



NATIONAL BROADBAND NETWORK POINTS OF INTERCONNECT

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Australian Competition
and Consumer Commission

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1. Executive summary

- > The NBN must do more than simply enhance the technical efficiency of the telecommunications industry, it must deliver the long overdue structural reforms required to drive Australia's digital productivity growth. Structural reform requires distinguishing between the natural monopoly elements of the NBN and its potentially competitive elements. The NBN must be implemented in a manner that promotes competition at every stage of the telecommunications value chain. To that end, the number and location of the Points of Interconnect (POI) will have a critical impact on the form of competition that emerges from the National Broadband Network (NBN) and for many more years to come.
- > For that reason, Vodafone Hutchison Australia Pty Limited (VHA) is in favour of Option 2, which places POIs at points of aggregation within the network where contested backhaul currently exists and is able to support future unbundling. NBN Co should not build infrastructure in areas where there are already at least three operators offering services, who are not constrained by their access to infrastructure (that is, not simply reselling services from other providers). Competition provides the best safeguard for efficiency and innovation. Excessive overbuild by NBN Co will destroy an existing market in backhaul transmission services, and prevent the likely emergence of a viable 'Layer 3' market.
- > The definition of functional competition is important. A well-functioning market requires at least three players with unconstrained infrastructure access. Our view is informed by our direct experience of acquiring transmission services on routes where only one or two providers exist. The prices paid on these routes are consistently more expensive than on routes where there are multiple providers.
- > The Australian Competition and Consumer Commission (ACCC) have previously determined that many transmission links in Australia (see **Appendix A**) are characterised by functional competition. The remaining transmission links are covered by the declaration of the Domestic Transmission Capacity Service (DTCS). In these situations, VHA supports the ACCC taking a more robust approach to its application of the access pricing principles for the DTCS. Specifically, the ACCC must issue indicative prices for the DTCS.
- > VHA notes its assessment of the number and location of POIs is hampered by a lack of transparency regarding the impact of the NBN Co's Financial Heads of Agreement (FHoA) with Telstra on the deployment of the NBN. For instance, it is unclear if the FHoA includes provisions for NBN Co to lease dark fibre from Telstra. NBN Co's means of delivering backhaul connectivity to POIs is relevant to the ACCC's consideration of competition and it will influence the number and location of POIs.
- > Options 1, 3 and 4 are not likely to promote the long-term interests on end-users. Options 3 and 4 propose too few POIs, bypassing competitive transmission services and replacing them with monopoly infrastructure. Option 1 proposes the most number of POIs of any of the options (between 718 and 950), but the lack of contested backhaul available from many of these POIs means that symbiotic relationships are likely to emerge between NBN Co and the one or two access seekers with infrastructure at the majority of these locations. As such, Option 1 is not conducive to promoting competition in downstream markets.
- > NBN Co's preferred position – Option 4, or the so-called 'composite model' – does not provide an appropriate framework to support future unbundling nor is it a proportionate response to the Government's desire for uniform wholesale pricing.
- > Finally, there remains a disturbing lack of certainty for industry participants making long term investment decisions. Uncertainty over the number and location of POIs, not to mention the services provided by NBN Co, means that there is little scope for access seekers to plan and invest in fibre infrastructure to complement the NBN. In addition, significant uncertainty remains around how NBN Co will operate, what products it will and how products will be priced. The decision on the number and location of POIs must be seen in this context. Like many in Australia, VHA is eager to understand what the NBN will offer, when it will offer it and how we can use it to support and enable the growth of Australia's digital economy.

2. Introduction

VHA welcomes the opportunity to respond to the ACCC’s discussion paper on the POIs for the NBN. The discussion paper brings a timely focus to the structural features of the NBN. These features will impact competition in Australia’s telecommunications industry for decades to come.

A POI is the inter-network location where traffic is exchanged between one network and another. The initial NBN POIs are the POIs which will allow retail service providers (RSPs) to connect to the NBN. The number and location of POIs will determine the extent of backhaul required by each RSP in order to connect end-users to services. We note NBN Co has prepared its own public position paper, *NBN Co Public Position Paper: Proposed NBN Co Points of Interconnect*. NBN Co has proposed four options for the number and location of POIs (see Table 1).

Table 1: NBN Co’s proposed POI options

Option	Number and location
Option 1 No consolidation	718-950 POIs
Option 2 Low consolidation	Indeterminate, depending on definition of contestable backhaul
Option 3 High consolidation	14 aggregation POIs
Option 4 Composite	14 aggregation POIs + up to ~195 Connectivity Serving Areas (CSA)

Source: ACCC, NBN Co.

2.1 Policy and regulatory context

On 7 April 2009 the Australian Government announced two separate, but inter-linked, policies objectives related to the Australian telecommunications industry:

- > deliver superfast broadband services to connect 90 per cent of all Australian homes, schools and workplaces with broadband speeds up to 100 megabits per second, and connect all other premises in Australia with next generation wireless and satellite technologies; and
- > provide structural reform by requiring NBN Co to operate as a wholesale-only, open access broadband network together with a suite of regulatory reforms to improve competition, strengthen consumer safeguards and remove redundant or inefficient red tape.

Much has been done by the Australian Government since these announcements to progress toward these objectives. The Government has established NBN Co to build, own and operate the National Broadband Network (NBN), declared that the fibre-to-the-premise would extend to 93 per cent of Australian premises and introduced the Telecommunications Legislation Amendments (Competition and Consumer Safeguards) Bill 2010 to the Australian Parliament. NBN Co has commenced construction at its initial trial sites, and announced 19 locations for the next stage of its rollout on the mainland. In Tasmania, NBN Co’s subsidiary, NBN Tasmania Limited, launched on 12 August 2010.

