



FINAL REPORT

Pricing principles and structures for the nbn

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Summary

NBN Co has released a discussion paper about future pricing options for the nbn, as part of a process the ACCC is undertaking to consider the future regulatory arrangements for the nbn. The pricing of the nbn is a key part of ensuring the Australian community obtains the greatest public benefits for its enormous investment in this infrastructure. The CIE has been asked by TPG Telecom to consider the implications of alternative pricing constructs put forward for the nbn.

Typically, discussions of pricing for a regulated utility revolve around issues of costs. Measures of total costs and measures of the marginal cost provide key anchoring points for prices. These anchoring points are completely missing from the current discussion of prices for the nbn. Greater consideration of and transparency about these issues should be provided, covering:

- estimates of total costs and what part of costs would be expected to be recovered from users over time
- the long run marginal costs of peak data use and speed for the nbn
- what is the minimal distorting price discrimination to achieve a specified level of cost recovery, including minimising impacts on consumption and minimising transactions costs.

In the absence of these anchoring points for prices, there is less certainty and transparency for retailers and end-users, and more unpredictable demand-based pricing such as promotions, discounts and bonuses.

Conceptually, the nbn is a fixed-cost network with minimal costs associated with the level of traffic. However, NBN Co's AVC-CVC charging model is fundamentally at odds with this cost structure, and revenue growth will come increasingly from usage, even though this does not drive changes in costs. Imposing usage charges that are not cost based causes welfare losses and reduces the public benefits of the nbn. In the case of CVC charges, the reduced public benefits include restrictions on data use for consumers (data caps), risks for retailers in managing CVC growth, transaction costs for retailers to manage financial risks related to CVC and potentially reductions in service quality so that retailers can reduce their CVC exposure. These impacts suggest that using access charges will be significantly less distorting than CVC charges, and that removing CVC-based charges will produce significant public benefits.

CVC charges may provide a lower minimum product price for nbn services through data capped plans, albeit also with a much lower service level and the imposition of an inefficient charge on all other services. Most retailers don't offer data capped plans, because of the high transaction costs, low margins and low consumer satisfaction. TPG is the only major retailer brand to offer a low data capped plan, with its \$30 per month 10

GB plan. [c-i-c] [c-i-c]. We expect that these offers will be less widely available over time.

The main group that could benefit from CVC charges as opposed to higher access charges are data capped customers. The costs to data capped customers of moving away from a CVC charge are expected to be small. Accenture has estimated the impacts of removing CVC charges for data capped customers at \$213 million per year. **This estimate is hugely overstated, and we estimate that this is closer to \$1 million per year, using the assumptions of Accenture applied correctly.** These very small benefits to data capped customers will be hugely outweighed by the costs of CVC charges to retailers, such as increased risks and increased transaction costs to manage CVC. The small costs to data capped customers will also likely decline over time as customers are migrated off the very low capped plans anyway. This indicates that CVC charges are a high cost method of increasing nbn's cost recovery.

CVC charges are also not a good way to address issues of affordability for vulnerable customers. Accenture estimates that data capped customers are more likely to be vulnerable customers than customers on unlimited plans. However, based on the information in its presentation, **many more vulnerable customers are on unlimited plans than on data capped plans, and many customers on data capped plans are not vulnerable.** It is clearly preferable to address issues of equity directly through targeted programs, rather than shifting nbn's overall pricing structure to accommodate this. For example, targeted low-income specific products which NBN Co has already suggested.

Putting NBN Co/Accenture's claimed benefits from CVC charges for data capped customers in the context of the other major distortions arising from CVC, CVC is almost certainly producing a net negative overall impact on public benefits.

1 *Background*

NBN Co has released a discussion paper about future pricing options for the nbn, as part of a process the ACCC is undertaking to consider the future regulatory arrangements for the nbn. The pricing of the nbn is a key part of ensuring the Australian community obtains the greatest public benefits for its enormous investment in this infrastructure.

The CIE has been asked by TPG Telecom to consider the implications of alternative pricing constructs for the nbn.

Current NBN Co pricing and its implications

NBN Co is a provider of wholesale services, not a direct provider of services to customers. Its current wholesale pricing structure has three main components:

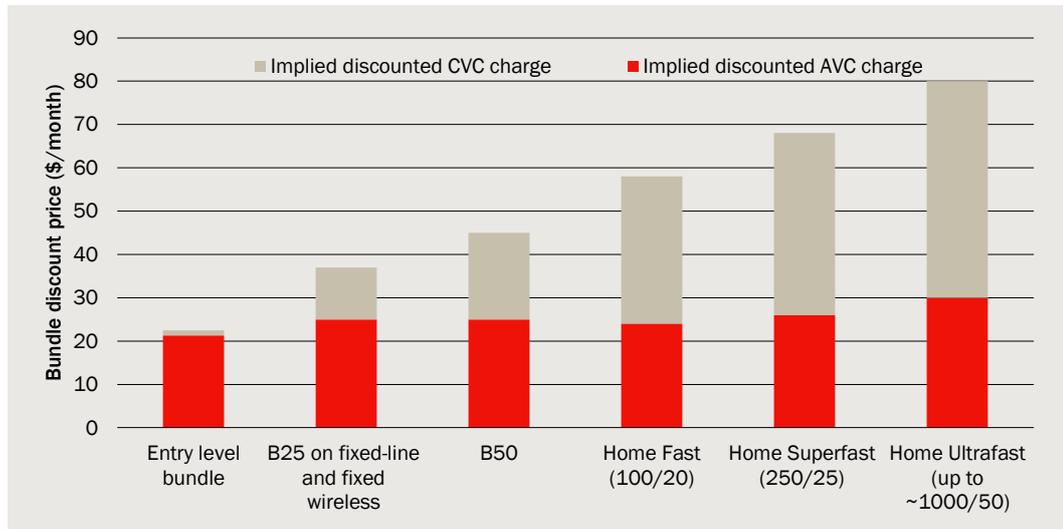
- an access charge to be able to use the network at all
- a speed charge, which is an additional amount that is charged for a connection to a higher speed
- a 'peak usage' charge, which is based on the peak usage across all the customers of a retailer. This is called the Connectivity Virtual Circuit (CVC) charge)

The access and speed charges together are called the Access Virtual Circuit (AVC) charge.

In practice, NBN Co bundles a product together that combines access, speed and a level of peak usage. It then charges for the overall bundle.

Current nbn pricing, as reflected in the discounted bundled prices for TC-4 products indicate that NBN Co is largely differentiating based on expected peak data usage. It is not really differentiating based on speed, with the underlying access charge quite similar across products once the included CVC has been removed (chart 1.1). For example, the AVC charge for the entry level bundle is \$21 which provides a download speed of 12 Mbps and an upload speed of 1 Mbps, compared to the AVC charge for the Home Fast product of \$24, with a download speed of 100 Mbps and upload speed of 20 Mbps.

1.1 nbn charges



Note: The total charge is disaggregated into an AVC and CVC charge through applying the included CVC and a CVC charge of \$8 per Mbps.

Data source: CIE analysis; <https://www.nbnco.com.au/content/dam/nbn/documents/sell/wba/2021/sfaa-wba-nbn-ethernet-price-list-20210505.pdf>.

