



NATIONAL BROADBAND NETWORK POINTS OF INTERCONNECT

***An ACCC Discussion Paper on points of interconnect to the
National Broadband Network***

October 2010



© Commonwealth of Australia 2010

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968* no part may be reproduced without prior permission from the Australian Competition and Consumer Commission. Requests and inquiries concerning reproduction and rights should be addressed to the Director Publishing, Australian Competition and Consumer Commission, PO Box 3131, Canberra ACT 2601.

Table of contents

1. Introduction.....	4
2. Framework for ACCC’s consideration.....	6
3. Background	8
4. Markets affected by the decision as to the number and location of POIs	16
5. Layer 1 unbundling.....	20
6. Uniform national wholesale pricing and POI location	21
7. Issues for Discussion	23
ATTACHMENT A.....	
ATTACHMENT B.....	

1. Introduction

This discussion paper is issued by the Australian Competition and Consumer Commission (ACCC) in response to a request from the government for the ACCC and NBN Co Limited (NBN Co) to undertake a process, including public consultation, to seek agreement on the number and location of initial Points of Interconnect (POI) for the National Broadband Network (NBN) that will best meet the long-term interests of end-users (LTIE). NBN Co has prepared its own public position paper, *NBN Co Public Position Paper: Proposed NBN Co Points of Interconnect* (Public Position Paper), as part of this consultation process. The NBN Co Public Position Paper lays out NBN Co's thinking on POI location and describes NBN Co's preferred position (based on the analysis NBN Co has conducted). It is included as Attachment A to this ACCC discussion paper.

The purpose of this joint process is to inform both the ACCC and NBN Co of industry issues which arise from the location of NBN's initial POIs. This will assist the ACCC and NBN Co in forming an opinion as to the appropriate number and location of POIs that is in the LTIE (noting that NBN Co's objectives are not limited to the LTIE but more broadly involve the cost effective implementation of government policy). This advice will also inform the government's consideration of its broader response to the NBN Implementation Study and is intended to give NBN Co and industry certainty regarding the manner in which the ACCC is likely to approach POIs in future regulatory decisions regarding the NBN.

The ACCC invites submissions on any issues raised by this discussion paper or NBN Co's Public Position Paper and in particular, responses to the specific questions set out in this paper.

All submissions will be considered public and posted on the ACCC's website. If interested parties wish to submit commercial-in-confidence material to the ACCC they should submit both a public and a commercial-in-confidence version of their submission. The public version of the submission should clearly identify the commercial-in-confidence material by replacing the confidential material with an appropriate symbol or '[c-i-c]'. As this process is intended to enable the ACCC and NBN Co to provide joint advice to government, it is the ACCC's preference that as much material is provided in the public response as is feasible. The ACCC would prefer to be able to make submissions received available to NBN Co.

For further information please contact:

Richard Home		Rob Nicholls
General Manager		General Manager
NBN Engagement and Group	or	Convergence and Mobility
Coordination Branch		Branch
Phone 03 9290 6960		Phone 02 9230 3854

Submissions will be accepted by no later than 5.00 pm on **8 November 2010**.

The ACCC prefers to receive submissions in either Adobe PDF or Microsoft Word format which allows text to be searched.

Please forward submissions to:

nbnpoiconsultation@acc.gov.au

Please copy correspondence to:

Joshua Davies
Communications Group
Australian Competition & Consumer
Commission
Email: joshua.davies@acc.gov.au

2. Framework for ACCC's consideration

The ACCC and NBN Co have been asked by the government to undertake a process, including public consultation, to provide advice to the government as to the most appropriate approach in relation to the number of initial POIs for the NBN that will best meet the LTIE. The government has requested that the advice address issues including the:

- short and long-term competition impacts of the initial number and location of POIs on the backhaul and retail markets;
- current and prospective state of competition in the backhaul market including pricing and the location of and value of any assets that may be stranded by the agreed number and location of POIs and options for addressing any adverse implications (if any) for existing backhaul asset owners;
- implications (if any) for potential future Layer 1 unbundling and home-run topology; and
- stakeholder response to the consultation process.

The ACCC notes that although it is unable to formally 'approve' an agreed number and location of POIs through this process, an expected outcome is to provide confidence to NBN Co and industry regarding how the ACCC is likely to handle this issue if it is later required to consider it as a part of an assessment of NBN Co's Special Access Undertaking (SAU). If NBN Co were to lodge an SAU, the ACCC would need to conduct an assessment of the terms and conditions of the SAU in accordance with section 152CBD of the *Trade Practices Act 1974* (TPA). This provision requires the ACCC to take into account a broader set of considerations than the LTIE, including the reasonableness of any POI position proposed by NBN Co.¹

The ACCC also notes that the exposure draft of the *Telecommunications Legislation Amendment (National Broadband Network Measures – Access Arrangements) Bill 2010* proposes to amend section 152CBD of the TPA. Under the current version of the proposed amendments, the ACCC must also be satisfied that the terms and conditions of the SAU would be consistent with the category B SAOs (as set out in proposed section 152AXB). The promotion of the LTIE would therefore be only one factor considered by the ACCC in determining whether a POI position is reasonable in any SAU lodged by NBN Co.

Long-term interests of end-users

In considering the number and location of the initial NBN POIs that will best meet the LTIE, the ACCC will have regard to the following objectives (consistent with how that test is described under section 152AB(2) of the TPA):

- promoting competition in markets for listed services;
- achieving any-to-any connectivity in relation to carriage services that involve communication between end-users; and

¹ In determining whether particular terms and conditions are reasonable, regard must be had to the (non exhaustive) set of factors outlined in s 152AH (1) of the TPA.

- encouraging the economically efficient use of, and economically efficient investment in, infrastructure by which telecommunications services are supplied and any other infrastructure by which telecommunications services are, or are likely to become, capable of being supplied.

Competition is the process of rivalry between firms, where each market participant is constrained in its price and output decisions by the activity of other market participants. The benefits of competition to end-users are lower prices, better quality and a better range of services over time.

Any-to-any connectivity, which encompasses the objective of end-users on different networks being able to communicate with each other, is central to the NBN.

Economic efficiency has three components:

- *Productive efficiency* refers to the efficient use of resources within each firm to produce goods and services using the least cost combination of inputs.
- *Allocative efficiency* is the efficient allocation of resources across the economy to produce goods and services that are most valued by consumers. It also refers to the distribution of production costs amongst firms within an industry to minimise industry-wide costs.
- *Dynamic efficiency* refers to efficiencies flowing from innovation leading to the development of new services, or improvements in production techniques. It also refers to the efficient deployment of resources between present and future uses, such that the welfare of society is maximised over time.

These objectives are interrelated. In many cases, the LTIE may be promoted through the achievement of two or all three of these matters simultaneously. In other cases, there may be some trade-off between the different aspects and the ACCC will need to weigh up the different effects. In this regard, the ACCC will interpret 'long-term' to mean a balancing of the flow of costs and benefits to end-users over time in relation to the criteria. Thus, it may be in the LTIE to receive a benefit for even a short period of time if its effect is not outweighed by any longer term cost.

Further detail of how the ACCC considers the LTIE is at [Attachment B](#).

3. Background

The National Broadband Network

NBN Co is a wholly owned Commonwealth entity that has been prescribed as a government business enterprise. NBN Co has been created in order to design, build and operate a new NBN. The predominant purpose of the NBN is to deliver high-speed broadband services at affordable prices to all Australians. This will be achieved by building a new and faster access network using a combination of optical fibre, wireless and satellite technologies with the following initial specifications:

- (a) fibre-based coverage with speeds of 100 Mb/s to 93 per cent of premises; and
- (b) wireless or satellite coverage with speeds of 12 Mb/s to the remaining 7 per cent of premises.

These speeds represent the government's initial requirement for the NBN but, as announced by NBN Co,² it is expected that speeds of 1 Gb/s will be available when the fibre network is first deployed.

NBN Co intends to only offer wholesale Layer 2 bitstream products "in order to occupy as small a footprint as possible in the overall value chain".³ It is envisaged that this will create the opportunity for access seekers to build upon this basic offering in order to sell wholesale services to other retail service providers (i.e. bundled, aggregated offerings) and differentiated retail services directly to consumers.

Points of interconnect

A POI is the inter-network location where traffic is exchanged between one network and another. In the copper based network, local exchanges in each exchange service area (ESA) operate as potential POIs for access seekers. Currently, approximately 550 ESAs actually operate as POIs for access seekers who utilise unconditioned local loop service (ULLS) and line sharing service (LSS) facilities.

In the NBN context, copper ESAs will be replaced by fibre serving areas (FSAs). There will be significantly fewer FSAs (700-1 000) than ESAs (5 000). This is driven both by technology differences (greater reach of GPON network), and the fact that NBN Co's fibre network will cover 93% of premises, which overlays approximately 1 900 of today's ESAs.

The service descriptions for many currently declared services define the service by reference to the POI. For example, for the Domestic Public Switched Telephone Network Originating Access service (PSTN OA), the service is defined as:

An access service for the carriage of telephone (i.e. PSTN and PSTN equivalent such as voice from ISDN) calls (i.e. voice, data over the voice band) to a POI...

² NBN Co website: www.nbnco.com.au/wps/wcm/connect/main/site-base/main-areas/publications-and-announcements/publications/industry-consultation-on-product-papers.

³ NBN Co website: www.nbnco.com.au/our-network/fibre-wireless-and-satellite, 18 August 2010.

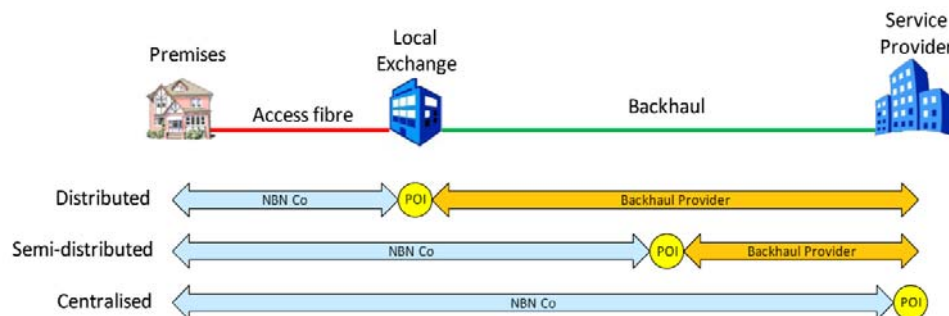
The service description for PSTN OA and PSTN Terminating Access (PSTN TA) also requires that where an access seeker requests an additional POI the access provider must, to the extent that it is technically and operationally feasible to do so, permit a POI at that location. Currently, there are 66 POI locations for PSTN OA and TA, which serve identified Call Collection Areas.