Elements of the Government’s proposed structural reforms will be achieved by Telstra’s decision, which still requires shareholder approval, to participate in the roll-out of the NBN. The decision Telstra and NBN Co have signed non-binding Financial Heads of Agreement, which

includes payment for the decommissioning of Telstra's copper network and cable broadband and payment for the use of Telstra's infrastructure. Should the agreement between Telstra and NBN Co proceed, then the number and locations of the NBN Co's points of interconnect is likely to be influenced by the location of Telstra's existing network design, in particular the location of its exchanges. While this is certainly likely to prove the most cost-effective means of building the NBN, VHA is extremely concerned by the lack of transparency over key elements of the deal.

The number and location of the Points of Interconnect (POIs) will have a significant impact on competition in the market for telecommunications services. It will have a significant influence on the network design and investment decisions of a number of carriers, including VHA, for the foreseeable future. The POI decision should not be left to NBN Co to determine in isolation. NBN Co is a public owned company with a mandate to build a national monopoly. As such, competition and competitive neutrality matters must be taken into consideration. We are therefore pleased that the ACCC is considering the short-term and long-term competition impacts likely to arise from the initial number and location of the POIs. To date, there has been too much focus on the NBN's design and build, and not enough focus on delivering an industry structure that promotes competition.

It is imperative that this once in a generation opportunity for structural reform is not lost. It is far more important to get the industry structure right than it is to get the industry infrastructure right. The right infrastructure enables consumers and business to be more productive but, in the long-term, without the right industry structure much of the value from such benefits accrues to the infrastructure owner. Consistent with object of Part XIC, the long-term interests of end-users are best served by an industry structure that promotes competition, encourages efficient investment in infrastructure and encourages efficient use of infrastructure.

Economic efficiency is best achieved if competition exists in as many elements of the value chain as possible. We acknowledge that where there are economies of scale, the number of players sustainable in an industry might be limited. If the economies of scale are significant and durable, the firm may have a natural monopoly. That is, it is more economical for one firm supply the relevant market than it is for several firms to supply the market. An *enduring bottleneck* is a particular form of natural monopoly typically associated with a facility (or other form of infrastructure) that is essential for the provision of services in vertically-related markets. Enduring bottlenecks are extremely unlikely to be bypassed through technological or market developments.

Sound competition policy requires that natural monopoly elements of the value chain be separated from the more competitive elements of the value chain. Absent of any separation, a natural monopoly provider typically has an incentive to leverage its market power into other vertically-related markets. Unsurprisingly, firms with control of enduring bottlenecks have more pernicious incentives. For example, a vertically integrated firm in control of an enduring bottleneck has the ability to exclude its upstream or downstream rivals from access to essential facilities. Such behaviour may take the form of direct exclusion or through 'price squeeze' behaviour, whereby downstream competitors face higher prices than those implicitly faced by the enduring bottleneck provider.

Aspects of the NBN, most notably the consumer access network or so-called 'last mile', represent an enduring bottleneck. The ACCC has previously observed that the challenges of regulating an enduring bottleneck are high. In such circumstances, the regulator is likely to be faced with imperfect or asymmetric information regarding the demand, cost structures and technological capabilities of the regulated firm. As a consequence, the risk of regulatory error is high with consequent detrimental impacts to economic efficiency and welfare.

The NBN should not be permitted to bypass, and effectively foreclose, competitive markets. Where competition has been demonstrated to work effectively, it is always preferable to the imposition of a monopoly. Competition is the best consumer safeguard, providing the market with the discipline to ensure that productivity benefits are passed-on to end-users. Competition is an essential driver of productivity and innovation, as firms continuously seek to differentiate themselves or strive for cost efficiency in the pursuit of competitive advantage.

The Government's vision for the NBN is predicated on providing fibre-to-the-premises on a wholesale-only, open access basis. We contend that the NBN Co's preferred position, the so-called 'composite model', is not consistent with the Government's objective to deliver an open network. Less POIs, by definition, means the NBN is less open than it could otherwise be. In our view, the consequence is an unnecessary constraint on innovation and investment in Australia's telecommunications sector.

2.2 Framework for the ACCC's decision

As the ACCC is aware, if NBN Co lodge Special Access Undertaking (SAU) under section 152CBD of the *Trade Practices Act 1974* (TPA) then the ACCC must have regard to the object of Part XIC of the TPA *as well as* a broader set of consideration specific to s152CBD. The object of Part XIC is to promote the long-term interest of end-users of carriage services or of services provided by means of carriage services. In considering the object, the ACCC must have regard to the following objectives:

- > promoting competition in markets for listed services;
- > achieving any-to-any connectivity in relation to carriage services that involve communication between end-users;
- > encouraging the economically efficient use of, and the economically efficient investment in:
 - > the infrastructure by which listed services are supplied; and
 - > any other infrastructure by which listed services are, or are likely to become, capable of being supplied.

The ACCC has clearly referenced these objectives in its previous consideration of the declaration and pricing principles for fixed line services, the Domestic Transmission Capacity Service (DTCS) and the Mobile Terminating Access Service (MTAS). Therefore, we would expect the precedents set in the ACCC's often recent consideration of such matters to remain applicable to any future consideration of SAU lodged by NBN Co. In particular, we note the ACCC undertook a comprehensive assessment of competition in the market for the DTCS as part of its Decision on Telstra's DTCS exemption applications in November 2008 (the *Exemption Decision*).