The methods for pricing different components of the nbn have implications for the amount customers pay, the quality of the services and the risks faced by retailers.

Retailers have to provision for the amount of peak data that they expect their customers to use. Retailers could also seek to limit the amount of CVC they provision and peak data use, resulting in congestion and slower speeds for customers in peak times. The evidence collated by the ACCC indicates that busy hour speeds are only slightly below all hour speeds, and hence that retailers are choosing to ensure they provide sufficient CVC so that their customers' experience is not impacted.¹ This indicates that retailers consider that customers place sufficient importance on achieving busy hour speeds commensurate with the plan they have chosen and that this is a better strategy than providing a less expensive product with more variable service quality.

In terms of how retailers provision for CVC, each bundle incorporates some amount of discounted CVC. Retailers can purchase further CVC at a cost of \$8 per Mbps, however, if they don't provision enough CVC, they run the risk of being charged \$17.50 per Mbps. Retailers face risks of purchasing too much or not enough CVC.

The second implication of nbn pricing is how different structures will impact on revenue in the future. There are three types of changes in demand that increase NBN Co's revenue.

- Increasing customer numbers — the more customers that connect to the nbn the higher the revenue. Following the completion of the initial roll-out, customer growth is fairly limited, and is linked to macroeconomic trends such as new housing supply and population growth.

¹ ACCC 2021, Measuring broadband Australia – June 2021 report, https://www.accc.gov.au/system/files/Measuring%20Broadband%20Australia%20-%20Report%2013%20-%20June%202021_0.pdf

- Compositional shift — the more customers move on to higher speed plans the faster the increase in revenue to nbn. Note that the higher revenue for higher speed plans is largely because these higher speed plans come with additional CVC included.
- Growing data use — additional data use will increase the CVC that retailers are required to purchase, leading to increased costs for retailers and increased retail prices for customers. [c-i-c] [c-i-c]

These patterns mean that NBN Co improves its revenue growth over time by having a higher amount of revenue coming from CVC (including the CVC included in bundles) and a smaller amount of revenue coming from being charges for access to the nbn.

The incentives detailed above have led to large divergences between the cost structures of nbn and the pricing framework. Nbn is a network with a large amount of fixed costs, and small variable costs associated with usage. However, it would increasingly be gaining revenue from charges related to usage through the CVC charging mechanism.

Regulated restrictions on nbn

NBN Co is a regulated business, with the ACCC responsible for regulation of the nbn. The specific price controls are discussed further below. However, NBN Co also has some overall revenue controls, based on a typical ‘building block’ regulation. This form of regulation estimates all the efficient costs of providing the regulated service, including a return on capital and depreciation, and then ensures that revenue does not exceed these costs. That is, it creates a revenue cap for the regulated business. The regulation arrangement allows for costs not recovered (including opex) to be rolled forward into future years using its Initial Cost Recovery Account (ICRA).

If NBN Co’s actual costs are used as efficient costs, then the revenue cap on NBN Co is expected to be well above what it would actually recover based on current prices. The ACCC does not expect that the revenue cap on NBN Co will be binding within the term of the Special Access Undertaking (SAU) to 2040.²

The bundled discounted prices offered by NBN Co are also currently outside of the regulatory arrangements.

NBN Co proposed pricing options

NBN Co has developed a set of possible future pricing constructs, as part of its June 2021 nbn SAU Variation 2021 Discussion Paper. These constructs seek to address a range of issues raised by retailers. The options are preliminary and would be further developed.

The key aspects of the options developed by NBN Co are set out in table 1.2.

² ACCC 2021, Framing paper for ACCC Industry Roundtable on regulatory arrangements under nbn Co’s Special Access Undertaking, p.3, <https://www.accc.gov.au/regulated-infrastructure/communications/national-broadband-network-nbn/inquiry-into-nbn-access-pricing/industry-roundtable-on-nbn-regulation>.

- All constructs reduce the component of charges related to CVC compared to the current discounted charge (chart 1.3).
- The quid pro quo to this would be that **access prices will increase more than they would otherwise over time**, and would increase in real terms if there were no CVC charges (increase by the consumer price index + X per cent). The exact pattern of increase has not been specified, but NBN Co has indicated this would be related to growth in usage.

The constructs also bring current arrangements such as bundled discounted offers and the multi-technology mix within the regulatory framework.

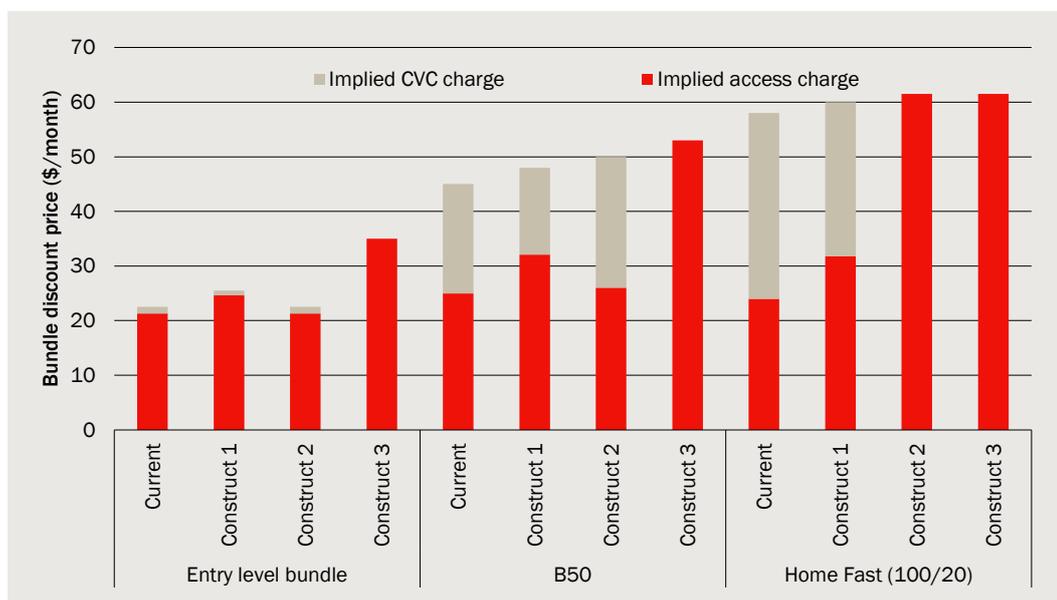
1.2 Pricing constructs put forward by nbn

	Current discounted TC-4 bundles	Construct 1	Construct 2	Construct 3
Usage charges (CVC)	Yes, \$8 per Mbps	Yes, \$6 per Mbps	Yes, \$8 per Mbps for customers with plans for speeds lower than 50 Mbps No for customers on higher speed plans	No
Access charges varied by speed tier	Minimal differentiation (\$21.3 for Entry level bundle to \$24 for 100/20)	Some differentiation \$24.6 for entry level to \$31.8 for 100/20	Yes, mainly differentiated on speed	Yes. Ranges from \$35 per month for entry level plan to \$51-\$55 for a 50/20 plan and \$60-\$63 for 100/20 plan.
Changes in plan prices over time	CPI less 1.5 per cent	Not clear	Real increased linked to usage, but expected increases not identified	Real increased linked to usage, but expected increases not identified

Source: *nbn Special Access Undertaking Variation 2021 Discussion Paper*,

<https://www.nbnco.com.au/content/dam/nbn/documents/media-centre/media-statements/2021/nbnco-pricing-review-2021-consultation-paper-1.pdf>.