The Standard Access Obligations provided for in the TPA⁴ also deal with an access provider’s obligations in relation to interconnection. The relevant provision provides that upon request by an access seeker, an access provider must permit interconnection with an access seeker, to enable the access seeker to be provided with a declared service.

In addition to this regulatory framework, the location of POIs for declared and non-declared services which are supplied over existing networks are also negotiated and agreed commercially between access seekers and access providers.

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 backhaul⁵ required by each RSP in order to connect end-users to services. For example, a large number of distributed POIs will mean that each RSP will be required to provide more of their own backhaul from a POI to their main point of presence (POP) in the network. The diagram below provides a simplified form of how this works.

Figure 1 – NBN Co’s depiction of POIs



Source: NBN Co Public Position Paper: Proposed NBN Points of Interconnect (POIs)

Options available for POIs for the NBN

There are a number of alternatives as to the number and location of POIs for the NBN. At one end of this spectrum, NBN Co could offer interconnection at every FSA, before any aggregation of that network traffic has occurred (that is, the highly distributed POI option). At the other end, NBN Co could offer interconnection only at limited locations where nearly all of the network traffic is aggregated in some way (that is, very centralised POIs).

⁴ See section 152AR of the TPA.

⁵ Please note, we have used the terms “backhaul” and “transmission” interchangeably throughout this paper.

Within that range, NBN Co could potentially offer POIs with a low to medium level of consolidation. The number of POIs could span between the minimum number canvassed under the highly consolidated option (i.e. 14 POIs) to the maximum number available where POIs are fully distributed as far as technically feasible (i.e. 718 – 950 POIs) and could be located wherever particular criteria are met. Such criteria could include, but would not be limited to, whether multiple backhaul providers are available or whether the POI would serve a minimum number of premises. The establishment of these criteria would require significant input from a range of stakeholders, particularly if factors such as availability of backhaul providers were to be one of the criteria used.

A further complexity is that NBN Co may be able to offer multiple POIs for any one FSA. For example, the composite option proposed by NBN Co (see Table 1 on page 13) would allow interconnection for all services at centralised POIs and limited “local” interconnection at some partially aggregated, distributed POIs. However, there may be other ways in which such a composite approach could work including allowing local interconnection at all fibre access node (FAN) sites together with the option to alternatively interconnect at a centralised point (such as capital cities or regional hubs).

Implementation Study recommendations

The NBN Implementation Study (the Study) prepared for the government by McKinsey/KPMG, included specific recommendations regarding the location of NBN Co’s POIs and relevantly noted that:

- fibre exchanges served by multiple backhaul providers should become the location of NBN Co’s POIs;⁶
- NBN Co should construct its own transit backhaul service to aggregate and deliver traffic from fibre exchanges deeper in the network that are currently served by monopoly backhaul links;⁷
- NBN Co could offer more consolidated POIs in capital cities, which would enable RSPs with limited network footprints to connect easily to the NBN; however, this approach would involve stranding significant lengths of competitive backhaul;⁸ and
- the location of NBN Co’s POIs should be reviewed on a regular basis – POIs should be taken lower into the network where multiple providers were prepared to invest in building backhaul links; and POIs should be taken higher into the network if the presence of multiple backhaul providers did not deliver affordable pricing on selected routes.⁹

The Study’s specific recommendations in relation to POIs and NBN Co’s provision of backhaul services are included in recommendations 48, 50, 51, 52 and 54.

⁶ NBN Implementation Study, p. 333.

⁷ Ibid., p. 332.

⁸ Ibid., p. 333.

⁹ Ibid., p. 334.

Previous ACCC consideration of POIs

The ACCC has previously considered the location of POIs in the context of other proposed network designs. While these previous considerations of the issue of POI locations are informative, the ACCC will consider the matter afresh in considering the number and location of initial POIs for the NBN.

The ACCC has previously considered the issue of POI location in the context of its assessment of FANOC Pty Ltd's (FANOC) SAU for a FTTN Broadband Access Service in 2007.¹⁰ In that matter, the ACCC found that there are a range of criteria that a Layer 2 bitstream service should meet. In the context of a fibre-to-the-node (FTTN) network upgrade or similar fibre access network roll-out, it concluded that the service should include POIs which are as close to the end-user as is appropriate and efficient. In the first instance, the ACCC found that this is likely to mean that POIs should be located at or near existing local access switches and other POIs for current ULLS and LSS products. The ACCC acknowledged that aggregated POIs located higher up in the network may be needed where competitive backhaul has not been rolled out to local access points of interconnect, and that they may be needed on a longer term basis outside metropolitan areas if competitive backhaul would be inefficient.¹¹

The ACCC also noted that:

- the fact that access seekers using ULLS/LSS are currently able to interconnect efficiently at existing local exchanges suggests that they will be able to interconnect efficiently to a replacement bitstream access service at or near those exchanges;
- it does not appear justifiable to restrict interconnection to points higher in the network where greater aggregation of traffic has occurred;
- many access seekers have existing investments in backhaul at those places - interconnection near existing investments will facilitate a smooth migration and is a relevant factor to be taken into account both in considering the promotion of competition and the interests of persons who have a right to use the service; and
- where FANOC is unable to provide interconnection within existing Telstra exchanges, interconnection at similar locations nearby would be a possible substitute.

However, the ACCC also cautioned that as the network configuration develops, particularly if the rollout of VDSL2 or FTTH renders existing exchange buildings irrelevant to the network topology, there may be a need to revisit the situation.¹²

FANOC were also proposing to offer interconnection at 'Transit Access Points' (TAP) – interconnection points higher in the network than local access points. In relation to that proposal, the ACCC noted that:

¹⁰ ACCC, *Assessment of FANOC's SAU in relation to the Broadband Access Service – Draft Decision*, December 2007.

¹¹ *Ibid.*, p. 11-12.

¹² *Ibid.*, p. 67-68.

- it is possible, but unclear, that TAPs may be needed in addition to local interconnect points on a permanent or interim basis where competitive backhaul has not been rolled out;
- it could be possible for other firms to offer a commercial wholesale backhaul service to access seekers; and
- an SAU is not a vehicle that can be used to prevent firms from selling particular services – if the SAU is restricted to services from customer premises to local access point (LAP), that will not prevent FANOC from selling that service plus backhaul to a TAP on a purely commercial basis. If such services were sold commercially at anti-competitive or predatory prices, then Parts IV and XIB of the TPA would be the relevant means of redress.¹³

The ACCC also considered the issue of POI location in its assessment of Proposals to the government's 2008 Request for Proposals (RFP) to roll out and operate a National Broadband Network. In the ACCC's report to the NBN Expert Panel, it reiterated that POIs which are commercially feasible for service providers and which support competition, including competition for backhaul services from the first point of aggregation, would be a minimum requirement. Such an approach to POI location would likely promote competition and investment in new services, be in the long-term interests of end-users, and meet the objectives of the Commonwealth's RFP.¹⁴

The ACCC's report also noted that interconnection as close as possible to existing backhaul/transmission investments is likely to facilitate a smooth migration to the NBN, as any relocation of POIs might raise access seekers' costs to the point where they were not able to provide services.¹⁵

NBN Co's analysis in relation to POIs

NBN Co has indicated to the ACCC that it has been guided by its understanding of the policy objectives established by the government for the NBN in order to identify the option that is most likely to promote the achievement of those objectives.

In December 2009 NBN Co publicly released *NBN Co Consultation paper: wholesale fibre bitstream products* (December 2009 Consultation paper). The paper outlined four options for POI locations:

- local – the POI is located at the same location as the Optical Line Terminal (OLT), such that access to the POI provides access to all lines connected to that FSA;
- district – the POI serves two or more FSAs;
- regional – the POI is located upstream in the network from the location of the OLT, aggregating a number of FSAs and corresponding to a footprint for a relatively large geographic area; and
- state/national – POIs are located in capital cities.

¹³ Ibid., p. 68.

¹⁴ ACCC, *Assessment of Proposals National Broadband Network Process, Report to Expert Panel*, Appendix G, January 2009, p. 181.

¹⁵ Ibid., Appendix I, January 2009, p. 249.

NBN Co’s proposal for the location of POIs was based on aggregating smaller regional FSAs to a single POI and locating POIs based on the existence (or likely emergence) of contestable backhaul routes. In its Public Position Paper, NBN Co states that industry gave general support (but not universal) for the proposal. Industry were interested in NBN Co undertaking further consultation and providing more specific information on the proposed locations of POIs.

Since the release of its December 2009 Consultation paper, NBN Co has continued to engage with the industry on its network and product design, and further developed its thinking on POI location as a result of feedback received from industry.

As part of this current consultation process, NBN Co has publicly released its Public Position Paper in Attachment A, outlining its proposed options in relation to POIs. These are summarised in the table below.

Table 1 – NBN Co proposed POIs

Option	Number and location	Rationale
Option 1 No consolidation	718 - 950 POIs ¹⁶	POIs are fully distributed and located at every FSA
Option 2 Low consolidation	Indeterminate , depending on definition of contestable backhaul.	POIs are partially distributed, at the edge of where contested backhaul currently exists
Option 3 High consolidation	14 Aggregation POIs (4 x Sydney, 4 x Melbourne, 2 x Brisbane, 2 x Adelaide, 2 x Perth)	Traffic is carried to “Aggregation POI” locations. POIs are centralised at five capital cities
Option 4 Composite	14 Aggregation POIs + up to ~195 CSAs	POIs available at five mainland state capital city locations, plus additional interconnection at up to ~195 Connectivity Serving Areas (CSAs)

The Public Position Paper identifies NBN Co’s preferred position (based on the analysis NBN Co has conducted) as the composite model. Under this model, NBN Co will provide RSPs with a bundled access and backhaul product at 14 Aggregation POIs located in mainland state capitals and up to approximately 195 additional POIs at CSA locations.¹⁷ Access to the CSA POIs will be limited by timing constraints and NBN Co’s business rules. The Aggregation POIs will therefore be the default locations for interconnection. For the reasons set out in the Public Position Paper,

¹⁶ NBN Co indicates that the 718 FSAs in its initial plan may change as its detailed network planning progresses. NBN Co currently predicts that approximately 950 FSAs may be provided in its final design.

¹⁷ The composite model involves up to 81 additional POIs in regional areas and 114 in metropolitan areas.

NBN Co believes that this model is the most effective means to achieve the government's policy objectives, including those in relation to the uniform wholesale pricing of NBN Co's services.

Connectivity Serving Areas

NBN Co advises that the 195 CSAs are a network design construct and are located independent of any consideration of the provision of contestable backhaul, and are defined to provide significant addressable markets to RSPs in each CSA.

Under the composite model, RSPs would be able to request interconnection at CSAs subject to timing constraints and NBN Co's business rules (which are yet to be determined) as to when it will permit such interconnection. 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.