3. Determining the Points of Interconnect

We do not anticipate any circumstance where NBN Co should build infrastructure in circumstances where a well-functioning market already exists. In our view, a well-functioning market must have at least three players. Therefore, NBN Co must typically restrict its infrastructure build to areas where an enduring bottleneck has previously been identified, regardless of whether such a bottleneck occurs in the access network or in the aggregation network (that is, transit backhaul). Its secondary focus should be in areas where economies of scale have limited the number of infrastructure providers to two players.

There is no rationale for replacing competition with a monopoly. The NBN must not be permitted to overbuild or bypass areas where the ACCC has already examined the market and deemed that there was sufficient competition. To that end, we anticipate the number and locations of NBN Co POIs should be strongly influenced by the ACCC's consideration of the level of competition in the provision of Domestic Transmission Capacity Services (DTCS) and the number of access seekers using Unconditioned Local Loop Services (ULLS) and/or Line Sharing Services (LSS) in Telstra's Exchange Service Areas (ESA).

VHA contends that Option 2 is the only viable choice for the number and location of NBN Co's POIs. However, the ACCC's focus must be on contested rather than contestable markets. That is, the number and location for the POIs should be based on the availability of contested backhaul (see Table 2). In particular, a POI must deliver competition between at least three providers of transmission capacity services, each with their own distinct infrastructure. (That is, transmission capacity providers must be more than just resellers). VHA provides further reasons for its support of Option 2, and its opposition to Options 1, 3 and 4 in the remainder of the document.

In the short-term, VHA considers that NBN Co has a role in building transmission infrastructure and offering transmission services but such services must be provided on a modular basis. That is, NBN Co's backhaul services, including any transit backhaul services, must be priced on a separate basis from its fibre access services. If NBN Co provides backhaul it should initially be provided on a layer 2 Ethernet basis, with NBN Co given discretion to offer dark fibre services once the NBN is fully constructed. In the long-term, the NBN Co's backhaul infrastructure should be structurally separated from the fibre access network prior to the Government disposing of its interests in NBN Co. Such an approach ensures that the DTCS market can transition from the existing, arguably imperfect regulatory framework, to a model where competition is permitted to develop.

Table 2: Decision criteria for locations of NBN Co's POIs

No. of backhaul providers* from Telstra's local exchange	Decision by NBN Co in fibre footprint area
1	Bypass – not a POI
2	POI. NBN Co builds competing backhaul infrastructure which is priced and offered separately from NBN Co's fibre access services
3 or more	POI. NBN Co does not build backhaul infrastructure

Note: Each backhaul provider must have unconstrained access to optical fibre infrastructure.

The number and location of POIs should not be regarded as static through time. A review of the number and location of NBN Co's initial POIs should occur after the completion of the NBN and prior to the Government's divesture of its interests in NBN Co.

NBN Co's preferred position, the so-called 'Composite model' (that is, Option 4), is completely unacceptable. Option 4 does not provide a level playing field for access seekers and is only likely to advantage vertically-integrated carriers who have fibre transmission links installed to the majority of these POIs. That the NBN Co's preferred position is independent of the existence of contestable backhaul is extremely concerning and suggestive of monopoly behaviour. Even if access seekers are physically able to interconnect at the CSA, NBN Co would have far too much discretion on who it connects and on the associated conditions of such a connection. NBN Co has stated that it initially considers that interconnection will only be available at CSAs in limited circumstances, such as for technical reasons (such as latency, avoidance of tromboning), or to provide interconnection for applications or content distribution. Such statements provide little, if any guidance, to access seekers and are certainly not likely to provide access seekers with any confidence in their dealings with NBN Co.

4. Relevant markets

There are three relevant markets directly impacted by a decision on the number and location of the NBN's POIs:

- > transmission markets;
- > retail markets; and
- > wholesale markets.

We explore the state of competition in each of these markets below and the implications and likely impact from each of the proposed POI options.

4.1 Transmission market

The product supplied in the transmission market is a direct substitute for the services proposed by the NBN. Our basis for determining the product definition for transmission is drawn from the ACCC's definition of the DTCS, which was recently reviewed and varied:

The domestic transmission capacity service is a service for the carriage of certain communications from one transmission point to another transmission point via network interfaces at a designated rate on a permanent basis by means of guided and/or unguided electromagnetic energy, except communications between:

- (a) one customer transmission point and another customer transmission point*
- (b) a transmission point in an exempt capital city and a transmission point in another exempt capital city*
- (c) one access seeker network location and another access seeker network location*

Competition has been steadily increasing on many major transmission markets. We consider that regulatory intervention in well-functioning markets should be minimised and we are supportive of the ACCC's removal of regulation through the class exemption it issued for several DTCS markets and its subsequent decision to incorporate exemptions in the service description.¹

The ACCC's previous consideration of competition in the market for transmission services provides strong support for Option 2. In the DTCS Exemption Decision, the ACCC indicated that, as a matter of principle, where there is empirical evidence of providers other than Telstra building alternative transmission networks, the existence of actual or potential competitors in the relevant geographic and product market is likely to mean that the particular transmission market is no longer a bottleneck. More specifically, the ACCC considered that evidence of two DTCS providers using optical fibre, in addition to Telstra, was sufficient to establish the existence of effective competition or contestability. Using this principle, the ACCC went on to determine the routes in respect of which there was sufficient competition and therefore continued regulation was not required.

