management and IAP Take Up - Exco – 23 March 2022 • IOP23 C&A Optimisation (Trucks Rolls Reduction Initiatives) - Exco – 30 March 2022 • Update on Initial FY23 Financial Position – ExCo – 13 April 2022 • IOP23 IER Prioritisation – Exco 13 April 2022 • RTC & Activations Changes – Exco - 13 April 2022 • IOP23 CX Update - Exco – 27 April 2022 • IOP23 Finance Overview & Kick Off - Exco – 10 May 2022 • IOP23 Key nbn strategic priorities + metrics - Exco – 10 May 2022 • IOP23 Customer Products & Marketing- Exco – 10 May 2022 • IOP23 Operations- Exco – 10 May 2022 • IOP23 Regional Development & Engagement [RDE] – Exco 11 May 2022 • IOP23 Network Engineering & Security [NES] – Exco 11 May 2022 • IOP23 Systems Engineering & Operations [SEO] – Exco 11 May 2022 • IOP23 Risk Profile – Exco – 11 May 2022 • Corporate Business Units - Exco – 11 May 2022 • Integrated Operating Plan FY22-26 Draft 10 – ExCo – 18 May 2022	Various

	• Future Workforce update – ExCo 18 May 2022	
15.	NBN ACCC Briefing - IOP23 Expenditure Overview	16 Decebmber 2023
16.	Expenditure review – comments from NBN Co	19 April 2023

FEDERAL COURT OF AUSTRALIA

EXPERT EVIDENCE PRACTICE NOTE (GPN-EXPT)

General Practice Note

1. INTRODUCTION

1.1 This practice note, including the *Harmonised Expert Witness Code of Conduct* ("**Code**") (see **Annexure A**) and the *Concurrent Expert Evidence Guidelines* ("**Concurrent Evidence Guidelines**") (see **Annexure B**), applies to any proceeding involving the use of expert evidence and must be read together with:

(a) the Central Practice Note (CPN-1), which sets out the fundamental principles concerning the National Court Framework ("**NCF**") of the Federal Court and key principles of case management procedure;

(b) the Federal Court of Australia Act 1976 (Cth) ("**Federal Court Act**");

(c) the *Evidence Act 1995* (Cth) ("**Evidence Act**"), including Part 3.3 of the Evidence Act;

(d) Part 23 of the *Federal Court Rules 2011* (Cth) ("**Federal Court Rules**"); and

(e) where applicable, the Survey Evidence Practice Note (GPN-SURV).

1.2 This practice note takes effect from the date it is issued and, to the extent practicable, applies to proceedings whether filed before, or after, the date of issuing.

2. APPROACH TO EXPERT EVIDENCE

2.1 An expert witness may be retained to give opinion evidence in the proceeding, or, in certain circumstances, to express an opinion that may be relied upon in alternative dispute resolution procedures such as mediation or a conference of experts. In some circumstances an expert may be appointed as an independent adviser to the Court.

2.2 The purpose of the use of expert evidence in proceedings, often in relation to complex subject matter, is for the Court to receive the benefit of the objective and impartial assessment of an issue from a witness with specialised knowledge (based on training, study or experience - see generally s 79 of the Evidence Act).

2.3 However, the use or admissibility of expert evidence remains subject to the overriding requirements that:

(a) to be admissible in a proceeding, any such evidence must be relevant (s 56 of the Evidence Act); and

(b) even if relevant, any such evidence, may be refused to be admitted by the Court if its probative value is outweighed by other considerations such as the evidence

being unfairly prejudicial, misleading or will result in an undue waste of time (s 135 of the Evidence Act).

2.4 An expert witness' opinion evidence may have little or no value unless the assumptions adopted by the expert (ie. the facts or grounds relied upon) and his or her reasoning are expressly stated in any written report or oral evidence given.

2.5 The Court will ensure that, in the interests of justice, parties are given a reasonable opportunity to adduce and test relevant expert opinion evidence. However, the Court expects parties and any legal representatives acting on their behalf, when dealing with expert witnesses and expert evidence, to at all times comply with their duties associated with the overarching purpose in the Federal Court Act (see ss 37M and 37N).