NBN Co proposes providing RSPs with essentially one wholesale product that is made up of two components (but which will need to be acquired together). The two components are:

- an access virtual circuit (AVC) from the end-user premise to an Ethernet Aggregation Switch that services a CSA. These access circuits may be aggregated from multiple FSAs; and
- a connectivity virtual circuit (CVC) which aggregates and contends many access services at the Ethernet Aggregation Switch and transports the data to a network-network interface (NNI) at a POI (to connect with the RSPs network).

Both components will apply, irrespective of whether the POI is distant from the Ethernet Aggregation Switch (that is, a centralised POI) or locally (that is, a CSA POI).

If a RSP interconnects at a CSA, the RSP would use alternative backhaul providers to transport data to their own POP. NBN Co would not provide separate backhaul services to RSPs that interconnect at a CSA POI.

The ACCC invites respondents to consider whether interconnection issues (including competitive backhaul) should guide the location of CSAs.

Wireless services (terrestrial and satellite)

NBN Co's current view is that the technically and economic efficient location of POIs for wireless (terrestrial and satellite) delivered services is in mainland state capital cities.

Relocation of initial POIs

It should be noted that as a part of this process, the ACCC and NBN Co have only been directed to provide advice to government in relation to the number and location of the *initial* POIs for the NBN. However, in the interests of providing certainty that the location of NBN Co's POIs will continue to meet the LTIE on an ongoing basis, the ACCC and NBN Co are also seeking interested parties views as to whether:

- RSPs should be allowed to interconnect at additional points in the network at a later time; and/or
- whether NBN Co should be required to provide additional POIs at a later time.

The ACCC and NBN Co would also be interested in respondents' views regarding the mechanisms that should be used to effect any change to the NBN POIs (i.e. consultation processes and notification timeframes).

4. Markets affected by the decision as to the number and location of POIs

There may be a number of markets which may be affected by the location and number of POIs for the NBN, including markets for transmission services and downstream markets at both a retail and wholesale level.

Transmission markets

Transmission capability is required by carriers and carriage service providers to transport their network traffic between end-user locations to their closest POP. The types of traffic carried over transmission networks include traffic relating to consumer broadband and voice services, business and government services and traffic relating to mobile phone networks. Large government and business entities may also acquire transmission capability directly from carriers which they will manage to suit their specific use.

Transmission services are used to carry aggregated voice and data traffic between various points over medium to long distances. Broadly speaking, transmission services are used to connect local exchanges, mobile and fixed wireless towers all across Australia using optical fibre and, in some circumstances, microwave technology. Carriers and carriage service providers can use transmission capacity to set up their own networks for aggregated voice or data channels, or for integrated data traffic (such as voice, video, and data). In its analysis of transmission services, the ACCC has previously considered that dark fibre is likely to be a substitute for a transmission service.¹⁸

While Telstra's transmission network is the most extensive in terms of geographic coverage, the arrival of new entrants has facilitated a level of facilities-based competition in the supply of transmission services, particularly in metropolitan areas. Outside of metropolitan areas, facilities-based competition has been slower to develop.

Competition has developed on a number of routes such that the ACCC has been able to wind back regulation on those routes. Since the Domestic Transmission Capacity Service (DTCS) was first deemed a declared service in 1997, the ACCC has progressively exempted transmission routes which it found to be competitive. The current declaration excludes (in addition to the inter-capital routes) 23 nominated capital–regional routes and a number of routes between CBD and metropolitan exchanges. On these routes the scale of demand and increased likelihood of a return on investment has created the conditions for competitive infrastructure entry.

Under the NBN, the ACCC expects that there could be scope for some areas of transmission supply to become more competitive as, depending upon how many premises can be served by a potential POI, the scale of premises which can be reached by interconnecting with a single POI is likely to be significantly greater than under the existing copper network.

¹⁸ For example, ACCC: *Telstra's domestic transmission capacity service exemption applications: Final decision (Public version)*, November 2008, p.29.

Effect of POIs on transmission markets

The number and location of POIs will determine the extent of backhaul required by each RSP in order to connect customers to that RSPs services. POIs located in each of the FSAs,¹⁹ will mean that RSPs will be required to provide their own backhaul from the NBN POI to their main POP in the network. POIs located in fewer FSAs in centralised locations, such as the mainland state capitals, would allow RSPs to connect to all end-users serviced by that capital city POI without needing to acquire extensive backhaul. Where POIs are centralised, NBN Co would have to either build or purchase the necessary backhaul links to carry traffic from the FSA to the centralised POIs.

The number and location of POIs may also be particularly important in relation to services such as content distribution networks where there are advantages in having content servers relatively close to the end-user to minimise the required transmission resources.

It is likely that certain transmission services will still exist alongside NBN Co's backhaul where a centralised or composite approach is adopted. For example, although low capacity transmission services will likely be migrated over to NBN products, corporate customers requiring high capacity and high quality of service are likely to still require non-NBN transmission products, especially when provided over dedicated uncontended fibre links. However, current transmission markets are likely to be materially impacted if NBN Co were to adopt a centralised or composite model.

While a larger number of POIs may provide greater scope for competitive entry in the transmission markets, competitive build in transmission services has been generally limited to inter-capital and metropolitan areas and a small number of capital-regional routes. There has also been little evidence of entry into the backhaul markets outside these areas. If there are a large number of distributed POIs, RSPs would either be required to purchase backhaul services from existing fibre suppliers or build their own backhaul links.

The exact boundary between competitive and monopoly supply of transmission services is, however, unclear. The extent of future competition and investment in transmission is also uncertain. It is likely that some parts of the existing Telstra transmission network will continue to exhibit monopoly characteristics even following the changes to the industry that are likely to occur following the roll-out of the NBN.

It is likely that a very low number of consolidated POIs risks stranding existing infrastructure assets and foreclosing the potential for further backhaul entry. This is noted in the Study, which states that duplicating access to backhaul where competitive supply already exists would be "harmful to competition and industry investment incentives".²⁰ As a potential consequence of NBN deployment will be an increased reliance on transmission services brought about by the increased quantity of data

¹⁹ NBN Co planning indicates there are approximately 718 FSAs, however this number may change as planning progresses. NBN Co predicts approximately 950 FSAs.

²⁰ The Study, p. 27.

which will likely be consumed by end-users, there is potential that a highly consolidated approach to POIs would risk foreclosing dynamic development in this sector.

In the context of current services, the ACCC considers that the ability of RSPs to acquire transmission services from a number of different providers has enhanced the level of rivalry in the DTCS market and, consequently, the retail Digital Subscriber Line (DSL) market. While Telstra remains the dominant transmission provider, as noted above, there is substantial competition in inter-capital, some capital-regional routes and between selected metropolitan ESA. The ACCC considers that this rivalry in the transmission markets has contributed to providing innovation, lower prices and choice amongst RSPs in the related retail markets.

Retail services market

NBN Co noted in its December 2009 consultation paper that it believes that a consolidated POI option, where the POIs are only located where there are multiple backhaul providers, will have benefits for competition in retail markets. In addition, NBN Co indicated that it wished to avoid embedding or increasing barriers to entry for smaller RSPs through its POI location.

In this context, NBN Co has noted that if it only provides local POIs as a way of accessing services in less densely populated areas, this may preclude a wide range of RSPs from operating in those areas due to:

- (a) the limited amount of backhaul which is available in those areas and the cost of accessing that expensive backhaul; and
- (b) the complexity involved for RSPs in managing these backhaul requirements.

The NBN Co Public Position Paper notes that wholesale level pricing will be the same under the high consolidation or composite approach in order to achieve the government's desire for uniform retail pricing.

The Public Position Paper also suggests that under the high consolidation or composite approach where NBN Co provides only a limited number of POIs, the ability of 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 (assuming the type of uniform national wholesale price that NBN Co proposes is adopted). To the extent that these cross-subsidised prices are lower than the commercial price that would otherwise have been paid, this may encourage additional entry at the retail level in non-metropolitan areas as RSPs would be largely indifferent as to whether their customer is located in a regional or metropolitan area. On the other hand, in order for NBN Co to be able to offer lower, cross-subsidised backhaul prices to retailers in non-metropolitan areas – and to therefore lower the total costs to retailers of serving these areas – prices in metropolitan areas would need to be higher than they would otherwise have been, in order to provide the source of the cross-subsidy. Hence, the total cost to retailers of serving metropolitan areas could be higher than it would otherwise have been.

The Public Position Paper notes that “...in the context of UNWP [universal wholesale national pricing] it is important to recognise that the benefits are very much dependent on NBN Co's POI location policy.” It is, however, not clear to the ACCC that the design of the network and the pricing of services provided over the network are linked issues; rather, it appears possible that UNWP can be achieved independently of POI location considerations. In particular, under NBN Co's proposed approach to POI location and UNWP, there is a need to balance any potential benefits of reduced barriers to entry for RSPs with the possibility of foreclosure in transmission markets discussed above. This trade-off might be able to be avoided by adopting a different approach to uniform national wholesale pricing. This issue is outlined further in section 6.

Assuming, however, that backhaul pricing in non-metropolitan areas is reduced by some mechanism (whether it be centralised POIs and a cross-subsidy internal to NBN Co or a different mechanism), the benefits NBN Co anticipates for competition in retail markets are proposed to arise from an increased number of RSPs being able to serve more areas. However, it is important to note that the number of competitors in a market is only one factor which is used to assess the level of competition within that market. For example, where there are a number of firms competing in a market where there is little ability for them to compete on price or by differentiating their service offerings, the level of competition in the market may not necessarily be enhanced by more firms entering that market.

In this respect, the potential benefits from a consolidated POI approach where backhaul services are bundled with access services could be outweighed by a number of factors including:

- (a) reducing competition on price – there may be less scope for RSPs to seek to change the costs that they face in supplying the service to particular markets; and/or
- (b) reducing 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.

Wholesale services market

In restricting its product offering to wholesale Layer 2 bitstream services, NBN Co has stated that it is seeking to occupy as small a footprint as possible in the overall value chain, leaving RSPs with significant ability to innovate and develop new services in the higher levels of the value chain.

The NBN may also provide opportunities for larger service providers to offer wholesale Layer 3 services to smaller carriage service providers and new entrants, without them incurring the capital costs and burden of building and operating their own infrastructure, in a manner which would encourage retail competition.

The number and location of NBN POIs may have the potential to affect the development of a Layer 3 wholesale services market. The evolution of such a Layer 3 market is a possible outcome of the deployment of the NBN. A consolidated POI

approach would entail NBN Co aggregating traffic from around Australia and delivering it to the main capital cities. This type of aggregation service is usually provided as part of a managed Layer 3 wholesale service. As a result, it may be harder for prospective Layer 3 wholesale providers to differentiate their services by offering significant value-added features if they are unable to utilise their own network infrastructure where it would otherwise be efficient for them to do so. It is possible then that a consolidated POI approach may inhibit the development of a vibrant and competitive market for wholesale Layer 3 services. On the other hand, the aggregation of services resulting from a consolidated POI approach may provide the scale benefits necessary to provide market entry incentive to new Layer 3 service providers.