Transmission services typically originate or terminate at a POI. For example, the ACCC stated that it considers that "a transmission point can be defined as a point of interconnection (POI), a customer transmission point or an access seeker network location".² Appendix A contains a list of transmission routes where the ACCC has previously granted an exemption from declaration on the basis that there was sufficient competition. These routes implicitly or explicitly reference a POI and should inform the NBN Co's choice of location for some of its POIs.

Competition in the transmission market must be adversely affected by any option for NBN Co that leads to less POIs than from which the ACCC has previously deemed there were competitive backhaul services provided (that is, Options 3 and 4). By definition, such infrastructure would be left stranded as transmission providers at existing POIs would have no option to offer their services to NBN Co customers. Furthermore, if as anticipated, Telstra's copper network is decommissioned VHA anticipates few remaining uses for such infrastructure.

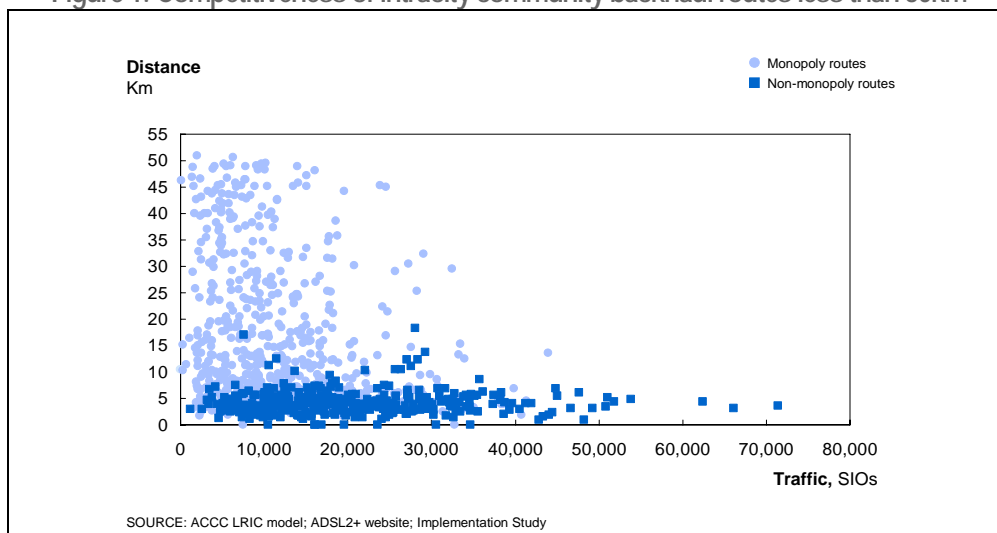
¹ ACCC 2009, Final Report on reviewing the declaration of the domestic transmission capacity service, March.

² Ibid., p 30.

We note that some transmission routes suffer from a lack of competition. For example, most mid-length intracity links are provided over monopoly infrastructure – a fact illustrated in the Implementation Study for the National Broadband Network prepared by McKinsey & Co and KPMG (see Figure 1). The Implementation Study observed that “there is reason to believe today’s backhaul bottlenecks will persist without direct intervention by NBN Co”.³ The lack of competition for DTCS in many geographic markets has a significant impact on the cost of the DTCS as a wholesale input for access seekers. VHA has recently provided the ACCC with information demonstrating that competition significantly lowers our cost of purchasing transmission services.⁴

Option 1 will not promote the long-term interest of end-users. Competition in transmission services would not be enhanced by creating POIs at locations that do not currently exhibit functional competition in the provision of transmission capacity services (Option 1). Barriers to entry for transmission services can be significant, which may prevent the emergence of competition. The primary barriers to entry associated with transmission are the incumbent’s sunk cost of investment and the excess capacity on some routes.⁵ We do not believe there are sufficient incentives for entry at POIs associated with transmission routes from local exchanges that have not previously received an exemption (that is, the route is declared). We regard this as a significant deficiency with Option 1.

Figure 1: Competitiveness of intracity community backhaul routes less than 50km



Source: McKinsey & Co and KPMG 2010, *Implementation Study for the National Broadband Network*, prepared for the Department of Broadband, Communications and the Digital Economy, March, p328.

4.2 Retail services market

Competition is widely recognised as the main driving factor behind the delivery of the highest welfare to consumers. Reducing competition at any element of the value chain will not, in our view, promote competition in downstream retail markets. NBN Co argues the ability of

³ McKinsey & Co and KPMG 2010, *Implementation Study for the National Broadband Network*, prepared for the Department of Broadband, Communications and the Digital Economy, March, p327.

⁴ For further details see VHA 2010, *Submission to the ACCC on the Domestic Transmission Capacity Service: Pricing Review*, July.

⁵ Where routes are reaching capacity the respective DTCS market may become contestable due to the additional infrastructure investment required, but contestability might be affected by a number of factors and should be considered on a route-by-route basis.