1.3 nbn initial charges under alternative constructs, selected bundles



Note: The total charge is disaggregated into an AVC and CVC charge through applying the included CVC and a CVC charge of \$8 per Mbps for current and Construct 2, and \$6 per Mbps for Construct 1.

Data source: CIE analysis; <https://www.nbnco.com.au/content/dam/nbn/documents/sell/wba/2021/sfaa-wba-nbn-ethernet-price-list-20210505.pdf>; *nbn Special Access Undertaking Variation 2021 Discussion Paper*, <https://www.nbnco.com.au/content/dam/nbn/documents/media-centre/media-statements/2021/nbnco-pricing-review-2021-consultation-paper-1.pdf>.

NBN Co also discusses different options for how prices are regulated in the future, ranging from a weighted average price cap approach to individual product price changes allowed over time.

These constructs and options are a useful start in terms of how NBN Co is thinking about pricing. The main difficulty is that there is nothing that articulates the framework that NBN Co has used to arrive at these options, or could make judgements about these, and what the specific trade-offs are between a lower usage charge and higher price increases over time. There is no discussion of key issues typically used to anchor regulated prices, such as the long run marginal cost or the level of revenue collected and how this aligns to efficient costs. Nor is there any discussion about what different pricing constructs mean from an economic efficiency perspective.

NBN Co has also commissioned Accenture to examine the impact of options without a usage (CVC) charge on customers with low data usage. The key messages from this work are that:

- 1.4m households that are on data capped plans would be negatively impacted by the removal of CVC charges
- 95 per cent of these customers would face a price increase of on average \$120 per annum, and would remain with the nbn
- 5 per cent would leave the nbn
- the consumer surplus of these low data households will fall by \$213 million per year.

This work does not examine the overall benefits and costs of different pricing structures, but only examines the impact on the small set of customers who may benefit from CVC charges.

There are a number of significant issues with the inputs and calculations that inform these key messages, which suggests that further investigation is required. For example, the extent to which customers on data capped plans are legacy customers, rather than being reflective of current plans in the market, and whether caps are largely cosmetic (e.g. the price and usage differences between 500GB+ capped vs unlimited plans are minimal). We also do not believe the consumer surplus calculations are correct, as detailed later in this report. In fact, **the implications of removing CVC for the benefits generated by the nbn are very modest for low data customers.** These will be far outweighed by the negative impacts of CVC charges for retailers, such as risk and higher transaction costs.

The key strategic issue is the level of cost recovery for nbn

The pricing discussions for NBN Co should start with one key issue — **to what extent NBN Co can and should recover its costs.** If NBN Co is to fully recover its costs, including a return on its capital, then average revenue per customer will have to increase substantially. The NBN Co discussion paper is silent on this issue.

If NBN Co is to achieve cost recovery including a return on its past investments, revenue will have to increase substantially above existing and projected levels. Part of the revenue growth required can come from an increase in the number of customers. However, this has a natural limit and thereafter increases fairly slowly. By 2023, the last year of the 2021 Corporate Plan, the number of customers is expected to increase by only 2 per cent. The revenue per customer at this point (2023) is expected to be \$53 per month.

This means that the bulk of the required revenue increase would need to be from higher revenue per customer. Achieving cost recovery would mean substantial additional costs for households for their telecommunications services.

NBN Co is not expecting that it will achieve a rate of return commensurate with that allowed in the SAU. In its 2021 Corporate Plan, it estimates an internal rate of return of 3.7 per cent nominal. This indicates that it is not seeking to achieve cost recovery in the sense of recovering costs and earning a rate of return that is allowed in the SAU. Exactly what the level of cost recovery that is being factored into NBN Co's expectations is not clear.

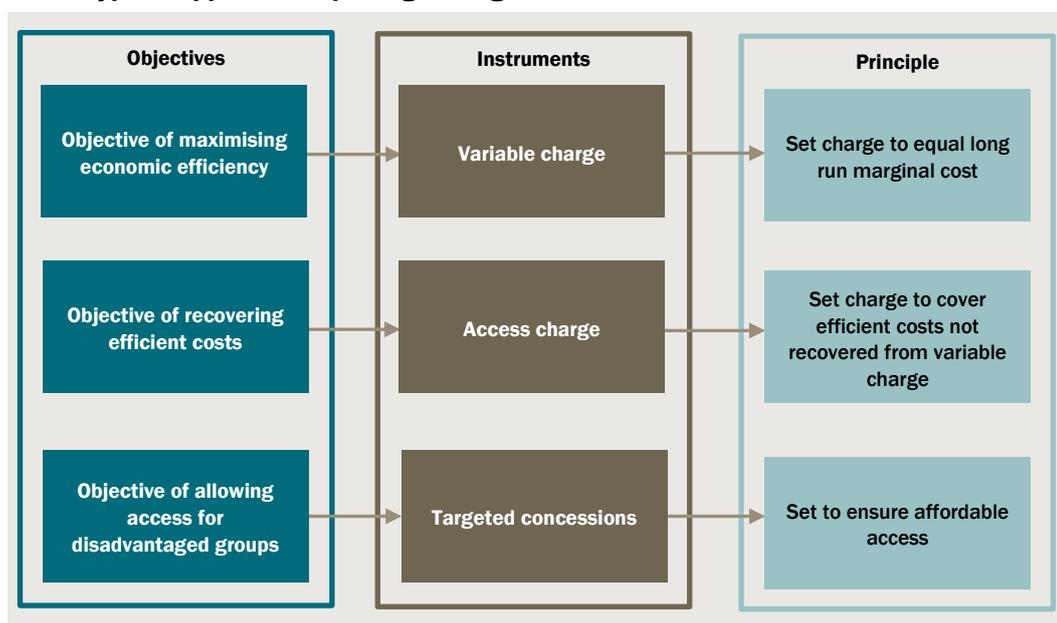
- **Without greater transparency about what level of cost recovery nbn should achieve, and that is credibly set within the regulatory system, retailers and customers will not be able to predict long term future prices.**

2 Pricing principles for infrastructure assets

In Australia, outside of the communications sector, the main regulated infrastructure assets are electricity and gas distribution and transmission networks and water and wastewater networks. The form of pricing for these natural monopoly networks provides some relevant insights into pricing principles for the nbn.

- The predominant pricing structure for energy and water infrastructure is a two-part tariff. One part of the tariff is an access fee and a second part of the tariff is a usage fee (chart 2.1).
- The usage fee is typically set first, equal to the long run marginal cost associated with additional usage.
- The access fee is set second to ensure the regulated utility can generate sufficient revenue to recover its efficient costs.

2.1 Typical approach to pricing for regulated utilities



Data source: The CIE.