5. Layer 1 unbundling

The request for advice from the government asks the ACCC and NBN Co to consider the effect of POI location on potential Layer 1 unbundling and home-run topology. The location of POIs will likely affect the feasibility of future unbundling of the network.

Fibre unbundling requires a single fibre per premises from the FSA and can be implemented using home run topology. From a competition perspective, there are two main ways that an optical access network could be considered for unbundling at the physical layer; that is, the actual fibre (Layer 1):

- physical fibre unbundling – providing a separate fibre from the fibre exchange to each premise; and
- wavelength unbundling – providing access to individual wavelengths on the one fibre.

The Study included specific recommendations relating to unbundling:

- that national FTTP standards require new developments to have home-run topology and not shared topology, with this being reviewed by the time 15 per cent of premises are covered of 31 December 2013, whichever is earlier²¹
- that NBN Co be required to deploy fibre topologies that support the ongoing needs of multiple stakeholders, including service providers who may seek access to Layer 1 services, anticipating the likelihood of future unbundling requirements²², and
- that NBN Co conduct demonstrations of appropriate network topologies to enable physical and wavelength unbundling with a plan of the extent of such topology developed in consultation with the ACCC.²³

Beneath these broad distinctions, there are a number of ways in which physical fibre unbundling could potentially be implemented. Layer 1 unbundling, especially physical unbundling, requires the ability of the access seeker to interconnect at the local exchange level, as it requires direct access to the fibre line of a premises so that the access seeker can terminate the line on its own equipment. This is analogous to the

²¹ Recommendation 15, *Ibid.*, p 95.

²² Recommendation 36, *Ibid.*, p 191.

²³ Recommendation 75, *Ibid.*, p 472.

legacy network arrangements for ULLS and digital subscriber line access multiplexers (DSLAMs). Unbundling of legacy, passive layers has promoted competition in the provision of broadband services.

It is not yet clear how wavelength unbundling might be implemented in the future over an optical access network, as there are no agreed international standards on this application of Wavelength Division Multiplexing. Wavelength unbundling could be implemented to provide a form of Layer 1 access.

Unbundling does not appear to be feasible under NBN Co's preferred option for POI location if it does not maintain opportunities for alternative service providers to access the fibre exchange in the future. This may be the case regardless of whether the unbundling in question is physical fibre unbundling or wavelength unbundling. It is also not clear whether the provision of Layer 1 unbundling in the access network would be attractive in the absence of corresponding Layer 1 unbundling in backhaul networks.

6. Uniform national wholesale pricing and POI location

The ACCC and NBN Co recognise the barriers to entry that high backhaul prices in non-metropolitan areas have posed for RSPs and the extent to which this has deterred entry into these markets. As outlined by the Study, costs of backhaul are particularly high in non-metropolitan areas due to a number of interrelated factors including monopoly and duopoly pricing, vertical integration, high build costs and regulation of prices.²⁴

There are a range of ways in which backhaul prices in regional areas could be reduced. It is possible that UNWP – or more specifically, the delivery of a geographically uniform cost structure to retailers - can be achieved independently of POI location considerations. For example, the Study proposed one example of an approach to facilitating a uniform cost structure to retailers across regions:

- NBN Co would provide a backhaul service to connect fibre exchanges to the nearest practical point where backhaul services are available from government (e.g. via the Regional Backbone Blackspots Program) or multiple providers.
- This backhaul service would be offered and priced on a modular basis (i.e. not as a bundle with an FTTP access service). The price of the FTTP access service would be uniform across the FTTP footprint.
- The price of the backhaul service would be required to meet an affordability test, determined by the government.

Another alternative to NBN Co providing these backhaul links could be for the affordability cap to be placed on existing operators of high priced backhaul.

To the extent that such an affordability cap would result in the provision of these links being non-commercial or 'uneconomic', some form of funding may need to be provided to the backhaul operator supplying the service at the capped price. There are a range of ways in which this funding could be sourced, for example, via a transparent

²⁴ Ibid., pp. 326-327

levy placed on end-users of telecommunications services; a transparent up-lift on the prices of NBN Co's FTTP access service; or a levy placed on all access seekers in proportion to their share of eligible revenues.

Approaches such as these could avoid the trade-offs between the benefits of reduced barriers to entry for RSPs in regional areas and the possibility of foreclosure in transmission markets that NBN Co's proposed approach to POI location and UNWP might entail.

7. Issues for Discussion

The ACCC and NBN Co have formulated a number of questions designed to promote discussion of the issues raised in this paper.

Effect on relevant markets

1. *To what extent will the number and location of POIs impact competition in the backhaul market in the short term and in the long term?*
2. *To what extent (if any) do you anticipate that any of your transmission assets (or other relevant assets) will become stranded under any of the proposed approaches to POIs on the NBN? What is the value of and location of those assets?*
3. *What is the current state of competition in the relevant backhaul markets? To what extent are backhaul services priced competitively in CBD, metro, regional and remote areas?*
4. *How would investment in backhaul infrastructure used for other networks, such as mobile and non-NBN fixed networks, be affected by the number and location of NBN POIs?*
5. *To what extent will the number and location of NBN POIs impact competition at the retail level in the short term and in the long term?*
6. *Is the emergence of a Layer 3 wholesale sector likely under the NBN? If so, how will the location of NBN Co's POIs affect this market in the short and long term?*

Location of POIs on the NBN and provision of related services

7. *What is the preferred number and location of initial NBN POIs and why? How would this be different in the short term and the long term?*
8. *What are the strengths and weaknesses of NBN Co's preferred 'composite model' outlined in its Public Position Paper?*
9. *Where a composite or low-medium consolidation approach is adopted for NBN Co's POI location, what factors should be taken into account in determining the location of the distributed POIs? For example, is the number of available backhaul routes relevant? If so, what should be the threshold?*
10. *On what terms should NBN Co supply backhaul from the small number of centralised aggregation POIs to the decentralised disaggregated POIs if its 'composite model' is adopted?*
11. *If NBN Co supplies backhaul, should this be on a Layer 2 Ethernet basis or in the form of dark fibre (or both)?*

Timing and Business Rules for interconnection under NBN Co's composite approach

12. *Under NBN Co's 'composite model', what "business rules" should govern when NBN Co will allow interconnection at the distributed POIs?*
13. *What should be the process to coordinate the addition of interconnection at the disaggregated POIs?*

Changes to the initial POIs

14. *What factors should trigger a review of the location of NBN Co's initial POIs?*
15. *What mechanisms should be used to effect a change to the location of NBN Co's POIs? (i.e. consultation requirements and notification periods)*

Layer 1 Unbundling

16. *What are the implications of the number and location of POIs for potential Layer 1 unbundling and home-run network topology for the NBN?*

Uniform National Wholesale Pricing (UNWP)

17. *To what extent can UNWP be achieved independently of decisions about the number and location of POIs?*
18. *Is NBN Co's definition of UNWP "...that Access Seekers should face the same total wholesale cost from any premises to a designated state capital city point of presence" an appropriate one? If not, what alternative definition would you propose?*
19. *To what extent can it be ensured that Access Seekers face the same total wholesale cost in supplying services to end-users across regions independently of decisions about the number and location of POIs? That is, are there alternative ways to the approach proposed by NBN Co of ensuring that Access Seekers face the same total wholesale cost in supplying services to end-users across regions?*
20. *If NBN Co's preferred composite model were to have no price differentiation between interconnecting at designated capital cities or at CSA locations, what impact would this proposal have, particularly on regional retail markets and regional backhaul transmission markets?*

Wireless Services

21. *Should the same approach for the number and location of POIs for NBN Co's fibre services be adopted for wireless and satellite services? Why and/or why not?*

Other

22. *In relation to the data provided in Appendix A of NBN Co's Public Position Paper, do you believe that NBN Co's input information is accurate, and has NBN Co correctly assessed the current state of the backhaul and competitive DSLAM markets?*
23. *Are there any other considerations or information that you think are relevant to the selection of NBN Co's POI locations?*

NBN Co Public Position Paper

Broadbanding
Australia

NBN Co Public Position Paper

PROPOSED NBN CO POINTS OF INTERCONNECT (POIs)



Table of Contents

1. Executive Summary	3
Background	3
Summary of NBN Co's proposed Points of Interconnect	3
2. Uniform National Wholesale Pricing	5
3. Building the fibre access network and product set	6
4. Location of Points of Interconnect for NBN Co wholesale fibre network	9
Wireless and Satellite	10
5. Industry Feedback	11
6. NBN Co Points Of Interconnect Analysis and Preferred Position	12
NBN Co's preferred position to best achieve government objectives	13
7. Conclusion and next steps.....	15
Appendix A – Summary data for Option 4: Composite	16
Appendix B – Glossary of Terms	18

1. Executive Summary

BACKGROUND

NBN Co's role is to realise the Australian Government's vision for the development of a next generation national broadband network. An important part of this vision is the achievement of uniform national wholesale pricing for broadband services, no matter which technology is used to deliver the service or which part of the country the service is delivered to. NBN Co regards the location of the Points of Interconnect (POI) as playing an intrinsic role in delivering uniform pricing, and the delivery of this Government objective has significantly shaped its thinking on POI locations. To ensure that it is successful in delivering the Government's objectives effectively, NBN Co recognises the need to consult widely to ensure the needs of its wholesale customers and the wider Australian community are met. This Public Position Paper represents the latest step in NBN Co's ongoing public consultation on the location of its POIs, and should be read in conjunction with the Australian Competition and Consumer Commission discussion paper on National Broadband Network Points of Interconnect, which invites feedback from any interested parties.

In December 2009 NBN Co publicly released an Industry Consultation Paper regarding NBN Co's proposed high level network design and wholesale fibre bitstream products.¹ NBN Co has also undertaken a number of industry forums with relevant stakeholders, and conducted a large number of bilateral "deep dive" consultations with many industry participants. The Industry Consultation Paper included a general discussion of NBN Co's initial thinking on the location of Points of Interconnect (POI)² for the wholesale fibre bitstream proposed product and sought industry comment. There was general, but not universal, support for NBN Co's approach to determining POI locations, and industry was keen that NBN Co undertake further consultation and provide further information in regard to the specific locations of its proposed POIs. NBN Co committed to undertake further work on the options available and release a more detailed discussion paper addressing this issue.

The Australian Government has requested that the Australian Competition and Consumer Commission (ACCC) and NBN Co undertake a joint process, including public consultation, on the issue of POI location. The ACCC issued its discussion paper "National Broadband Network Points of Interconnect" in October 2010, outlining what it sees as some of the key issues, and inviting industry response.