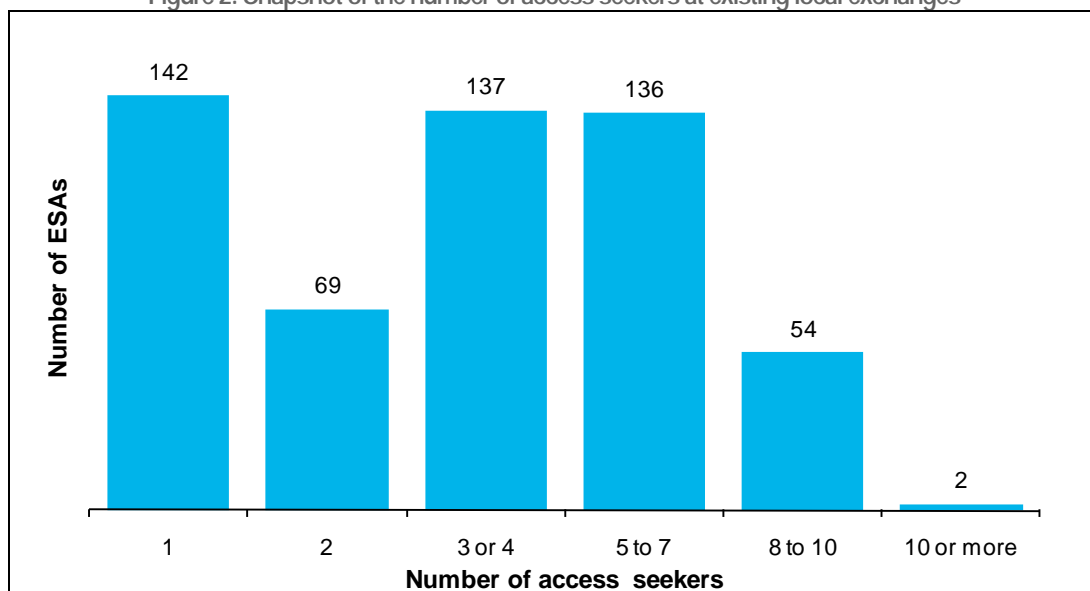
RSPs to service additional markets would likely be enhanced because, rather than having to source alternative commercially supplied non-metropolitan backhaul from the POI, they would acquire non-metropolitan backhaul from NBN Co at cross-subsidised prices. VHA actively participates in the market for transmission services to deliver national retail prices. Based on our experience, we do not share NBN Co's view cross-subsidised prices will necessarily lead to lower national retail broadband.

There is evidence of strong competition in Australia's retail fixed broadband services market. Currently, non dial-up fixed broadband services can be supplied through:

- > DSL broadband over Telstra's copper-based Customer Access Network (CAN);
- > broadband provided over a HFC network (either Telstra or Optus); or
- > fibre-to-the-premise services (current supply is extremely limited).

Fixed broadband DSL services have been a popular choice for access seekers. These services can be delivered over Telstra's copper line via an unbundled line (that is, either ULLS or LSS) plus the access seekers own infrastructure in the exchange building, or by reselling wholesale broadband from Telstra or another access seeker. According to the Australian Bureau of Statistics (ABS), there are 4.2 million DSL broadband subscribers,⁶ and according to the ACCC 1.6 million services in operation are provided using either the ULLS or LSS.⁷ The approach to unbundling in copper-based fixed line services has seen fixed asset investment by access seekers at a number of Telstra's local exchanges (see Figure 2). At present, there are 398 local exchanges with at least two access seekers, and Telstra, offering retail services. This suggests that a competitive retail services market can be sustained with more POIs than are offered under Options 3 and 4.

Figure 2: Snapshot of the number of access seekers at existing local exchanges



Source: ACCC 2010, *Snapshot of Telstra's customer access network as at 30 June 2010*.

⁶ ABS 2010, *Internet Activity, Australia: June 2010*, Cat no. 8153.0.

⁷ ACCC 2010, *Snapshot of Telstra's customer access network as at 30 June 2010*.

Looking forward, it is important to understand the drivers of competition in the retail services markets under the NBN. Retail service competition is achieved by creating an ecosystem where RSPs can invest time and resources in developing and marketing innovative propositions for consumers. Such innovations could, for instance, take the form of a tablet device for home entertainment, HD tele-working and collaborative applications, remote healthcare and home connected propositions. Access and transmission infrastructure must be responsive to rapidly changing requirements that innovative new services will offer. A view that is well-recognised internationally with the European Commission calling for greater differentiation and deeper interconnection in broadband communication wherever it is feasible.⁸

In our view, NBN Co's preferred position - the so-called composite model - reduces flexibility and, as a consequence the scope for service innovation at the retail level. For example, some RSPs may prefer to acquire dark fibre services rather than managed transmission to support their retail offerings, as managed transmission products may not meet their specific requirements.

By definition, Option 2 would produce the optimal competition on price, proven by the cost benchmarking in Figure 2. Option 2 produces highest number of feasible POIs, given that the presence of multiple backhaul providers at these locations demonstrates their feasibility.

Option 2 would also be the preferred option to ensure a future transition to an end-to-end open system once Layer 1 unbundling is provided, as explained in the next section.

All the other Options will hinder competition in the consumer market, in particular:

- > Option 1 would give an unfair advantage to the existing incumbent, limiting consumer choice and competition in the regional areas;
- > Option 3 would restrict the retail markets in three ways:
 - > lack of flexibility in the transmission would limit innovation in the product space
 - > cross-subsidised price would mean the cost of access in metropolitan areas (where most of consumers reside) would be increased unnecessarily, given that competitive backhaul already exists in the regional areas covered by Option 2
 - > lower barriers to entry than DSL would instigate the entrance of 'no frills - low cost' retail providers, whose sole interest would be in providing basic and uninspiring services to the consumers, defying the main scope for the investment in a national fibre network

In summary, Option 2 would ensure the most flexible network at the lowest cost, which in turn would stimulate the development of compelling and innovative services by RSPs, guaranteeing a thriving market for end consumers.

4.3 Wholesale services market

Option 2 is most likely to lead to the emergence of a Layer 3 wholesale sector under the NBN. Option 2 provides greater scope for large service providers to build and operate their own infrastructure with a view to offering wholesale Layer 3 services to smaller carriage service providers and potential new entrants.