3. INTERACTION WITH EXPERT WITNESSES

3.1 Parties and their legal representatives should never view an expert witness retained (or partly retained) by them as that party's advocate or "hired gun". Equally, they should never attempt to pressure or influence an expert into conforming his or her views with the party's interests.

3.2 A party or legal representative should be cautious not to have inappropriate communications when retaining or instructing an independent expert, or assisting an independent expert in the preparation of his or her evidence. However, it is important to note that there is no principle of law or practice and there is nothing in this practice note that obliges a party to embark on the costly task of engaging a "consulting expert" in order to avoid "contamination" of the expert who will give evidence. Indeed the Court would generally discourage such costly duplication.

3.3 Any witness retained by a party for the purpose of preparing a report or giving evidence in a proceeding as to an opinion held by the witness that is wholly or substantially based in the specialised knowledge of the witness[1] should, at the earliest opportunity, be provided with:

(a) a copy of this practice note, including the Code (see Annexure A); and

(b) all relevant information (whether helpful or harmful to that party's case) so as to enable the expert to prepare a report of a truly independent nature.

3.4 Any questions or assumptions provided to an expert should be provided in an unbiased manner and in such a way that the expert is not confined to addressing selective, irrelevant or immaterial issues.

[1] Such a witness includes a "Court expert" as defined in r 23.01 of the Federal Court Rules. For the definition of "expert", "expert evidence" and "expert report" see the Dictionary, in Schedule 1 of the Federal Court Rules.

4. ROLE AND DUTIES OF THE EXPERT WITNESS

4.1 The role of the expert witness is to provide relevant and impartial evidence in his or her area of expertise. An expert should never mislead the Court or become an advocate for the cause of the party that has retained the expert.

4.2 It should be emphasised that there is nothing inherently wrong with experts disagreeing or failing to reach the same conclusion. The Court will, with the assistance of the evidence of the experts, reach its own conclusion.

4.3 However, experts should willingly be prepared to change their opinion or make concessions when it is necessary or appropriate to do so, even if doing so would be contrary to any previously held or expressed view of that expert.

Harmonised Expert Witness Code of Conduct

4.4 Every expert witness giving evidence in this Court must read the *Harmonised Expert Witness Code of Conduct* (attached in Annexure A) and agree to be bound by it.

4.5 The Code is not intended to address all aspects of an expert witness' duties, but is intended to facilitate the admission of opinion evidence, and to assist experts to understand in general terms what the Court expects of them. Additionally, it is expected that compliance with the Code will assist individual expert witnesses to avoid criticism (rightly or wrongly) that they lack objectivity or are partisan.

5. CONTENTS OF AN EXPERT'S REPORT AND RELATED MATERIAL

5.1 The contents of an expert's report must conform with the requirements set out in the Code (including clauses 3 to 5 of the Code).

5.2 In addition, the contents of such a report must also comply with r 23.13 of the Federal Court Rules. Given that the requirements of that rule significantly overlap with the requirements in the Code, an expert, unless otherwise directed by the Court, will be taken to have complied with the requirements of r 23.13 if that expert has complied with the requirements in the Code and has complied with the additional following requirements. The expert shall:

(a) acknowledge in the report that:

(i) the expert has read and complied with this practice note and agrees to be bound by it; and

(ii) the expert's opinions are based wholly or substantially on specialised knowledge arising from the expert's training, study or experience;

(b) identify in the report the questions that the expert was asked to address;

(c) sign the report and attach or exhibit to it copies of:

(i) documents that record any instructions given to the expert; and

(ii) documents and other materials that the expert has been instructed to consider.

5.3 Where an expert's report refers to photographs, plans, calculations, analyses, measurements, survey reports or other extrinsic matter, these must be provided to the other parties at the same time as the expert's report.