This paper, "Proposed NBN Co Points of Interconnect (POIs)", seeks to provide NBN Co's latest thinking on how best to realise the Government's vision through the location of the NBN POIs, and should be read in conjunction with the ACCC's discussion paper. It follows more detailed financial and network architecture assessment, and discussions with industry and key stakeholders, including NBN Co's Shareholder, the Government.

SUMMARY OF NBN CO'S PROPOSED POINTS OF INTERCONNECT

NBN Co has been established by the Government to play a key role in delivering high-speed broadband at affordable prices to all Australians no matter where they live. To achieve this, NBN Co's objectives are to deliver the lowest total cost solution for Access Seekers (i.e. Retail and Wholesale Service Providers) in turn helping to enable service equivalence for Access Seekers and end users. The fulfilment of these objectives will assist in promoting healthy competition, and therefore maximise the benefits of the NBN to Australian

¹ The Consultation Paper and an NBN Co's response to industry and stakeholder submissions can be found at: <http://www.nbnco.com.au/publications-and-announcements/publications>.

² Points of Interconnect (POIs) determine one of the boundary points of NBN Co's network, the other boundary point being the ONT (Optical Network Terminal) at the end-users premises.

consumers and businesses. POI locations have a significant impact on the cost to serve economics for a Retail Service Provider (RSP) and thus their business decisions to enter regional markets.

NBN Co expects that there will be a range of potential uses of the network that will be delivered in ways that are very different to traditional telecommunication operational models. As we consult to finalise our POI position, NBN Co will also consider the potential for new and innovative industry participants, and seek to identify what their interests may be, as well as considering the interests of existing stakeholders.

NBN Co has analysed a number of options, and believes that a “composite” option for the location of POIs would best promote the objectives of the Government by encouraging wider take-up of NBN Co services in regional and metropolitan Australia, lowering the barriers to entry for new service providers, and addressing current issues associated with the delivery of competitive retail broadband services. This approach would see the network built with 14 centralised POIs and the opportunity to connect at a selection of a larger number of Connectivity Serving Areas where for technical reasons (ie applications which have low latency requirements) or local content reasons connection is needed deeper in the network. There are currently 81 potential regional and regional urban Connectivity Serving Areas and 114 potential metropolitan and outer metropolitan Connectivity Serving Areas and after the initial build of the centralised POIs there would be potential to connect at those areas subject to meeting appropriate business rules. NBN Co intends to charge Access Seekers the same price for access to its network at any of the POIs, irrespective of location.

2. Uniform National Wholesale Pricing

In developing the National Broadband Network, NBN Co is guided by the policy objectives established by the Australian Government. The Government recently announced that a key objective is to ensure that NBN Co services are delivered at a uniform wholesale price irrespective of location within Australia. As noted by The Minister for Broadband, Communications and the Digital Economy, Senator Stephen Conroy, “My ambition is that there will be the same wholesale price for every household for the same speed across satellite, wireless and fibre-to-the-node. This is about bringing every Australian up to speed, so to speak, after years of Australian telecommunications being far slower and more expensive than most of the rest of the world.”³ Further, the Prime Minister, Julia Gillard, has recently committed to ensuring that “broadband prices will be the same for households and businesses regardless of where they are located – in the city, in regional Australia or in more remote parts of the country. This will be achieved by a new cross subsidy to ensure a uniform national wholesale price so that regional areas can pay the same price as people in the city”⁴.

Uniform National Wholesale Pricing (UNWP), which is distance and technology independent, provides a wide range of substantial economic and social benefits:

- UNWP will lower the barriers to entry for RSPs, facilitating a higher number of players with significant scale and therefore greater levels of retail competition and innovation. This can be contrasted with the current pricing for the Unconditioned Local Loop Service (ULLS) which has experienced competition in only a limited number of exchanges (540 out of ~5000 exchanges) due primarily to the costs associated with long-distance, non-metro backhaul.
- Greater competition in rural and regional Australia lowers the costs of doing business in those geographies, and addresses concerns about the emerging “digital divide”. The number and frequency of transactions increases with access to affordable broadband and this contributes to the capacity of regional areas to increase their relative attractiveness for investment and employment.
- More extensive retail competition resulting from UNWP will also facilitate greater take-up by end-users.
- More ubiquitous take up of high speed services by end-users will in turn stimulate the development of new applications and services that require these speeds, increasing the utility of the NBN.
- Higher numbers of services in operation and a shift in population and commuting patterns are likely to result in meaningful carbon abatement from reduced transport requirements and increase the feasibility of smart metering and demand-side energy management.
- Increase the viability of long-term in-home health care and reduce the geographic restrictions of education and training.

In achieving the Government’s objectives on UNWP, NBN Co will seek to ensure that Access Seekers should face the same total wholesale cost from any premises to a designated state capital city point of presence. This means that the total cost of access to NBN Co’s network plus any required backhaul to the designated capital city (Sydney, Melbourne, Brisbane, Perth, Adelaide) for the same NBN Co service should not depend on customer location or technology used to deliver that service. This definition of UNWP specifically does not cover any inter-capital transmission or international capacity required, as the price of these facilities does not depend on customer location, and is not within the scope of NBN Co’s network.

³ Northern Daily Leader, 22 September 2009

⁴ “A Better Deal For Australia”, 7 September 2010

3. Building the fibre access network and product set

The Australian Government has established NBN Co to build a Fibre to the Premises (FTTP) network that will provide services to 93 per cent of Australian premises. In a manner similar to the current copper-based Public Switched Telephone Network (PSTN), in a particular geography the network will link each premises with fibre to a centralised local location. For NBN Co's FTTP network, this point is known as the Fibre Access Node (FAN) and the footprint of premises that are connected to it is known as a Fibre Serving Area (FSA). While NBN Co is currently undertaking a detailed assessment, planning and design process, an indicative configuration of a typical FSA is set out in Figure 1. Note that Figure 1 describes a FSA that is also a Point of Interconnect (POI).

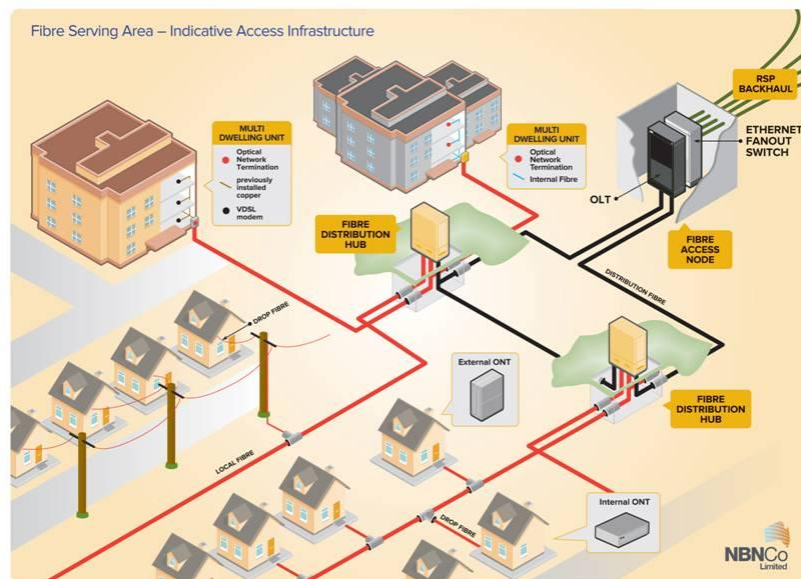


Figure 1: Indicative Fibre Serving Area

The footprint of the FSAs across Australia, under the initial draft network plan, is depicted in Figure 2.⁵

⁵ Note, the number of 718 FSAs in this initial plan may change as detailed network planning progresses. For example, the number may increase significantly in order to best use existing duct infrastructure. At this stage NBN Co is predicting approximately 950 FSAs.

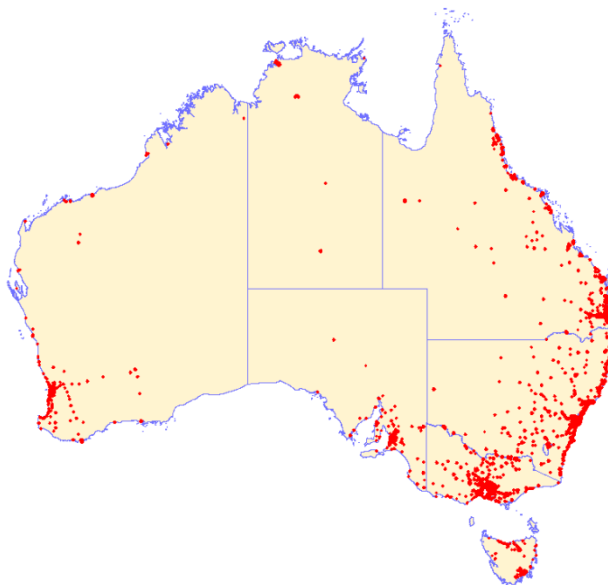


Figure 2: Fibre Serving Areas

Due to the extended reach of optical fibre based access networks in comparison to the existing copper access network, the number of potential premises served by a single “Exchange” is, in general, higher for optical fibre networks, thus requiring fewer distinct FSAs. For comparison, the metrics relating to NBN Co’s FSAs and Telstra (copper-based) Exchange Serving Areas are presented in Table 1 and Table 2 respectively⁶. For example, under NBN Co’s initial network plan there are 99 FSAs designated within “Metro” areas, and on average 58,000 premises are passed by fibre within each of these FSAs.⁷

	Fibre Serving Area Type				Total
	Metro	Outer Metro	Regional Urban	Regional	
Number	99	33	28	558	718
Av addresses	58k	17k	44k	5k	12k

Table 1: NBN Co Fibre Serving Area metrics

	Exchange Serving Area Zone				Total
	Urban	Major Rural	Minor Rural	Remote	
Number	774	257	985	3049	5065
Av addresses	11k	4k	1k	176	2157

Table 2: Telstra Exchange Serving Area metrics

The figures in Table 1 and Table 2 suggest that the number of premises accessible within a FSA is generally greater than in a typical copper-based ESA. This highlights the likely change in RSP/WSP build economics for the NBN Co fibre footprint versus a copper-based Unconditioned Local Loop Service (ULLS) footprint. However, it should be noted that the figures for the copper based ESAs in Table 2 cover a larger proportion of

⁶ Note:

•“Metro” and “Outer Metro” includes state and territory capital cities.

•“Regional Urban” includes major regional development areas such as NSW Central Coast, Geelong, Gold Coast, Mandurah, Newcastle/Maitland, Rockingham, Sunshine Coast, Townsville, Wollongong.

•“Regional” includes all other regional cities and towns.