⁸ Regulators are required to ensure that access seekers can achieve access to the network at a distribution point that "will need to host a sufficient number of end-user connections to be commercially viable for the access seeker" (European Commission (2010), *On regulated access to Next Generation Access Networks*, Commission recommendation of 20 September).

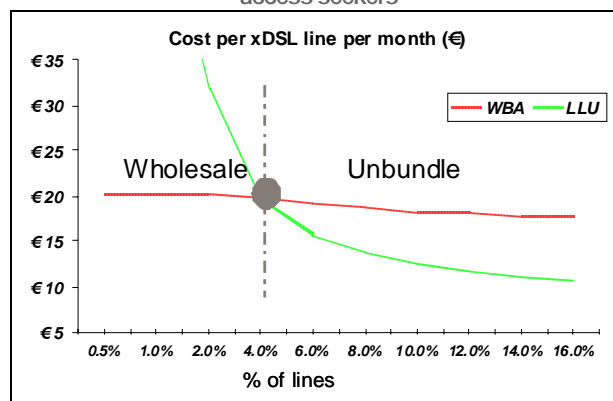
We agree with the ACCC's observation that a consolidated POI option – that is, Options 3 and 4 – would lead to NBN Co aggregating traffic from around Australia, effectively replicating a managed Layer 3 wholesale service. Under such an approach, the capacity and incentives for prospective Layer 3 wholesale providers to differentiate their service offering are more muted. In considering the counterfactual, we see little incentive for a service provider to pass-on the scale benefits from a consolidated POI option as part of a wholesale Layer 3 service offering.

5. Unbundling

It is useful in considering the potential for Layer 1 unbundling and home-run network topology for the NBN to consider the effectiveness of unbundling over copper-based fixed line services. Based on our observations of the Australian market and the experience of Vodafone Group plc in Europe,⁹ we contend that copper unbundling has proven very successful for mainly for two reasons, it:

- > provides the access seeker with a scalable cost model that provides strong incentives for the access seeker to pursue market share as compared to a typical Wholesale Bitstream Access (WBA), as Figure 3 demonstrates;¹⁰ and
- > reduces the dependence on the access provider (typically, the incumbent telecommunications provider) and allows for greater product differentiation.

Figure 3: The economics of unbundling versus WBA for access seekers



Source: VHA.

Access seekers were typically the first ones to offer ADSL2+ connectivity, developed and offer innovative DSL modems with dual backhaul (3G and DSL for resilience and instant activation), introduced voice over IP, etc. In contrast, wholesale bitstream access propositions to date have lacked of these qualities. For instance, Vodafone Portugal's DSL footprint is limited to the unconditioned local loop area because the incumbent, Portugal Telecom, does not provide the Quality of Service (QoS) required for Vodafone Portugal's VoIP service.

We further observe that flexibility and product differentiation in the access layer needs to be coupled with an equally open and flexible backhaul to avoid backhaul becoming the limiting factor for the access seeker. In Europe, Vodafone Group plc has found that the main reasons for this include:

⁹ Vodafone Group plc is the fifth largest acquirer of unbundled local loop services in Europe.

¹⁰ Numbers for illustrative purposes only.

- > QoS, with the ability to reconfigure the network to respond to changing needs, such as the introduction of a new service, or to configure scheduling parameters;
- > Multicast support, for the provision of Internet Protocol television services (IPTV); and
- > flexible bandwidth allocation to respond to quickly changing traffic profiles.

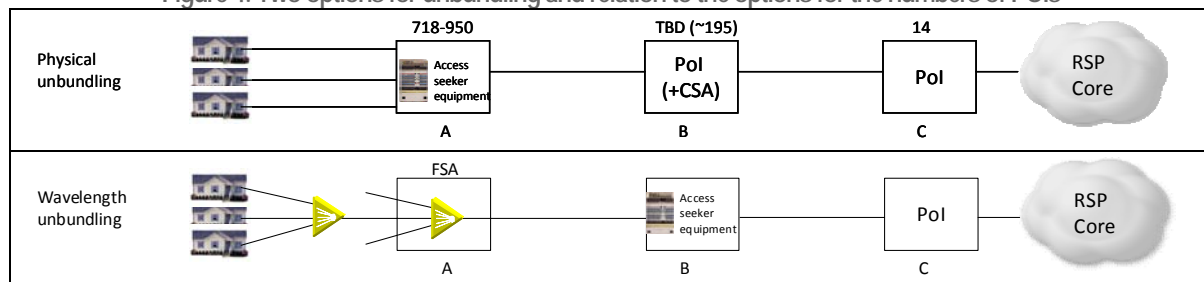
For this reason, most ISPs in Europe have migrated over the years from a leased line backhaul model to a dark fibre model.

The European experience provides clear lessons for the role of unbundling in the NBN. First, unbundling is a desirable objective. Second, the introduction of unbundling in NBN should stimulate investment and product differentiation, which is vital for the long term sustainability of the system. That said, the number and location of POIs in a layer 1 unbundling scenario depends on the way unbundling is achieved. There are two main options:

- > physical fibre unbundling; and
- > wavelength unbundling.

These options are illustrated in Figure 4 and discussed below. Both of the unbundling options involve some trade-off between the cost and complexity of the NBN and the level of openness that can ultimately be achieved. We assess the merits of each option below.

Figure 4: Two options for unbundling and relation to the options for the numbers of POIs



Source: VHA, Vodafone Group plc.