6. CASE MANAGEMENT CONSIDERATIONS

6.1 Parties intending to rely on expert evidence at trial are expected to consider between them and inform the Court at the earliest opportunity of their views on the following:

(a) whether a party should adduce evidence from more than one expert in any single discipline;

(b) whether a common expert is appropriate for all or any part of the evidence;

(c) the nature and extent of expert reports, including any in reply;

(d) the identity of each expert witness that a party intends to call, their area(s) of expertise and availability during the proposed hearing;

(e) the issues that it is proposed each expert will address;

(f) the arrangements for a conference of experts to prepare a joint-report (see Part 7 of this practice note);

(g) whether the evidence is to be given concurrently and, if so, how (see Part 8 of this practice note); and

(h) whether any of the evidence in chief can be given orally.

6.2 It will often be desirable, before any expert is retained, for the parties to attempt to agree on the question or questions proposed to be the subject of expert evidence as well as the relevant facts and assumptions. The Court may make orders to that effect where it considers it appropriate to do so.

7. CONFERENCE OF EXPERTS AND JOINT-REPORT

7.1 Parties, their legal representatives and experts should be familiar with aspects of the Code relating to conferences of experts and joint-reports (see clauses 6 and 7 of the Code attached in Annexure A).

7.2 In order to facilitate the proper understanding of issues arising in expert evidence and to manage expert evidence in accordance with the overarching purpose, the Court may require experts who are to give evidence or who have produced reports to meet for the purpose of identifying and addressing the issues not agreed between them with a view to reaching agreement where this is possible ("**conference of experts**"). In an appropriate case, the Court may appoint a registrar of the Court or some other suitably qualified person ("**Conference Facilitator**") to act as a facilitator at the conference of experts.

7.3 It is expected that where expert evidence may be relied on in any proceeding, at the earliest opportunity, parties will discuss and then inform the Court whether a conference of experts and/or a joint-report by the experts may be desirable to assist with or simplify the giving of expert evidence in the proceeding. The parties should discuss the necessary arrangements for any conference and/or joint-report. The arrangements discussed between the parties should address:

(a) who should prepare any joint-report;

(b) whether a list of issues is needed to assist the experts in the conference and, if so, whether the Court, the parties o r the experts should assist in preparing such a list;

(c) **t**he agenda for the conference of experts; and

(d) arrangements for the provision, to the parties and the Court, of any joint-report or any other report as to the outcomes of the conference ("**conference report**").

Conference of Experts

7.4 The purpose of the conference of experts is for the experts to have a comprehensive discussion of issues relating to their field of expertise, with a view to identifying matters and issues in a proceeding about which the experts agree, partly agree or disagree and why. For this reason the conference is attended only by the experts and any Conference Facilitator. Unless the Court orders otherwise, the parties' lawyers will not attend the conference but will be provided with a copy of any conference report.

7.5 The Court may order that a conference of experts occur in a variety of circumstances, depending on the views of the judge and the parties and the needs of the case, including:

(a) while a case is in mediation. When this occurs the Court may also order that the outcome of the conference or any document disclosing or summarising the experts' opinions be confidential to the parties while the mediation is occurring;

(b) before the experts have reached a final opinion on a relevant question or the facts involved in a case. When this occurs the Court may order that the parties exchange draft expert reports and that a conference report be prepared for the use of the experts in finalising their reports;

(c) after the experts' reports have been provided to the Court but before the hearing of the experts' evidence. When this occurs the Court may also order that a conference report be prepared (jointly or otherwise) to ensure the efficient hearing of the experts' evidence.

7.6 Subject to any other order or direction of the Court, the parties and their lawyers must not involve themselves in the conference of experts process. In particular, they must not seek to encourage an expert not to agree with another expert or otherwise seek to influence the outcome of the conference of experts. The experts should raise any queries they may have in relation to the process with the Conference Facilitator (if one has been appointed) or in

accordance with a protocol agreed between the lawyers prior to the conference of experts taking place (if no Conference Facilitator has been appointed).

7.7 Any list of issues prepared for the consideration of the experts as part of the conference of experts process should be prepared using non-tendentious language.

7.8 The timing and location of the conference of experts will be decided by the judge or a registrar who will take into account the location and availability of the experts and the Court's case management timetable. The conference may take place at the Court and will usually be conducted in-person. However, if not considered a hindrance to the process, the conference may also be conducted with the assistance of visual or audio technology (such as via the internet, video link and/or by telephone).