The requirements for pricing for these regulated utilities are set out in various regulatory instruments. For electricity and gas utilities, the Australian Energy Market Commission (AEMC) determines rules. For pricing, these include that:

- Each network tariff must be based on the long run marginal cost of providing the service

- The revenue to be recovered from each network tariff must reflect the network business' total efficient costs of providing services to the consumers assigned to that tariff.
- Distribution Network Service Providers (DNSPs) must manage the impact of annual changes in network prices on consumers, e.g. by transitioning consumers to new network prices over one or more regulatory periods. DNSPs must set network prices which consumers are reasonably capable of understanding, i.e. consumers are able to relate their usage decisions to the price structure.³

The pricing of water is similar. For example, the Independent Pricing and Regulatory Tribunal (IPART) sets Sydney Water's usage price based on the long run marginal cost of providing additional water. It then sets the access fee to cover the remaining revenue requirement not covered by usage charges.⁴

In other sectors there are also specific policies targeted at people facing hardship, such as energy rebates for low income households.

Gas distribution networks, which are similar to the nbn in that people can choose not to take up gas, have similar provisions.⁵ In particular, the tariff should be set with regard to the long run marginal cost. The gas rules also envisage the possibility of where this doesn't recover revenue, If the long run marginal cost doesn't recover the expected revenue requirement then "the tariffs must be adjusted to ensure recovery of expected revenue with minimum distortion to efficient patterns of consumption."⁶ The National Gas Rules also make reference to the **transaction costs** associated with a tariff being a relevant factor in considering tariffs.

- **Other regulated utilities do not engage in the sorts of actions being undertaken by nbn, such as discounting, bonuses and promotions. Their pricing is anchored around measures of cost.**

While cost based pricing is the focus for most regulated utilities, as the National Gas Rules make clear, there can be a rationale for raising tariffs above long run marginal costs to recover enough revenue to equal efficient costs. This should be done with the minimum distortion to the efficient pattern of consumption. This is also discussed

³ AEMC 2014, National Electricity Amendment (Distribution Network Pricing Arrangements) Rule 2014, *Rule Determination*,

<https://www.aemc.gov.au/sites/default/files/content/de5cc69f-e850-48e0-9277-b3db79dd25c8/Final-determination.PDF>.

⁴ IPART2020, Review of prices for Sydney Water from 1 June 2020, Final report, Table 2.2, <https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/pricing-reviews-water-services-metro-water-prices-for-sydney-water-corporation-from-1-july-2020/legislative-requirements-prices-for-sydney-water-corporation-from-1-july-2020/final-report-review-of-prices-for-sydney-water-june-2020.pdf>.

⁵ National Gas Rules, s94, <https://www.aemc.gov.au/sites/default/files/2021-05/NGR%20v59%20full.pdf>.

⁶ National Gas Rules, s94 (5), <https://www.aemc.gov.au/sites/default/files/2021-05/NGR%20v59%20full.pdf>

extensively in the academic and regulatory literature on natural monopoly.⁷ Essentially, price discrimination across customers can be a way for a natural monopoly to increase profitability at the smallest overall cost to social welfare. This can be seen in the following:

- suppose that we start with a price equal to the marginal cost, and that this does not cover the fixed costs
- the monopoly has a set of customers with different preferences across the products that it offers, and it will have to increase some of its prices to increase revenue
- if it increases prices for and there is a large change in consumption patterns — for example, a reduction in use or reduction in customers — then this means a large reduction in consumer surplus and a smaller gain in revenue than if customers were less responsive
- the socially most efficient way to increase price is to do this in a way that minimise consumption changes.

Accenture discusses similar topics in their paper for NBN Co, noting that CVC charges provide for greater price differentiation.⁸ The presumption is that differentiation is positive, even though this differentiation is not linked to costs. However, from an efficiency perspective, **creating a price above the long run marginal cost to differentiate consumers is always a negative welfare impact**, and it is really about whether this is the least negative way of increasing revenue. This is akin to measuring the dead weight loss of taxation — any tax will have a distorting impact. Taxes should be levied in a way that minimises these distortions.

Why is the nbn different to other utilities?

NBN Co is adopting a substantially different role to most other utilities in terms of its pricing. Essentially, **NBN Co has focused much more on demand-based pricing rather than cost-based pricing** compared to other regulated utilities. Examples of this include:

- Focus on 50 — this wholesale promotion provided for discounts on higher speed nbn plans and a 50 per cent boost in bandwidth⁹

⁷ See for example Armstrong 2005, Recent developments in the economics of price discrimination, <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1048.986&rep=rep1&type=pdf>; Bergemann, Brooks and Morris 2014, The limits of price discrimination, <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.639.3668&rep=rep1&type=pdf>.

⁸ Accenture 2021, *Moving to a fixed price wholesale data model: risks for low data users*, prepared for nbn, May.

⁹ nbn website, accessed 7 July 2021, <https://www.nbnco.com.au/content/dam/nbnco2/documents/NBN-Co-march-progress-report-media-release1.pdf>.

- Focus on Fast — this nbn promotion includes rebates for internet retailers for six months and changes to discounts available on bundles ¹⁰
- the absence of any discussion of costs in NBN Co's pricing discussion paper.

Why is NBN Co adopting such a different approach compared to other utilities? Mainly this appears to reflect that it cannot easily achieve cost recovery and this has pushed costs into a subsidiary role in the development of pricing. The underlying reasons why cost recovery is more difficult for NBN Co than for other utilities are as follows.

- Unlike other utilities, if NBN Co seeks to increase access charges to achieve cost recovery through increased access charges, then people may choose not to take up nbn services. This reflects the weakness of the business model for the nbn. This is very unlikely for utilities such as water, wastewater and electricity because of the high customer value relative to alternatives, which has meant these businesses can use access charges to recover fixed costs
- The SAU put in place a relatively inexpensive product that aligned to existing services available, with the intent that people would not end up paying more when being required to move to the nbn. As the ACCC noted "To the extent that a functionally equivalent service is available, the ACCC considers that end-users should not be made worse off by virtue of their migration to the NBN".¹¹
- The high costs of the nbn, which has meant that recovering these costs from users would require substantial increases compared to historical communications prices.
- A desire from NBN Co and the government to ensure that customers choose high speeds and that the nbn demonstrates increasing speeds for Australian broadband.¹² This has meant that NBN Co has reduced the price differential for higher speeds, to ensure that customers choose these plans. Initially, many customers chose lower speed plans.

In the absence of easy mechanisms to achieve cost recovery, the most favourable interpretation is that NBN Co appears to be trying to use price discrimination to increase cost recovery with as small an impact on customers patterns of use as possible. An alternative interpretation is that **NBN Co has too many competing objectives** for the instruments it has at its disposal (see chart 2.2) — in conflict with the rule of needing one instrument for each objective.¹³ In both of these cases, NBN Co is balancing cost recovery and the value of the nbn in whatever pricing structures it puts in place.