Physical unbundling

To enable physical unbundling, a point-to-point network topology (that is, one fibre strand per household) has to be deployed. Hence, physical unbundling takes the Fibre Service Areas (FSA) as a starting point and endeavours to take individual fibre strands as far back into the network as possible. In practice, point-to-point deployment beyond point A in Figure 4 is generally unrealistic due to the:

- > high number of households served by a FSA (with 58,000 households per FSA in metropolitan areas and 12,000 households per FSA on average across Australia)¹¹. Any further consolidation would lead to very complex and expensive logistic challenges to handle the high number of fibre strands that would be required as a consequence;
- > costly investment required to build trenches and install ducts and fibre cables to bring the very high fibre count cables from the current FSAs (at point A) to the consolidated ones (for instance, point B).

¹¹ NBN Co 2010, *Proposed NBN Co Points of Interconnect (POIs)*, Public position paper, p7.

Physical fibre unbundling requires access seekers to place their access equipment at the existing FSAs, in a similar way to DSLAM collocation at Telstra's current ESAs. The various POI options will have the following impacts:

- > Option 1 (no consolidation): if there was contestable backhaul to all the FSAs, then this option would achieve an end-to-end open network, similar to today's unbundled ESAs where competitive backhaul (e.g. based on dark fibre) is provided. Given that this is not the case, option 1 would only guarantee openness to the a limited number of access seekers who own backhaul to all (or, at least, the vast majority of) FSAs. This would effectively discriminating against other access seekers and hence undermine the primary aim of access unbundling;
- > Option 2 (low consolidation): in this case the traffic will be picked up by access seekers at point B. The network section A-B will be provided by NBN Co. When unbundling is offered, NBN Co may be required to deploy additional fibre between A and B so that dark fibre can be offered in order to create an open end-to-end network; and
- > Option 3 (high consolidation): the situation is similar to Option 2, but with NBN Co having to provide backhaul services over a greater distance (that is, section A-C in **Figure 4**). This would constitute an unnecessary expense for NBN Co given the current competitive market between B and C.
- > Option 4 (composite model), where an access seeker could interconnect at point A or B, this option would penalise access seekers who do not own fibre infrastructure all the way to the FSAs, and should be avoided.

Wavelength unbundling

The standards for wavelength unbundling are yet to be finalised, but the technology is expected to permit consolidation of the FSAs due to the reduced fibre count. In this case, most of the planned 718 FSAs could potentially be consolidated to a fewer number of POIs, possibly coinciding with option 2.¹² Access seekers would then install their equipment at the consolidated FSAs (point B). Given that this number is expected to be much lower than the 718 FSAs for the physical unbundling option, the economics of wavelength unbundling are likely to be more compelling for the access provider, NBN Co, and access seekers than are the costs required to support physical fibre unbundling. Therefore, wavelength unbundling is consistent with cost-efficient construction of the access network, although it would require additional fibre strands in the section A-B (see **Figure 4**) to serve the needs of all access seekers.

The impact of wavelength unbundling for the various POI options is as follows:

- > Option 1 (no consolidation): in this instance the FSA node consolidation (and the associated cost savings) will not be realised, as access seekers would have to unbundle at the non consolidated 718 FSAs. In addition, this approach suffers from the same problems highlighted in the option 1 of the physical fibre unbundling scenario (that is, a lack of competitive transmission capacity service providers).
- > Option 2 (low consolidation): in this case, an open end-to-end infrastructure will be realised through open access from the consolidated FSAs to the home, and the presence of an open (contested) backhaul infrastructure back to the core.
- > Option 3 (high consolidation): This option will be more limiting than Option 2, as further FSA node consolidation is more difficult and access seekers will be restricted to NBN Co's services from section B-C, partly undermining the benefits of unbundling.
- > Option 4 (composite model) will penalise access seekers who do not own fibre infrastructure from point C to point B.

¹² Passive 1 to n splitters would be installed at the consolidated FSAs (point A in **Figure 4**), allowing the closure of the FSAs to reduce overall costs

VHA considers option 2 will most enhance the benefits of unbundling, regardless of the approach eventually implemented by NBN Co. In the case of physical unbundling, Option 2 is most likely to cost-effectively lead to an open end-to-end network and, in the case of wavelength unbundling, the FSA node consolidation enabled by the Wave Division Multiplexing (WDM) Passive Optical Network (PON) technology would naturally produce an open end-to-end network under Option 2.

6. Uniform wholesale pricing and POI location

The question of whether access seekers face the same total wholesale cost in supplying services to end-users cannot, of itself, yield an answer that is consistent with the object of Part XIC. Similarity, or indeed uniformity, of wholesale pricing is outcome that may be achieved by the ACCC's consideration of the object of Part XIC, but it is not a thing to which the ACCC ought to explicitly have regard. Rather, the ACCC must focus on the conditions necessary to promote competition in markets for listed services and to encourage efficient use of, and investment in, infrastructure.

VHA supports uniform national wholesale pricing (UNWP) for *fibre access services* (that is, fibre services offered in the 'last mile'). The access layer is an enduring bottleneck in all parts of Australia and the implementation of UNWP for fibre access services is consistent with the object of Part XIC. We note that this may entail a cross-subsidy to ensure the prices in regional areas are the same as metropolitan areas. There is nothing untoward about such cross-subsidisation; national pricing is already well-established in the mobile industry at both the wholesale and retail level. The pursuit of UNWP for the access layer must be viewed as distinct from pricing in the aggregation layer (that is, transit backhaul). To that end, the pursuit of UNWP for the access layer should be independent of decisions about the number and location of POIs.