7.9 Experts should prepare for a conference of experts by ensuring that they are familiar with all of the material upon which they base their opinions. Where expert reports in draft or final form have been exchanged prior to the conference, experts should attend the conference familiar with the reports of the other experts. Prior to the conference, experts should also consider where they believe the differences of opinion lie between them and what processes and discussions may assist to identify and refine those areas of difference.

Joint-report

7.10 At the conclusion of the conference of experts, unless the Court considers it unnecessary to do so, it is expected that the experts will have narrowed the issues in respect of which they agree, partly agree or disagree in a joint-report. The joint-report should be clear, plain and concise and should summarise the views of the experts on the identified issues, including a succinct explanation for any differences of opinion, and otherwise be structured in the manner requested by the judge or registrar.

7.11 In some cases (and most particularly in some native title cases), depending on the nature, volume and complexity of the expert evidence a judge may direct a registrar to draft part, or all, of a conference report. If so, the registrar will usually provide the draft conference report to the relevant experts and seek their confirmation that the conference report accurately reflects the opinions of the experts expressed at the conference. Once that confirmation has been received the registrar will finalise the conference report and provide it to the intended recipient(s).

8. CONCURRENT EXPERT EVIDENCE

8.1 The Court may determine that it is appropriate, depending on the nature of the expert evidence and the proceeding generally, for experts to give some or all of their evidence concurrently at the final (or other) hearing.

8.2 Parties should familiarise themselves with the *Concurrent Expert Evidence Guidelines* (attached in Annexure B). The Concurrent Evidence Guidelines are not intended to be exhaustive but indicate the circumstances when the Court might consider it appropriate for

concurrent expert evidence to take place, outline how that process may be undertaken, and assist experts to understand in general terms what the Court expects of them.

8.3 If an order is made for concurrent expert evidence to be given at a hearing, any expert to give such evidence should be provided with the Concurrent Evidence Guidelines well in advance of the hearing and should be familiar with those guidelines before giving evidence.

9. FURTHER PRACTICE INFORMATION AND RESOURCES

9.1 Further information regarding Expert Evidence and Expert Witnesses is available on the Court's website.

9.2 Further information to assist litigants, including a range of helpful guides, is also available on the Court's website. This information may be particularly helpful for litigants who are representing themselves.

J L B ALLSOP
Chief Justice
25 October 2016

Annexure A

HARMONISED EXPERT WITNESS CODE OF CONDUCT[2]

APPLICATION OF CODE

1. This Code of Conduct applies to any expert witness engaged or appointed:

   (a) to provide an expert's report for use as evidence in proceedings or proposed proceedings; or

   (b) to give opinion evidence in proceedings or proposed proceedings.

GENERAL DUTIES TO THE COURT

2. An expert witness is not an advocate for a party and has a paramount duty, overriding any duty to the party to the proceedings or other person retaining the expert witness, to assist the Court impartially on matters relevant to the area of expertise of the witness.

CONTENT OF REPORT

3. Every report prepared by an expert witness for use in Court shall clearly state the opinion or opinions of the expert and shall state, specify or provide:

   (a) the name and address of the expert;

   (b) an acknowledgment that the expert has read this code and agrees to be bound by it;

   (c) the qualifications of the expert to prepare the report;

   (d) the assumptions and material facts on which each opinion expressed in the report is based [a letter of instructions may be annexed];

   (e) the reasons for and any literature or other materials utilised in support of such opinion;

   (f) (if applicable) that a particular question, issue or matter falls outside the expert's field of expertise;

   (g) any examinations, tests or other investigations on which the expert has relied, identifying the person who carried them out and that person's qualifications;

   (h) the extent to which any opinion which the expert has expressed involves the acceptance of another person's opinion, the identification of that other person and the opinion expressed by that other person;

   (i) a declaration that the expert has made all the inquiries which the expert believes are desirable and appropriate (save for any matters identified explicitly in the report), and that no matters of significance which the expert regards as relevant have, to the

[2] Approved by the Council of Chief Justices' Rules Harmonisation Committee

knowledge of the expert, been withheld from the Court;

(j) any qualifications on an opinion expressed in the report without which the report is or may be incomplete or inaccurate;

(k) whether any opinion expressed in the report is not a concluded opinion because of insufficient research or insufficient data or for any other reason; and

(l) where the report is lengthy or complex, a brief summary of the report at the beginning of the report.