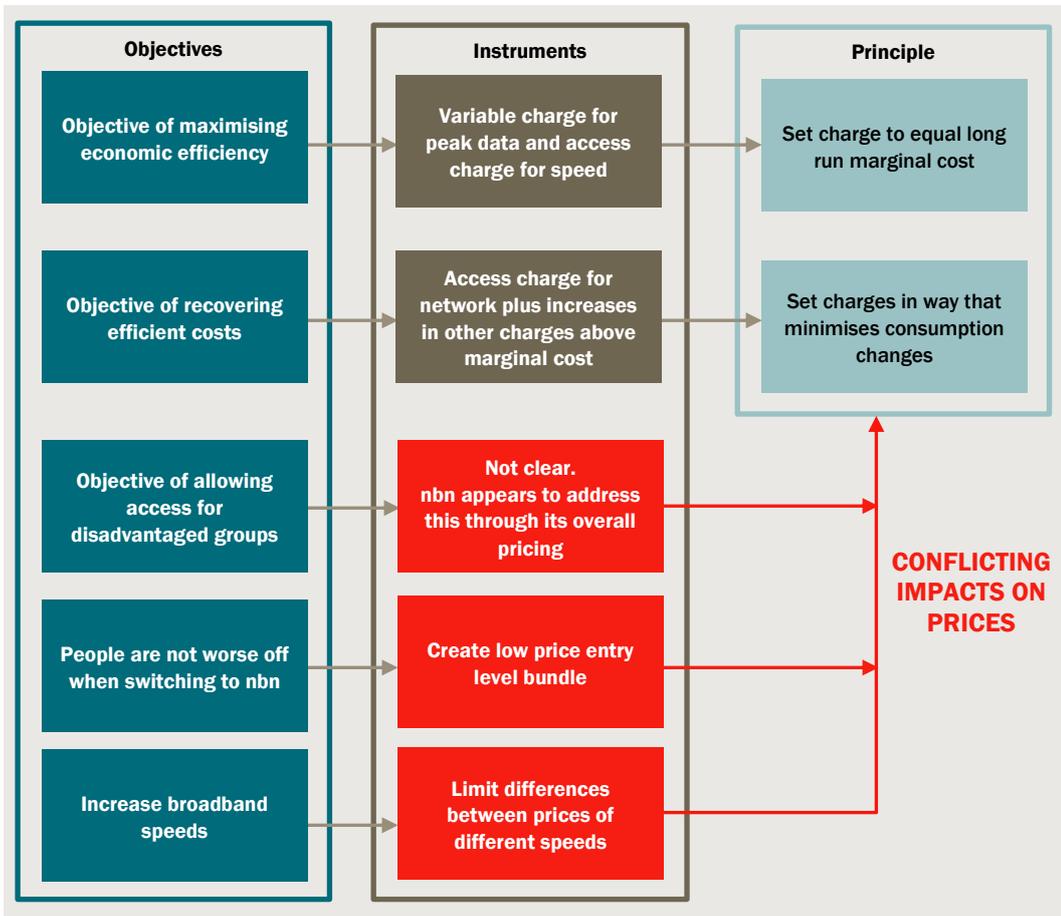
¹⁰ nbn website, accessed 7 July 2021, <https://www.nbnco.com.au/corporate-information/media-centre/media-statements/nbn-launches-new-focus-on-fast-campaign>.

¹¹ ACCC 2013, NBN Co Special Access Undertaking, Final Decision, p. 85, <https://www.accc.gov.au/system/files/ACCC%20Final%20Decision%20on%20the%20Special%20Access%20Undertaking%20lodged%20by%20NBN%20Co%20on%2019%20November%202013.pdf>.

¹² See nbn discussion paper p. 4, which details the objectives of the SAU, particularly objective number 3 of 'Supporting efficient investment in the network as well as efficient use of the network'.

¹³ Barre, Raymond & Tinbergen, J.. (1954). On The Theory of Economic Policy. *Revue économique*. 5. 124. 10.2307/3497941.

2.2 Objectives and instruments for nbn



Data source: The CIE.

3 Framework for nbn pricing

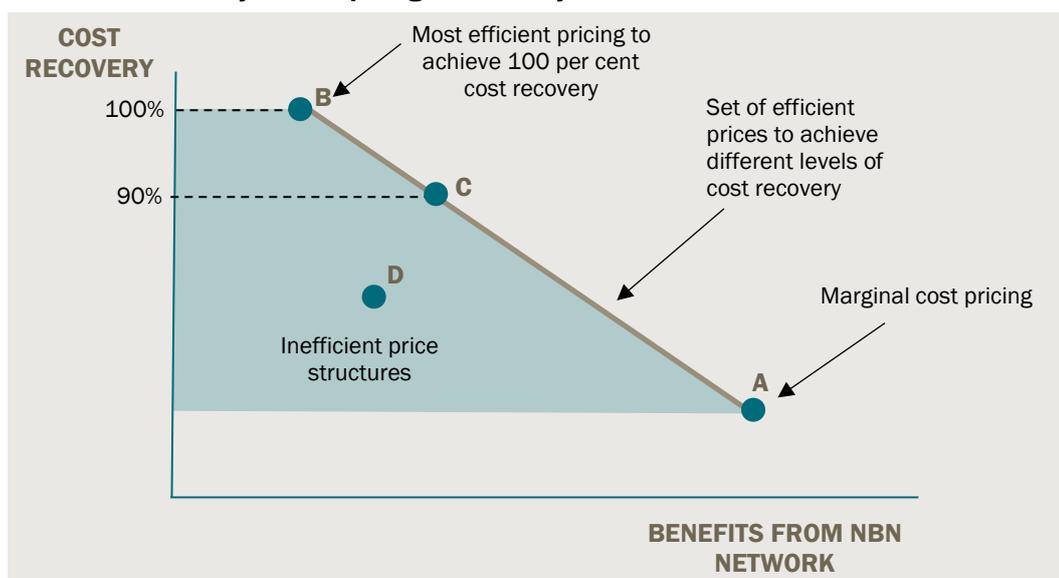
The frameworks for infrastructure pricing indicate that the key factors for nbn pricing are:

- understanding the overall costs (and efficient costs) for NBN Co and the extent to which revenues are expected to recover these costs
- understanding the long run marginal cost associated with aspects of the services that the nbn provides, such as usage (peak data or amount of data) and speed
- understanding where NBN Co should apply prices above long run marginal costs in a way that minimises changes to consumption patterns and minimises transaction costs.

In understanding these things, the trade-offs between the surplus to consumers generated by the nbn and the level of cost recovery become clear. As shown in chart 3.1, **there is a trade-off between the surplus, or benefits, generated by the nbn for the Australian community and the level of cost recovery.**

- The highest surplus is generated by marginal cost pricing, at point A, but this would likely lead to a low level of cost recovery
- Efforts to increase cost recovery will reduce the benefits of the nbn. The best that can be achieved is the line AB. For example, B is the most efficient way to achieve 100 per cent cost recovery, or C is the most efficient way to achieve a 90 per cent cost recovery
- There are also a range of inefficient ways to increase cost recovery, which are in the shaded area to the left of AB, such as point D.

3.1 Cost recovery and surplus generated by the nbn



Note: Illustrative only.

Data source: The CIE.

Note that it may be the case that 100 per cent cost recovery of the nbn is not feasible. If customer switching is sufficiently high then efforts to increase prices and revenue may fall short of achieving cost recovery, as higher and higher prices are levied on a smaller customer base.