The consideration of UNWP should start from first principles, logically mapping the problem through a range of options that ultimately lead to the desired outcome. The Australian Government has identified a problem – the lack of uniform wholesale prices in the city, in regional Australia and in more remote parts of the country. The problem manifests in a lack of retail broadband competition in regional and remote areas. NBN Co has determined that the best means of addressing this problem is to build a network that bypasses competing infrastructure so that access seekers “face the same total wholesale cost from any premises to a designated state capital city point of presence”. We contend that NBN Co's approach is completely at odds with economic theory, removing any incentives for dynamic efficiency. Any approach based on setting uniform prices at the expense of promoting competition is doomed to failure and any attempt to implement such a policy is almost certainly welfare-reducing. Over the long-term, we expect such an approach would entrench, rather than remove, the expensive retail broadband prices Australia currently experiences relative to the rest of the world.

We contend that the best means of improving retail broadband competition in regional and remote areas is to target the structural issues that prevent competition and to implement a robust regulatory regime for enduring bottlenecks such as transit backhaul. Competition ensures that prices are as close to the underlying cost of the infrastructure as possible. Even with a highly effective regulatory regime, the risk of regulatory error combined with the incentives for gaming by the regulated firm means that there can be no guarantee prices reflect efficient costs. In such circumstances, that wholesale prices are uniformly high provides little comfort to access seekers or end-users.

Even in areas where transmission services are characterised by economies of scale that limit the number of players to less than three, the existing access regime already has sufficient safeguards to ensure backhaul pricing is based on national underlying costs. The DTCS is a

declared service and it will cover any transit backhaul services offered by NBN Co. The ACCC recently stated: “services provided by NBN corporations which fall within the scope of the DTCS declaration will either be regulated under the current access regime or be regulated under an NBN corporation specific access regime [if Bills relating to the latter are passed into law]”.¹³

Historically, the ACCC’s decision not to issue indicative prices for the DTCS has been a major barrier to the emergence of national wholesale prices for transmission services. The ACCC issues (national) indicative prices for the mobile terminating access service and for fixed services such as wholesale line rental. Indicative prices provide ‘useful certainty’ to relevant parties regarding the Commission’s view on appropriate prices under its preferred pricing approach.¹⁴ The lack of indicative prices, combined with ambiguity over the breadth of the service definition,¹⁵ may have contributed to regulatory uncertainty that deterred access seekers from pursuing access disputes through the Commission. VHA’s experience with acquiring leased line transmission services suggests that access prices are likely to be above the efficient, cost-based price of service provision in areas of limited competition.

¹³ ACCC 2010, Domestic transmission capacity service: Declaration review, Final report, p36.

¹⁴ ACCC 2006, Local services review and strategic review of the regulation of fixed network services, Summary of draft indicative prices, 28 July, p2.

¹⁵ ACCC 2009, Domestic Transmission Capacity Service, Discussion Paper, November.

A Appendix: Transmission routes exempt from the DTCS declaration

Inter-capital routes exempt from declaration

Refers to transmission between points located in:

Sydney
Melbourne
Brisbane
Adelaide
Perth
Canberra

Capital-regional routes exempt from declaration

NSW	Victoria	Qld	SA
Sydney-Albury	Melbourne-Ballarat	Brisbane-Toowoomba	Adelaide-Murray Bridge
Sydney-Lismore	Melbourne-Bendigo	Brisbane-Gold Coast	Adelaide-Port Augusta
Sydney-Newcastle	Melbourne-Geelong	Brisbane-Townsville	
Sydney-Grafton	Melbourne-Shepparton	Brisbane-Rockhampton	
Sydney-Wollongong		Brisbane-Bundaberg	
Sydney-Taree		Brisbane-Maryborough	
Sydney-Dubbo			
Sydney-Campbelltown			
Sydney-Gosford			
Sydney-Coffs Harbour			
Sydney-Goulburn			

Inter-exchange transmission (metropolitan areas) exempt from declaration				
NSW		Victoria	Qld	WA
Ashfield	Lane Cove	Ascot	Paddington	South Perth
Balgowlah	Lidcombe	Brunswick	South Brisbane	Subiaco
Bankstown	Liverpool	Caulfield	Toowong	
Blacktown	Mascot	Coburg	Valley	
Burwood	Mosman	Elsternwick	Woolloongabba	
Campsie	Newtown	Footscray		
Carramar	North Parramatta	Heidelberg		
Castle Hill	North Ryde	Malvern		
Chatswood	North Sydney	Moreland		
Coogee	Parramatta	North Melbourne		
Cremorne	Pendle Hill	Port Melbourne		
East	Pennant Hills	Preston		
Eastwood	Petersham	Richmond		
Edgecliff	Randwick	South Melbourne		
Epping	Redfern	St Kilda		
Glebe	Revesby	Toorak		
Granville	Rockdale			
Harbord	Rydalmere			
Homebush	Ryde			
Hornsby	Seven Hills			
Hurstville	Silverwater			
Kensington	St Leonards			
Kingsgrove	Undercliffe			
Kogarah	Waverley			
Lakemba				

Inter-exchange transmission (CBD areas) exempt from declaration				
Refers to transmission between points located in (and transmission between listed CBD areas and metro exchanges)				
Sydney	Melbourne	Brisbane	Adelaide	Perth
City South	Batman	Charlotte	Flinders	Bulwer
Dalley	Exhibition	Edison	Waymouth	Pier
Haymarket	Lonsdale	Spring Hill		Wellington
Kent				
Pitt				