SUPPLEMENTARY REPORT FOLLOWING CHANGE OF OPINION

4. Where an expert witness has provided to a party (or that party's legal representative) a report for use in Court, and the expert thereafter changes his or her opinion on a material matter, the expert shall forthwith provide to the party (or that party's legal representative) a supplementary report which shall state, specify or provide the information referred to in paragraphs (a), (d), (e), (g), (h), (i), (j), (k) and (l) of clause 3 of this code and, if applicable, paragraph (f) of that clause.

5. In any subsequent report (whether prepared in accordance with clause 4 or not) the expert may refer to material contained in the earlier report without repeating it.

DUTY TO COMPLY WITH THE COURT'S DIRECTIONS

6. If directed to do so by the Court, an expert witness shall:

(a) confer with any other expert witness;

(b) provide the Court with a joint-report specifying (as the case requires) matters agreed and matters not agreed and the reasons for the experts not agreeing; and

(c) abide in a timely way by any direction of the Court.

CONFERENCE OF EXPERTS

7. Each expert witness shall:

(a) exercise his or her independent judgment in relation to every conference in which the expert participates pursuant to a direction of the Court and in relation to each report thereafter provided, and shall not act on any instruction or request to withhold or avoid agreement; and

(b) endeavour to reach agreement with the other expert witness (or witnesses) on any issue in dispute between them, or failing agreement, endeavour to identify and clarify the basis of disagreement on the issues which are in dispute.

ANNEXURE B

CONCURRENT EXPERT EVIDENCE GUIDELINES

APPLICATION OF THE COURT'S GUIDELINES

1. The Court's Concurrent Expert Evidence Guidelines ("**Concurrent Evidence Guidelines**") are intended to inform parties, practitioners and experts of the Court's general approach to concurrent expert evidence, the circumstances in which the Court might consider expert witnesses giving evidence concurrently and, if so, the procedures by which their evidence may be taken.

OBJECTIVES OF CONCURRENT EXPERT EVIDENCE TECHNIQUE

2. The use of concurrent evidence for the giving of expert evidence at hearings as a case management technique[3] will be utilised by the Court in appropriate circumstances (see r 23.15 of the *Federal Court Rules 2011* (Cth)). Not all cases will suit the process. For instance, in some patent cases, where the entire case revolves around conflicts within fields of expertise, concurrent evidence may not assist a judge. However, patent cases should not be excluded from concurrent expert evidence processes.

3. In many cases the use of concurrent expert evidence is a technique that can reduce the partisan or confrontational nature of conventional hearing processes and minimises the risk that experts become "opposing experts" rather than independent experts assisting the Court. It can elicit more precise and accurate expert evidence with greater input and assistance from the experts themselves.

4. When properly and flexibly applied, with efficiency and discipline during the hearing process, the technique may also allow the experts to more effectively focus on the critical points of disagreement between them, identify or resolve those issues more quickly, and narrow the issues in dispute. This can also allow for the key evidence to be given at the same time (rather than being spread across many days of hearing); permit the judge to assess an expert more readily, whilst allowing each party a genuine opportunity to put and test expert evidence. This can reduce the chance of the experts, lawyers and the judge misunderstanding the opinions being expressed by the experts.

5. It is essential that such a process has the full cooperation and support of all of the individuals involved, including the experts and counsel involved in the questioning process. Without that cooperation and support the process may fail in its objectives and even hinder the case management process.

[3] Also known as the "hot tub" or as "expert panels".

CASE MANAGEMENT

6. Parties should expect that, the Court will give careful consideration to whether concurrent evidence is appropriate in circumstances where there is more than one expert witness having the same expertise who is to give evidence on the same or related topics. Whether experts should give evidence concurrently is a matter for the Court, and will depend on the circumstances of each individual case, including the character of the proceeding, the nature of the expert evidence, and the views of the parties.