⁷ NBN Co’s latest planning indicates that the number of Metro, Outer Metro, Regional Urban and Regional FSAs is likely to increase to approximately 270, 40, 60 and 580 respectively. As this has yet to be confirmed, the data presented herein is based on the original 718 FSAs.

rural and remote areas within Australia compared to the fibre based FSAs in Table 1. This mainly impacts in the comparison of Minor Rural and Remote ESAs with Regional FSAs.

In addition to the number of premises accessible within a FSA being greater than in a typical copper-based ESA, NBN Co's provision of transit backhaul may further reduce the infrastructure requirements of some RSPs through the aggregation of traffic to a smaller number of more readily accessible POIs. A smaller number of POIs may open up new markets that were previously uneconomic for some Access Seekers to serve in the ULLS or LSS environment.

NBN Co's recently published Product Overview – Fibre Access Services and Product Technical Specification – Fibre Access Services⁸ introduced the concept of a "Connectivity Serving Area". A CSA defines the geographical region that is addressable using a single Connectivity Virtual Circuit (CVC), and is analogous in many respects to a Call Collection Area for the Australian Public Switched Telephone Network. The CSA may consist of one or more FSAs.

Further, depending on the degree of centralisation of POIs, a single POI may provide access to one and possibly multiple CSAs (and hence one or many FSAs). Therefore a POI will typically service a mix of locally connected ("Local") and non-locally connected ("Distant") premises.

⁸ The Product Technical Specification can be found at: <http://www.nbnco.com.au/publications-and-announcements/publications>.

4. Location of Points of Interconnect for NBN Co wholesale fibre network

A Point of Interconnect (POI) is a geographical location where two networks interconnect and exchange traffic. In NBN Co's case, it is where we will hand over traffic that has been carried on our network to the Access Seeker's network. In offering a Layer 2 Ethernet product there is significant flexibility in determining the locations of POIs. Traffic could be handed over as quickly as possible and the POIs could be located in all FSAs. Alternatively traffic could be aggregated from a number of FSAs to provide a more centralised POI architecture.

The choice of POI location can be summarised into three main approaches:

1. **Distributed Points of Interconnect** – at the Fibre Access Node, such that access to the POI provides access only to those premises within the corresponding local FSA. An Access Seeker would be required to backhaul their traffic from all FSAs;
2. **Semi-distributed Points of Interconnect** – upstream in the network, such that NBN Co could aggregate a number of FSAs and provide access to a larger area such as a district or region; or
3. **Centralised Points of Interconnect** – carry traffic all the way to capital cities.

A network's POI location policy has important implications for the use of that network and the costs associated with interconnecting with it. The critical issue for this discussion is the extent to which an Access Seeker must provide its own backhaul arrangements to interconnect with a network. The less centralised the POI location policy, the greater the requirement for the access seeker to acquire (potentially expensive) 'backhaul' services to carry the traffic to a more centralised location. This range is illustrated in Figure 3.

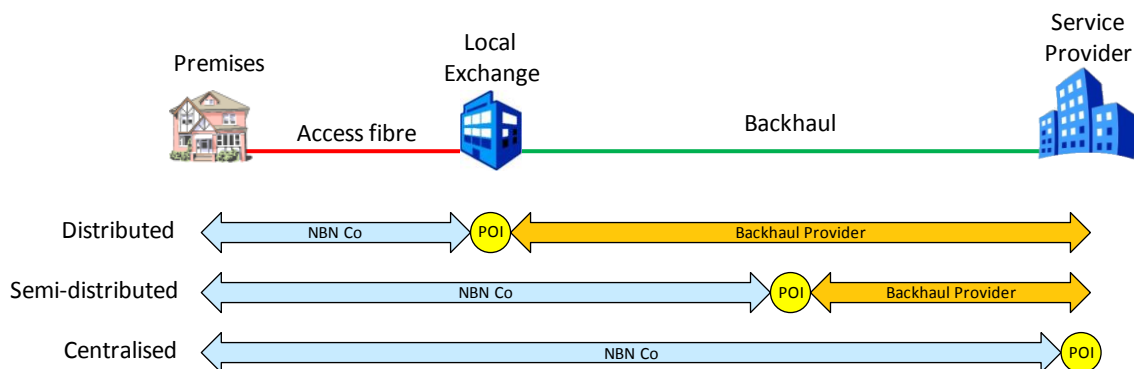


Figure 3: POIs and backhaul

In the context of UNWP it is important to recognise that the benefits are very much dependent on NBN Co's POI location policy. If POIs are highly distributed, Access Seekers would be required to purchase large amounts of backhaul services to carry their traffic back to their centres of operation. This could result in the perpetuation of the significant cost differential between the provision of metropolitan and regional broadband services. In other words, if NBN Co's network architecture does not overcome the high cost differential between regional and metropolitan Australia, then uniform pricing from premises to POI by NBN Co alone will not deliver the Government's stated objective of a national level competitive playing field for retail services.

NBN Co's approach to locating POIs is to achieve the Government's objectives of promoting infrastructure access for Retail Service Providers, enhancing greater retail competition and innovation in the provision of services to end users. This may be facilitated by aggregating together smaller regional FSAs to a single POI. This, in turn, will provide access to a larger number of end users through a single POI, thereby reducing barriers for Access Seekers to offer services in that location. However, NBN Co is also conscious that high levels of aggregation in its network may impact some existing market structures and participants.

WIRELESS AND SATELLITE

Turning to wireless and satellite, given that the expected combined footprint of both wireless and satellite will service in the order of 7% of premises (as fibre is expected to service the remaining 93%) a large number of wireless and satellite POIs would be inefficient. If there was a large number of distributed wireless and satellite POIs, then an Access Seeker would require their own (large) backhaul network, or the ability to acquire capacity on a third party's backhaul network, to connect to each of these POIs, and yet would only reach a small fraction of premises, making it uneconomic for most Access Seekers. It may be equally uneconomic for Access Seekers if the satellite POIs were located at the remote satellite earth stations. Hence, a relatively small number of POIs, most likely located in capital cities and co-located with selected fibre POIs, may be the most efficient solution for NBN wireless and satellite services. This would ensure the concentration of sufficient premises per POI to ensure that backhaul costs faced by Access Seekers are not prohibitive. It will also mean that Access Seekers should only need a single form of network and systems interfaces to service customers on all NBN Co technology platforms.

5. Industry Feedback

In December 2009 NBN Co released a public Industry Consultation Paper regarding NBN Co's proposed high level network design and wholesale fibre bitstream products. The Consultation Paper included a general discussion of NBN Co's initial thinking on the location of POI for the wholesale fibre bitstream product and sought industry comment. NBN Co put forward a proposal for POI location that was based on two general principles: Firstly, NBN Co proposed to aggregate smaller regional FSAs to a single POI. Secondly, NBN Co proposed that the location of these POIs would be selected based on the existence or likely emergence (e.g. the relative ease of building) competitive backhaul options. In other words, NBN Co would locate the POIs where backhaul routes are (or are likely to be) sustainably contestable.

There was general, but not universal, industry support for NBN Co's proposed high level approach for determining POI locations. There were also significant differences of opinion as to the best way to apply this proposal. While there was general agreement with NBN Co that the location of POIs needed to foster the optimal outcome for the industry, there were a range of views as to what constitutes "contested" backhaul and hence where POI locations should be established. These ranged from suggestions that:

- POIs should be available at most, if not all, FSAs;
- POIs should be located where there is at least one 'independent' backhaul provider, or that relative market share at each POI location should also be a consideration;
- POIs should be limited to locations where three or more, or four or more backhaul options are available; and
- Aggregation should be maximised with POIs located at 'core national' positions such as capital cities.

A number of industry submissions expressed concerns that the Consultation Paper's proposal would not necessarily deliver a level competitive playing field for the retail market. Submissions observed ongoing problems with the backhaul market such as enduring high prices, extensive vertical integration of major backhaul providers, high build costs for small and medium sized service providers, and the limitations of the regulatory regime to overcome the unique problems of the backhaul market.

In its response to the industry submissions, NBN Co acknowledged the range of responses on this issue and recognised that it reflected the breadth of choice and the nature of the trade-offs which need to be made in finalising POI locations. For this reason NBN Co committed to undertake further work on the options available and release a more detailed discussion paper addressing the POI issue.

Drawing from the feedback received via the Industry Consultation from December 2009, NBN Co has undertaken a detailed cost and benefit assessment of various POI options. In addition, NBN Co has also undertaken a large number of bilateral 'deep dive' consultations with industry participants. In these discussions there was a widespread view that NBN Co should play a more active role in backhaul than the initial proposal put forward by NBN Co – in particular, the offering of centralised POIs in state capital cities. Equally though, there was a recognition that access deeper in the network is required to satisfy the technical requirements of certain service providers. These include latency critical applications (e.g. for the remote operation of infrastructure), distributed content distribution networks, local content injection for rural cities, and the avoidance of trombone trunking of traffic.

6. NBN Co Points Of Interconnect Analysis and Preferred Position

NBN Co acknowledges that there is a continuum of potential POI options that warrant consideration. NBN Co has concentrated on four options that cover the breadth of approaches that can be taken. They are:

Option 1 – No Consolidation: POIs are fully distributed and located at every FSA.

Option 2 – Low Consolidation: POIs are partially distributed, at the edge of where contested backhaul currently exists.⁹ Note, there are many differing views in the industry of where contested backhaul does actually exist in Australia today. As a result, NBN Co would expect the identification of contestable backhaul to be carried out by a third party, such as the ACCC, to enable NBN Co to determine the precise locations for POIs.

Option 3 – High Consolidation: Traffic is carried to “Aggregation POI” locations. POIs are centralised at five capital cities.

Option 4 – Composite: POIs available at five capital city locations, plus, upon request and subject to timing and business rules (for example to provide interconnection for applications or technical reasons), at a selection of the NBN Co Connectivity Serving Areas. The actual CSAs to be made available for interconnection will depend on the business rules and subject to further consultation. Note, CSAs are a network design construct and are located independent of any consideration of the provision of contestable backhaul. The Aggregation POIs will be the default locations for interconnection; access at CSAs will only be provided subject to business rules. Access Seekers are permitted to have a mixture of both.

The criteria used to select the POIs, and the resultant POI counts for each option, are depicted in Figure 4 and Table 3 respectively.