In developing its pricing options, NBN Co should identify the level of cost recovery that it is seeking to achieve, and how its prices are the most efficient set of prices to achieve this.

For other utilities, AB is very steep if not vertical because access charges can be used to recover full cost recovery with almost zero impact on the benefits generated by the infrastructure.

Options available for nbn pricing

Conceptually, NBN Co could price in many different ways. It could charge for:

- access — the ability to connect to the network at all
- speed — the maximum speed that a household is allowed to receive for downloads or uploads
- data use — the amount of data downloaded or uploaded
- peak data use or time of data use — the amount of data downloaded or uploaded during peak periods
- priority of data — whether a connection is given priority for its data, or a part of its data.

Current NBN Co pricing constructs use all of these dimensions except for the amount of data use. Accenture discusses the nbn prices as similar to a two-part tariff. However, they are really more complicated than this because prices can vary over dimensions such as the speed of the service. Even if there were no CVC charge, prices would still be ‘two-part’ having a charge to access the nbn and a charge for the speed available.

What does the evidence suggest about the most efficient pricing structures?

The efficient price structures suggest a need to understand several key pieces of information to inform prices.

- 1 What is the expected level of cost recovery (or rate of return) that NBN Co is intending to achieve with its prices? Currently, the NBN Co Discussion Paper is silent on this issue
- 2 What is the long run marginal cost of additional use of data and speed? Currently, the NBN Co Discussion Paper is silent on this issue
- 3 Where tariffs have to be levied above long run marginal costs to achieve an (unspecified) level of cost recovery, what tariff structure will:
 - minimise distortions in efficient consumption patterns

- minimise transaction costs for retailers and consumers.

The NBN Co Discussion Paper and Accenture paper hint at some of these issues but have not attempted to address these in any systematic way. It is our expectation that the vast majority of nbn costs are fixed, and usage charges are more distorting than access charges. On this basis, the rationale for CVC charges as a preferred cost recovery mechanism is therefore weak.

In the sections below we summarise the state of the evidence on these issues.

What is the expected level of cost recovery?

The starting point for most regulated pricing discussions is a clear understanding of the overall costs and how these costs are expected to be recovered over time. It is clear from the NBN Co Corporate Plans that it is not currently expecting to recover a rate of return at a level allowed in the SAU, of the nominal bond rate plus 3.5 per cent. The NBN Co pricing constructs are silent on exactly what rate of return is expected from the different pricing constructs, and what projections underlie these prices so that they are revenue neutral from the perspective of NBN Co.

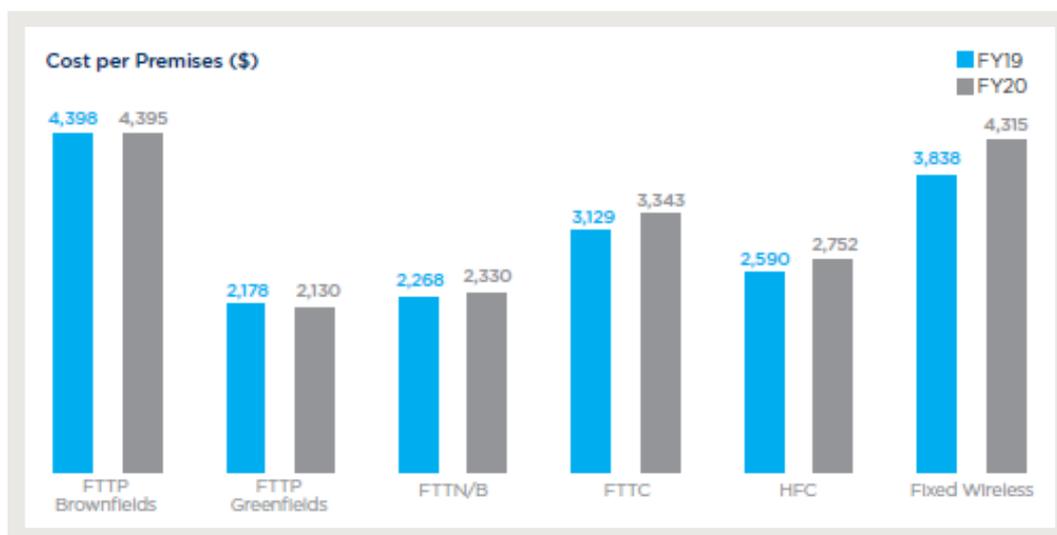
What is the long run marginal cost of peak data use and speed?

The long run marginal cost of additional peak data use to NBN Co is not currently clear. During Covid-19, NBN Co faced substantial increases in data use, and this was not noted as leading to any particular costs. Our expectation is that **the cost to NBN Co of additional peak data use is quite small for the fixed line network**, but much higher for the fixed wireless and satellite networks. Note that the long run marginal cost of data use, as opposed to peak data use, is expected to be zero.

In contrast to the long run marginal cost of peak data use, there is good evidence that the long run cost of additional speed is quite high. This reflects the costs of different technologies and upgrades, such as bringing fibre closer to or all the way to the home (chart 3.2). This supports having different access charges for different speeds. It does not support CVC charges. Aligning prices to this would be a good way to ensure that NBN Co has efficient incentives to upgrade technologies.

Note that where a technology has already been rolled out, such as fibre to the home, then the short run marginal cost of higher speed is likely to be zero. The extent to which pricing should reflect long run costs versus short run costs, and account for sunk costs, is a difficult one. From an efficiency perspective, once infrastructure such as fibre to the home is completed and costs are sunk then pricing on speed is not efficient. However, this would lead to inconsistencies in terms of thinking about this prior to upgrades and after upgrades are done.

3.2 Cost per premises for different technologies



Data source: NBN Annual Report 2020, p. 61.

What tariffs have the smallest impacts on the pattern of consumption?

Where there is a need to raise prices above the long run marginal cost, a key issue is doing this in a way that minimises changes to the patterns of consumption. This mirrors discussions of how to most efficiently levy taxes — the most efficient taxes lead to the smallest behaviour changes. For nbn, the relevant consumers are retailers, who are NBN Co's consumers, and end users (households and businesses). Ideally, prices would be increased in a way that:

- consumers would not change whether or not they use the nbn at all — this includes decisions by retailers about whether they purchase services from other wholesale networks and end user decisions about whether they use the nbn or other services
- consumers would not change what speed plan they choose on the nbn — this combines decisions by retailers, who are NBN Co's consumers, and end users. i.e. a retailer may choose to market a particular speed
- consumers would not change how they use the nbn, covering both
 - end users would not change what activities they use the nbn for
 - retailers would not change how they constrain the speeds available to their end users.

CVC charges are likely to impact on all these different aspects of consumption patterns (table 3.3). Access charges above the long run marginal cost would have impacts only on whether the nbn was used at all.

3.3 Impacts of different charges above long run marginal cost

nbn charge	Using nbn at all	Speed of service	How nbn is used
Access charge	Yes	No	No
Speed tier charge	Yes	Yes	Partially
CVC charge	Yes	Yes	Yes

Source: The CIE.