7. Although this consideration may take place at any time, including the commencement of the hearing, if not raised earlier, parties should raise the issue of concurrent evidence at the first appropriate case management hearing, and no later than any pre-trial case management hearing, so that orders can be made in advance, if necessary. To that end, prior to the hearing at which expert evidence may be given concurrently, parties and their lawyers should confer and give general consideration as to:

   (a) the agenda;

   (b) the order and manner in which questions will be asked; and

   (c) whether cross-examination will take place within the context of the concurrent evidence or after its conclusion.

8. At the same time, and before any hearing date is fixed, the identity of all experts proposed to be called and their areas of expertise is to be notified to the Court by all parties.

9. The lack of any concurrent evidence orders does not mean that the Court will not consider using concurrent evidence without prior notice to the parties, if appropriate.

CONFERENCE OF EXPERTS & JOINT-REPORT OR LIST OF ISSUES

10. The process of giving concurrent evidence at hearings may be assisted by the preparation of a joint-report or list of issues prepared as part of a conference of experts.

11. Parties should expect that, where concurrent evidence is appropriate, the Court may make orders requiring a conference of experts to take place or for documents such as a joint-report to be prepared to facilitate the concurrent expert evidence process at a hearing (see Part 7 of the Expert Evidence Practice Note).

PROCEDURE AT HEARING

12. Concurrent expert evidence may be taken at any convenient time during the hearing, although it will often occur at the conclusion of both parties' lay evidence.

13. At the hearing itself, the way in which concurrent expert evidence is taken must be applied flexibly and having regard to the characteristics of the case and the nature of the evidence to be given.

14. Without intending to be prescriptive of the procedure, parties should expect that, when evidence is given by experts in concurrent session:

(a) the judge will explain to the experts the procedure that will be followed and that the nature of the process may be different to their previous experiences of giving expert evidence;

(b) the experts will be grouped and called to give evidence together in their respective fields of expertise;

(c) the experts will take the oath or affirmation together, as appropriate;

(d) the experts will sit together with convenient access to their materials for their ease of reference, either in the witness box or in some other location in the courtroom, including (if necessary) at the bar table;

(e) each expert may be given the opportunity to provide a summary overview of their current opinions and explain what they consider to be the principal issues of disagreement between the experts, as they see them, in their own words;

(f) the judge will guide the process by which evidence is given, including, where appropriate:

(i) using any joint-report or list of issues as a guide for all the experts to be asked questions by the judge and counsel, about each issue on an issue-by-issue basis;

(ii) ensuring that each expert is given an adequate opportunity to deal with each issue and the exposition given by other experts including, where considered appropriate, each expert asking questions of other experts or supplementing the evidence given by other experts;

(iii) inviting legal representatives to identify the topics upon which they will cross-examine;

(iv) ensuring that legal representatives have an adequate opportunity to ask all experts questions about each issue. Legal representatives may also seek responses or contributions from one or more experts in response to the evidence given by a different expert; and

(v) allowing the experts an opportunity to summarise their views at the end of the process where opinions may have been changed or clarifications are needed.

15. The fact that the experts may have been provided with a list of issues for consideration does not confine the scope of any cross-examination of any expert. The process of cross-examination remains subject to the overall control of the judge.

16. The concurrent session should allow for a sensible and orderly series of exchanges between expert and expert, and between expert and lawyer. Where appropriate, the judge may allow for more traditional cross-examination to be pursued by a legal representative on a particular issue exclusively with one expert. Where that occurs, other experts may be asked to comment on the evidence given.

17. Where any issue involves only one expert, the party wishing to ask questions about that issue should let the judge know in advance so that consideration can be given to whether

arrangements should be made for that issue to be dealt with after the completion of the concurrent session. Otherwise, as far as practicable, questions (including in the form of cross-examination) will usually be dealt with in the concurrent session.

18. Throughout the concurrent evidence process the judge will ensure that the process is fair and effective (for the parties and the experts), balanced (including not permitting one expert to overwhelm or overshadow any other expert), and does not become a protracted or inefficient process.