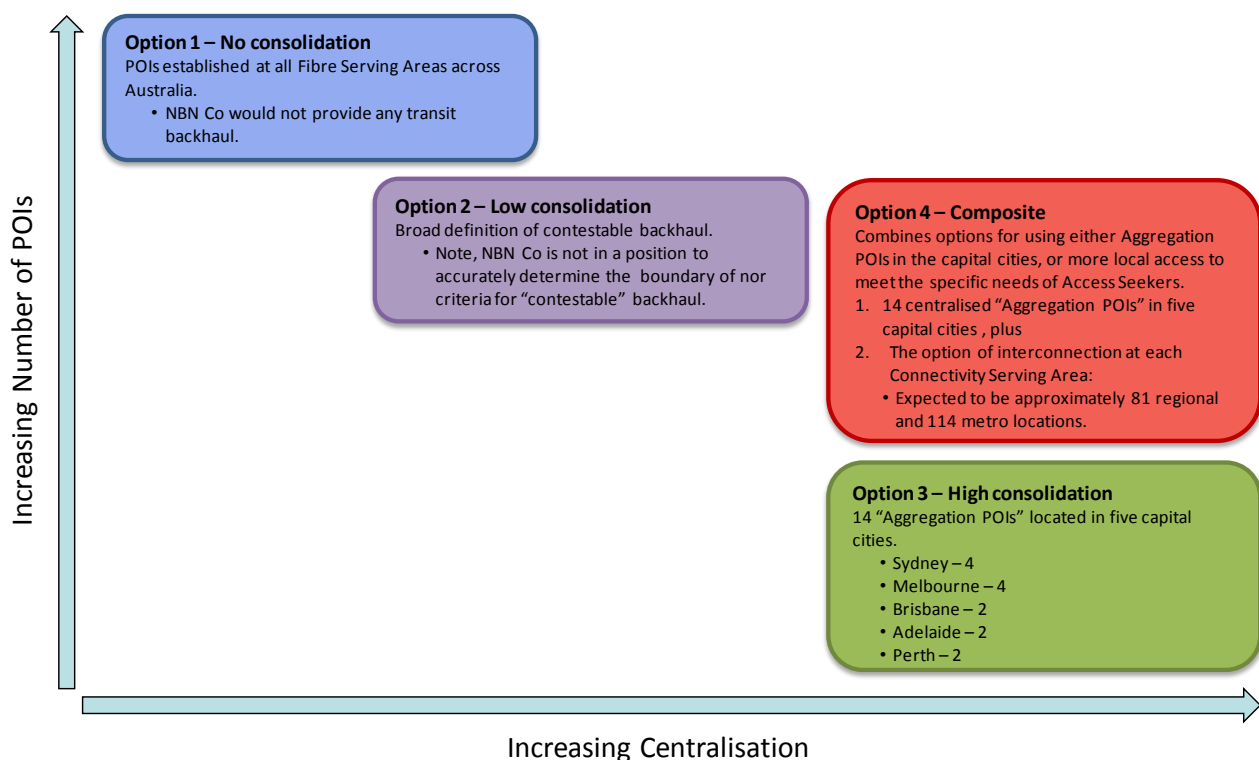


Figure 4: POI Options modelled by NBN Co

⁹ This is consistent with the initial NBN Co Consultation Paper proposal.

POIs	Option			
	1	2	3	4
Metropolitan	132 (310)	Indeterminate	14 Agg. POIs	14 Agg. POIs, with option for ~114
Regional	586 (640)	Indeterminate	-	14 Agg. POIs, with option for ~81
Total	718 (950)	Indeterminate	14	14 Agg. POIs, with option for ~195

* NBN Co's latest planning indicates that the number of Metro, Outer Metro, Regional Urban and Regional FSAs is likely to increase to approximately 270, 40, 60 and 580 respectively. As this has yet to be confirmed, the data presented herein is based on the original 718 FSAs.

Table 3: Resultant numbers of POIs

As noted above, NBN Co is mindful that there is a trade-off and tension between providing fewer POIs to facilitate more concentrated access to RSPs and the involvement of other service providers in the provision of regional backhaul. NBN Co's overarching requirement in locating POIs is to deliver widespread availability of affordable high-speed broadband.

NBN CO'S PREFERRED POSITION TO BEST ACHIEVE GOVERNMENT OBJECTIVES

To meet the Government's objectives NBN Co will provide UNWP by charging Access Seekers the same price for access to the network at any of the POIs, irrespective of location. That is, it is NBN Co's intention to provide flat pricing irrespective of the distance that the traffic is carried.

In order to achieve the Government's objective of delivering choice and competition in the delivery of broadband services via a UNWP, NBN Co's analysis concludes that a composite approach for the location of POIs, offering centralised access with the option for distributed access, is the most effective solution. The summary of this analysis is as follows:

Option 1: No Consolidation results in an unacceptably high cost differential between regional and metropolitan Australia due to high backhaul costs faced by Access Seekers. This would make it very difficult to achieve the Government's objective.

Under **Option 2: Low Consolidation** backhaul costs are improved. However, end-to-end uniform national wholesale pricing is still not achieved as these costs remain significant in regional areas. This would limit the benefits for regional Australia and not deliver on the Government's policy requirements.

Option 3: High Consolidation plus uniform transit pricing at each of the POIs best achieves uniform end-to-end national wholesale pricing. However, this option fails to satisfy the technical requirements of service providers who may require or want access deeper in the network.

NBN Co believes that **Option 4: Composite** is the most effective option as it provides uniform national wholesale pricing, facilitates the highest level of market uptake, and enables Access Seekers to connect closer to the edges of the network than capital cities.

Option 4: Composite results in a maximum set of 195 POIs set out in Appendix A – Summary data for Option 4: Composite, and depicted in Figure 5 below. The actual number will depend on the business rules and further consultation with industry.

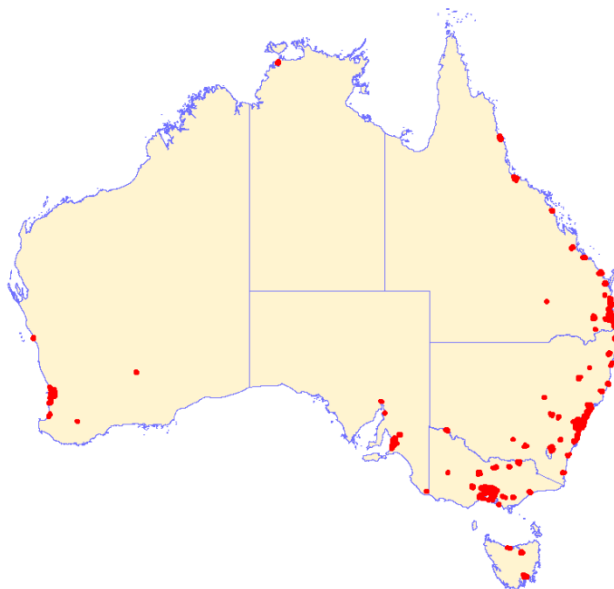


Figure 5: 195 Points of Interconnect across Australia

The breakdown into the Local and Distant categories of potential end-user premises in the fibre footprint is detailed in Table 4. That is, 83% of end-user premises are local to the POI, whereas 17% incorporate transit backhaul (i.e. are remote from the POI). Further, 41% (24%+17%) of end-user premises are serviced by POIs which simultaneously service not only a number of remote FSAs but also their own local FSA.

		% addresses served via POIs with Local services only	% addresses served via POIs with Local and Distant services	Total
Addresses served	Local	59%	24%	83%
	Distant		17%	17%

Table 4: Balance of Local and Distant services

7. Conclusion and next steps

This Public Position Paper has outlined the principles that underpin NBN Co's analysis, and the resulting locations for the POIs, under NBN Co's preferred option, which is the most likely to achieve the Government's objectives.

It is important to note that given both NBN Co's role and the implications for market structure, the final policy parameters on which the selection of the POI construct will be based remains the responsibility of the Australian Government. NBN Co will implement the POI structure as per the Government's instruction.

Industry responses to this paper are invited via the consultation process currently being conducted by the ACCC.

As requested by the government, NBN Co and the ACCC will be providing joint advice to the government on this issue, following the conclusion of the consultation process being conducted by the ACCC.

Appendix A – Summary data for Option 4: Composite

Note

- The suburb and town names used in the below tables have been derived from the locality name that encompasses the geographic centre of the FSA. As such, this name is a first approximation and does not represent the actual position of the FAN within a FSA, nor imply any facilities access.
- NBN Co has used a range of data sources currently available to it to ascertain the number of backhaul options and DSL operators within each geographic area. This information is the best available to us at this time. For example, the exact routes of some provider's backhaul assets are only indicative. Accordingly, NBN Co does not warrant the accuracy of this input information or the information derived from it. Industry participants are encouraged to highlight to NBN Co, via the ACCC consultation process, areas where they believe NBN Co's input information is inaccurate or NBN Co has erred in the interpretation of its information.
- The below table reflects an initial plan, which may change as detailed network planning progresses if the Composite model was to be implemented.

Aggregation POIs																			
POI name	State	Premises (000s)			Backhaul providers under 20km distant		DSL players		Distance to centre of capital	POI name	State	Premises (000s)			Backhaul providers under 20km distant		DSL players		Distance to centre of capital
		Total	Local	Distant	Total	Indep.	in FSA	adjacent				Total	Local	Distant	Total	Indep.	in FSA	adjacent	
Sydney Hurstville	NSW	885			6	2	6	8	16	Melbourne Sunshine	VIC	673			6	2	8	9	12
Sydney Miller *	NSW	885			6	2	7	8	31	Brisbane Goodna	QLD	1014			7	3	7	8	19
Sydney Pymble *	NSW	885			6	2	6	8	14	Brisbane Pinkenba	QLD	1014			7	3	7	8	10
Sydney Riverstone	NSW	885			6	2	5	8	41	Adelaide Clovelly Park	SA	406			6	3	8	9	9
Melbourne Brunswick *	VIC	673			6	2	9	8	7	Adelaide Para Hills West	SA	406			5	2	7	9	15
Melbourne Forest Hill *	VIC	673			6	2	8	8	18	Perth Mirrabooka	WA	536			6	3	8	9	10
Melbourne Springvale	VIC	673			6	2	6	8	24	Perth Wattleup	WA	536			5	2	8	9	24

* Dependent on traffic volumes, these sites may not be required.