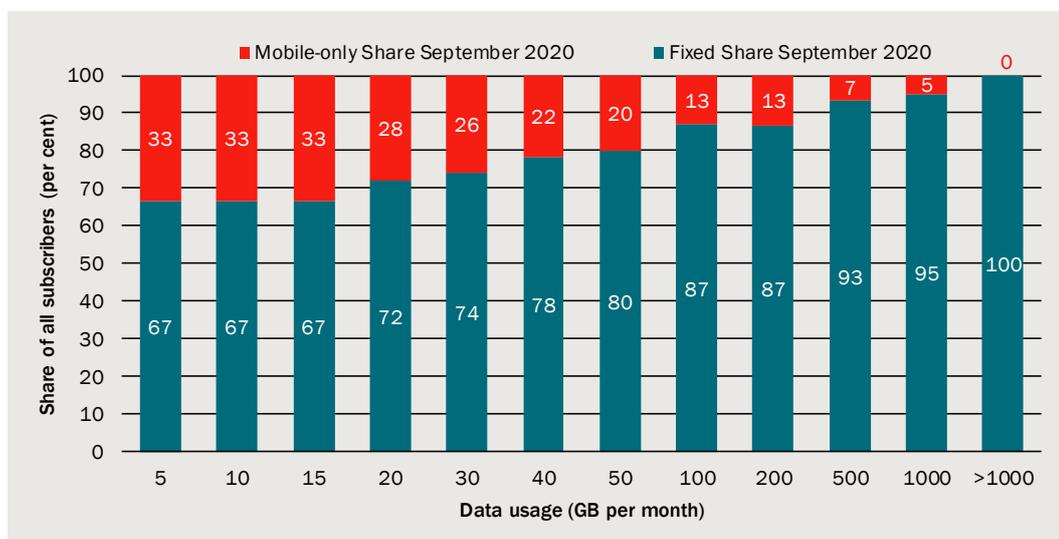
This suggests that access charges are likely to be the largest part of the recovery of a revenue shortfall above long run marginal cost. NBN Co's pricing constructs would all see a large part of revenue coming from access charges.

A speed related charge is likely to exist because there is a higher cost for providing technologies with higher speeds. Charging above long run marginal cost will be more distorting than a straight access charge. This is because it will distort patterns so that people choose a lower speed than is efficient. Note that cost arguments suggest that there would be a charge for higher speeds, and this is about whether there is an additional charge above this.

A peak usage charge (CVC) could be quite distorting because this will change how the nbn is used. Because peak usage charges are difficult for retailers to reflect in retail prices, the distortions from CVC charges on consumption patterns work through retailers. At worst, **CVC is highly distorting if retailers manage their CVC obligations by reducing the quality of service to customers at peak times.** It is also distorting if retailers shape some plans, which reduce the benefits of the nbn to some users. At best, retailers simply absorb CVC charges above long run marginal cost without passing these on to end users — in this case they become a de facto access charge, just with higher risks and transaction costs as discussed next.

The main reason why NBN Co relies on CVC charges is that they can target additional revenue collection at users who consume more data and because usage will increase over time. From NBN Co's perspective, it is secondary whether retailers can pass on CVC costs. If they cannot, then end users are less likely to leave the nbn for alternatives such as going mobile only (chart 3.4). High data users may be targeted by other fixed line broadband infrastructure providers, such as TPG's Telecom's fibre to the basement and HFC infrastructure.

3.4 Mobile only user share and data usage



Data source: Woolcott Research and Engagement survey (commissioned by the CIE) (n=1011).

Perhaps the best evidence that CVC is not the most efficient pricing structure is the evidence of retailers. Retailers are the consumers of the nbn. Retailers are best placed to understand end customers and the transactions costs (discussed next) of different pricing structures. If retailers are all in general agreement that NBN Co charges should be AVC-only, then it is not clear why NBN Co would diverge from the views of its customers.

Accenture approached this issue slightly differently, although still aiming to understand changes to consumption patterns. It asks whether the removal of CVC charges would lead to the removal of some plans that end users are currently choosing (and therefore prefer). It argues that:

- if CVC charges are removed then retailers would no longer offer plans with capped data
- the absence of CVC charges would be replaced by an increase in the access charge for each speed tier. The overall effect would be a higher nbn charge for end users on data constrained plans and a lower nbn charge for end users on unconstrained plans
- the higher nbn charge for end users on data constrained plans would lead them to either leave the nbn (5 per cent of these users) or remain with the nbn but maybe with a different speed.

Before turning to the calculations, to frame the argument consistent with an overall pricing strategy, Accenture is arguing that it is less distorting on consumption patterns to increase the CVC charge compared to increasing the access charge. This is because low data users would leave the nbn. The paper has not examined the effects on all users. It has only considered the impacts on the set of users who may benefit from CVC charges. **A better starting point would be to examine how different options for charging customers above marginal cost impact on the overall benefits and costs of the nbn.**

In terms of the detriment to consumer surplus from removing CVC charges, the lost consumer surplus for low data uses is estimated by Accenture at \$213 million per year. The basis for these calculations is shown in table 3.5.

3.5 Accenture calculations of consumer surplus

	Remain with nbn	Leave nbn	Total
Number of customers on low data plans	1.3 million	70 000	1.4 million
Share in each category (per cent)	95 per cent	5 per cent	100 per cent
Price increase (\$/customer/year)	\$120	\$120	\$120
Consumer surplus loss per consumer (\$/year)	\$118	\$844	na
Consumer surplus loss in total (\$/year)	\$155 million	\$58 million	\$213 million

Source: Accenture 2021, *Moving to a fixed price wholesale data model: risks for low data users*, prepared for nbn, May.

The total number of customers on data limited plans appears to be from the ACCC Internet Activity Record Keeping Rule Report.¹⁴ This indicates that there are 7.3 million nbn services in operation as at December 2020, of which 5.9 million are unlimited plans. This would leave 1.4 million users, or 16 per cent, on data constrained plans.

From reviewing nbn plans in the market, it is evident that current plans are nearly all unlimited, particularly for the major providers.¹⁵ A substantial component of customers on data limited plans are almost certainly on legacy plans that are no longer in the market. [c-i-c]

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[c-i-c]

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The number of customers on data constrained plans is partly reflective of history rather than the plans in the market now. The number of customers impacted by changes in CVC may be smaller than anticipated in this case.

Accenture estimate an average price increase of \$120 per customer per year on data constrained plans. This is a weighted average across different data caps. This is the retail price difference, which comprises the wholesale nbn price and the retailer component (as well as taxes).

¹⁴ <https://www.accc.gov.au/regulated-infrastructure/communications/monitoring-reporting/internet-activity-record-keeping-rule-rkr/december-2020-report>

¹⁵ See WhistleOut website, <https://www.whistleout.com.au/Broadband>.

In terms of the consumer surplus calculations. Our understanding is that customers who remain with nbn pay \$120 more per year and their consumer surplus is \$118 per year lower. **Presumably this means that they gain \$2 from moving to an unlimited plan.** In terms of overall welfare, this is a gain of \$2 per customer per year — the additional payments of \$120 per year is revenue to NBN Co or retailers. If price changes are revenue neutral, then other customers would face reduced prices exactly offsetting the additional revenue from data constrained customers.

For customers that leave the nbn, **Accenture applies a lost consumer surplus of \$844 per customer per year. This is an unconvincing economic figure**, because the study applies the average consumer surplus instead of the consumer surplus of consumers leaving the network. A customer facing a choice of a \$120 per year increase in price or an \$844 per year loss of consumer surplus would clearly pay the higher price. The standard approach to estimating consumer surplus for a customer that changes their decision is that the lost consumer surplus will equal somewhere between zero and the change in the price. If the demand curve is linear, on average the lost consumer surplus would equal half the change in the price, known as the rule of half — in this case \$60 per year.¹⁶

If we redo the calculations along these lines then we find that there is a lost consumer surplus for customers that leave the nbn of \$4.2 million per year, and a social welfare gain to customers moving to unlimited data of \$2.6 million per year. These are trivial impacts in terms of the benefits to this set of customers of having CVC charges. And as discussed later, will be far outweighed by the negative impacts of CVC charges.

3.6 CIE calculations of consumer surplus

	Remain with nbn	Leave nbn	Total
Number of customers on low data plans	1.3 million	70 000	1.4 million
Share in each category (per cent)	95 per cent	5 per cent	100 per cent
Price increase (\$/customer/year)	\$120	\$120	\$120
Consumer surplus loss per consumer (\$/year)	\$118	\$60	na
Total surplus gain per consumer	\$2	-\$60	na
Low data consumer surplus loss in total (\$/year)	\$155 million	\$4 million	\$159 million
Surplus gained by others (\$/year)	\$158 million	na	\$158 million
Total change in surplus (\$/year)	\$3 million	-\$4 million	-\$1 million

Source: The CIE.

¹⁶ Note that it is not clear if calculations of consumer switching were undertaken for each data constraint separately. If so, the loss may be higher because those consumers on very low data usage would have a higher price increase (\$360 per year), a higher consumer loss (\$180 per year) and comprise a higher share of switching customers.

The impacts would be smaller again when factoring in that many customers on data constrained plans are on legacy plans. Further, the largest impact is for 10GB/month customers. Accenture estimates that there are 28 000 of these. [c-i-c] [REDACTED]

[c-i-c] This suggests that use of this plan is more a consumer discovery process than reflecting a maximising plan from a consumer perspective.

These impacts are also not factoring in any increased surplus because other unlimited plans are now cheaper, which may increase nbn take-up to a small degree.

A key part of CVC charges from nbn's perspective is likely to provide a low entry level product. Alternative pricing constructs could also consider how speed tier pricing could be used to achieve this.

What tariffs have the smallest transaction costs?

A further important consideration in price structure design is the transactions costs and risks that different options entail. An access charge has minimal transactions costs or risks because it is easy to observe and charge for and can be passed directly on from retailers to end users.

CVC charges are complicated for retailers because:

- retailers do not charge end users directly for their peak data use, or contribution to the retailer's overall CVC — they could charge for this directly in some way, but have clearly decided that this is too high a cost or unattractive to consumers, even though NBN Co charges them in this way
- retailers face a risk around how much they are charging customers and what the actual CVC required is, and/or
- retailers face transaction costs to monitor their CVC and provision for this, and accurately price this into retail plans.

If a retailer wants to reduce their CVC costs, their options are to:

- target customers who they think will add only a small amount to overall CVC requirements, which is customers with low use at busy times. This could be done through marketing, deals with other providers¹⁷ and particular plans (such as data capped plans)
- provision more higher speed plans that come with additional CVC inclusions
- constrain the services that customers get at peak times, so that overall CVC requirements are smaller. For example, slowing speeds down at peak times. As noted earlier, this does not appear to be a strategy that retailers consider to be viable.

These strategies to reduce CVC use are imperfect and introduce risks for retailers. To take the example of data capped plans:

¹⁷ An example of a strategy to reduce CVC exposure is:

<https://www.itnews.com.au/news/aussie-broadband-looks-for-cvc-upside-from-white-label-customers-563429>

- data caps limit the amount of data that a customer use, rather than their peak data
- their busy hour data may be higher or lower than reflected in their relative data usage.

Furthermore, the CVC requirements are not stable over time. [c-i-c] [redacted]
[redacted]

[redacted] [c-i-c] These changes mean risk to a retailer. To account for this risk means a retailer has to increase the prices that it charges end users, as well as increasing costs to manage these risks.

[c-i-c] [redacted]
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Given the very small welfare benefits, the transaction costs and risks associated with CVC across all retailers and NBN Co are expected to far outweigh the gains to having CVC charges as a method for price discrimination compared to using access charges.

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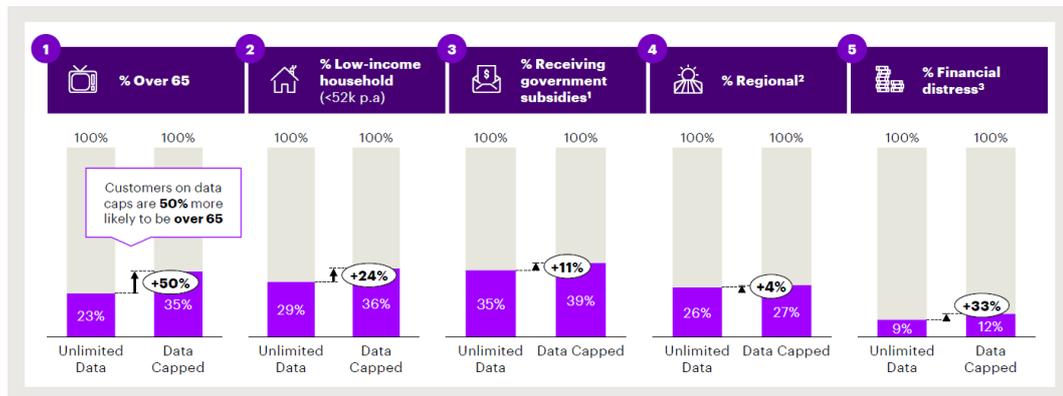
[redacted]
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4 Distributional impacts of price structures

Accenture has highlighted that data capped users are more likely to come from vulnerable sections of the population (chart 4.1). Targeting the price structure of the nbn to address the needs of parts of the population is seeking to achieve too many objectives with prices. As the estimates in chart 4.1 make clear, **most nbn users on data caps are not low income, do not receive government subsidies and are not in financial distress.** Given the small share of customers on data capped plans, it is also clear that there are more customers on unlimited data plans who are low income, receive government subsidies and are in financial distress.

Using affordability and equity issues for a subset of customers as a basis for a key part of NBN Co's price structure is the tail wagging the dog.

4.1 Unlimited and data capped users' characteristics



Source: Accenture 2021, *Moving to a fixed price wholesale data model: risks for low data users*, prepared for nbn, May.

The most obvious way to address specific affordability and equity issues is through Australia's broad-based welfare system, complemented by targeted assistance, as is typically done for other utilities.

Accenture also considers it 'unfair' to remove data capped services. It could equally be considered 'unfair' to provide a limited data capped service to vulnerable customers.

We suggest that these important considerations be part of targeted assistance programs, rather than be used as a justification for overall nbn pricing structures.



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