Potential Metro and Outer Metro Connectivity Serving Areas - 114																			
POI name	State	Premises (000s)			Backhaul providers under 20km distant		DSL players		Distance to centre of capital	POI name	State	Premises (000s)			Backhaul providers under 20km distant		DSL players		Distance to centre of capital
		Total	Local	Distant	Total	Indep.	in FSA	adjacent				Total	Local	Distant	Total	Indep.	in FSA	adjacent	
Sydney Balmain	NSW	75	75		6	2	8	8	5	Melbourne Richmond	VIC	35	35		6	2	8	9	3
Sydney Blacktown	NSW	53	53		6	2	7	8	31	Melbourne South Morang	VIC	72	63	9	6	2	5	9	21
Sydney Carlingford	NSW	64	64		6	2	8	8	18	Melbourne Springvale	VIC	63	63		6	2	6	8	24
Sydney City	NSW	64	64		6	2	8	8	1	Melbourne Sunshine	VIC	62	62		6	2	8	9	12
Sydney Cremorne	NSW	73	73		6	2	8	8	4	Melbourne Wandin North	VIC	63	52	11	3	0	6	8	38
Sydney Edgcliff	NSW	64	64		6	2	7	8	5	Melbourne Werribee	VIC	59	59		6	2	4	5	28
Sydney Homebush	NSW	34	34		6	2	6	8	12	Melbourne Yallambie	VIC	63	63		6	2	8	8	14
Sydney Hornsby	NSW	42	37	5	6	2	7	8	21	Melton	VIC	27	26	1	3	2	2	1	46
Sydney Hurstville	NSW	76	76		6	2	6	8	16	Sunbury	VIC	43	15	27	5	2	3	0	36
Sydney Kellyville	NSW	67	67		6	2	7	8	29	Brisbane Camp Hill	QLD	68	68		7	3	8	8	6
Sydney Kenthurst	NSW	35	35		6	2	8	8	30	Brisbane Camp Mountain	QLD	25	25		7	3	7	7	15
Sydney Lidcombe	NSW	44	44		6	2	6	8	18	Brisbane Chermiside	QLD	62	62		7	3	7	7	11
Sydney Maroubra	NSW	76	76		6	2	7	8	10	Brisbane City	QLD	73	73		7	3	7	8	4
Sydney Menai	NSW	25	25		6	2	4	7	26	Brisbane Drewvale	QLD	46	46		7	3	7	8	19
Sydney Miller	NSW	61	61		6	2	7	8	31	Brisbane Edens Landing	QLD	60	42	18	6	2	5	7	30
Sydney Minto	NSW	61	61		6	2	8	7	39	Brisbane Eight Mile Plains	QLD	54	54		7	3	7	8	17
Sydney Miranda	NSW	75	75		6	2	7	7	20	Brisbane Goodna	QLD	72	72		7	3	7	8	19
Sydney Mona Vale	NSW	58	58		6	2	6	8	21	Brisbane Laidley	QLD	69	53	16	7	3	5	7	18
Sydney Narellan	NSW	42	22	20	6	2	2	8	50	Brisbane Mango Hill	QLD	63	63		4	1	6	5	28
Sydney Northbridge	NSW	76	76		6	2	8	8	9	Brisbane Moorooka	QLD	68	68		7	3	8	8	7
Sydney Parramatta	NSW	73	73		6	2	8	8	21	Brisbane Mount Cotton	QLD	34	34		6	2	4	7	27
Sydney Penrith	NSW	68	68		5	1	5	7	46	Brisbane Norwell	QLD	22	7	14	6	2	1	5	42
Sydney Petersham	NSW	61	61		6	2	8	8	7	Brisbane Pinkenba	QLD	38	38		7	3	7	8	10
Sydney Pymble	NSW	53	53		6	2	6	8	14	Brisbane Pullenvale	QLD	33	33		7	3	7	8	12
Sydney Redfern	NSW	72	72		6	2	8	8	4	Brisbane Ransome	QLD	72	72		7	3	5	8	16
Sydney Revesby	NSW	71	71		6	2	6	8	22	Caboolture	QLD	65	38	27	3	1	3	6	44
Sydney Riverstone	NSW	38	38		6	2	5	8	41	Ipswich	QLD	54	36	18	7	3	7	7	31
Sydney Rockdale	NSW	64	64		6	2	6	8	11	Adelaide Brooklyn Park	SA	67	67		6	3	8	9	6
Sydney Ryde	NSW	64	64		6	2	8	8	10	Adelaide Clovelly Park	SA	72	72		6	3	8	9	9
Sydney Springwood	NSW	55	24	31	4	1	2	5	59	Adelaide Glenside	SA	70	70		6	3	9	9	4
Sydney Strathfield	NSW	75	75		6	2	8	8	13	Adelaide Highbury	SA	44	40	5	5	2	6	9	13
Sydney Wetherill Park	NSW	66	66		6	2	5	8	30	Adelaide Manningham	SA	68	68		6	3	9	9	6
Sydney Windsor	NSW	31	22	9	5	1	1	8	46	Adelaide Para Hills West	SA	63	63		5	2	7	9	15
Melbourne Albert Park	VIC	73	73		6	2	9	8	4	Adelaide Port Adelaide	SA	57	57		6	3	8	9	12
Melbourne Altona North	VIC	48	48		6	2	5	9	14	Adelaide Smithfield	SA	63	45	18	6	3	7	7	25
Melbourne Boronia	VIC	69	69		6	2	8	8	26	Adelaide Woodcroft	SA	62	62		5	3	8	8	20
Melbourne Brunswick	VIC	73	73		6	2	9	8	7	Crafer-Bridgewater	SA	33	8	26	6	3	7	8	16
Melbourne Caulfield North	VIC	68	68		6	2	8	9	8	Onkaparinga	SA	37	10	27	3	2	5	8	32
Melbourne Cheltenham	VIC	70	70		6	2	8	8	21	Perth Brentwood	WA	65	65		6	3	8	9	11
Melbourne City	VIC	49	49		6	2	8	9	1	Perth Brookdale	WA	43	41	2	5	2	7	8	26
Melbourne Cranbourne	VIC	90	39	52	5	1	1	8	44	Perth Carlisle	WA	74	74		6	3	7	9	6
Melbourne Dandenong	VIC	74	56	18	6	2	8	8	33	Perth Currambine	WA	68	58	10	3	2	8	8	26
Melbourne Deepdeen	VIC	41	41		6	2	6	9	8	Perth Hocking	WA	36	36		6	3	8	8	21
Melbourne Delahey	VIC	69	69		6	2	4	8	20	Perth Karrinyup	WA	67	67		6	3	8	9	11
Melbourne Doncaster	VIC	72	72		6	2	8	8	15	Perth Mirrabooka	WA	69	69		6	3	8	9	10
Melbourne Essendon	VIC	65	65		6	2	7	9	10	Perth Mount Claremont	WA	60	60		6	3	9	9	6
Melbourne Forest Hill	VIC	65	65		6	2	8	8	18	Perth Mount Lawley	WA	70	70		6	3	9	9	3
Melbourne Hartwell	VIC	37	37		6	2	8	9	10	Perth Wattle Grove	WA	68	68		6	3	7	8	16
Melbourne Hastings	VIC	21	15	6	3	0	2	7	57	Perth Wattleup	WA	75	75		5	2	8	9	24
Melbourne Kangaroo Ground	VIC	23	23		6	2	5	8	26	Perth West Swan	WA	86	61	24	6	3	7	9	17
Melbourne Langwarrin	VIC	73	73		4	1	7	8	42	Hobart Berriedale	TAS	32	26	7	3	1	3	6	12
Melbourne McKinnon	VIC	74	74		6	2	6	8	13	Hobart Cambridge	TAS	35	22	13	3	1	3	6	8
Melbourne Meadow Heights	VIC	60	60		6	2	4	9	18	Hobart Davey	TAS	49	33	16	3	1	6	3	2
Melbourne Mount Martha	VIC	39	39		3	0	2	7	54	Darwin	NT	71	36	35	4	2	2	1	8
Melbourne Mount Waverley	VIC	62	62		6	2	7	8	18	Canberra Evatt	ACT	62	57	4	6	2	6	8	8
Melbourne Narre Warren East	VIC	66	56	9	6	2	5	8	35	Canberra Fyshwick	ACT	67	65	2	6	2	8	6	6
Melbourne Preston	VIC	67	67		6	2	7	9	9	Canberra Torrens	ACT	63	63		6	2	6	8	13

Potential Regional Urban and Regional Connectivity Serving Areas - 81																			
POI name	State	Premises (000s)			Backhaul providers under 20km distant		DSL players		Distance to centre of capital	POI name	State	Premises (000s)			Backhaul providers under 20km distant		DSL players		Distance to centre of capital
		Total	Local	Distant	Total	Indep.	in FSA	adjacent				Total	Local	Distant	Total	Indep.	in FSA	adjacent	
Albury-Wodonga	NSW	58	44	14	5	2	4	0	220	Wangaratta	VIC	22	10	12	4	1	2	0	201
Armidale	NSW	31	11	20	4	1	3	0	365	Warragul	VIC	26	12	13	4	1	2	0	93
Ballina	NSW	34	21	13	4	1	1	0	160	Wonthaggi	VIC	21	5	16	2	1	0	0	106
Batemans Bay	NSW	43	12	31	3	0	1	1	109	Bundaberg	QLD	40	36	4	3	1	2	0	299
Bathurst	NSW	26	16	10	3	0	3	0	158	Cairns	QLD	67	55	12	3	1	2	1	1394
Bega	NSW	25	5	20	3	0	2	0	173	Cairns Smithfield	QLD	40	18	22	3	1	1	2	1407
Central Coast Gosford	NSW	70	70		5	2	6	2	57	Gladstone	QLD	26	6	21	4	2	1	1	428
Central Coast Morisset	NSW	24	24		5	2	2	6	94	Gold Coast Ashmore	QLD	60	60		6	2	8	7	69
Central Coast Woongarah	NSW	46	46		5	2	1	6	76	Gold Coast Biggera Waters	QLD	48	48		6	2	3	8	62
Central Coast Woy Woy	NSW	59	59		5	2	2	6	44	Gold Coast Elanora	QLD	53	53		6	2	4	7	84
Coffs Harbour	NSW	54	31	23	4	1	5	1	316	Gold Coast Mudgeeraba	QLD	25	25		6	2	4	8	70
Corrimal	NSW	32	28	4	5	2	2	6	57	Gold Coast Robina	QLD	51	51		6	2	7	8	77
Dubbo	NSW	36	18	18	4	1	4	0	301	Gold Coast Sanctuary Cove	QLD	56	43	13	6	2	1	8	54
Gold Coast Banora Point	NSW	62	42	20	5	1	1	4	98	Gympie	QLD	18	11	6	3	1	1	0	148
Goulburn	NSW	40	12	28	5	2	3	0	78	Mackay	QLD	64	16	47	3	1	2	2	805
Grafton	NSW	23	12	11	4	1	1	0											

This page is intentionally left blank

Appendix B – Glossary of Terms

Backhaul – Backhaul typically refers to the mid-to-long-distance transport of data from a series of disparate locations back to a more centralised location. This transport may involve some level of concentration (also referred to as aggregation).

Bitstream – A generic term often used to describe low-complexity data transmission products.

Connectivity Serving Area (CSA) – The NBN Co defined geographical region that is addressable using a single Connectivity Virtual Circuit. A CSA may cover up to 75,000 End-User Premises, enabling Access Seekers to efficiently deliver services to a large number of End Users. A Connectivity Serving Area will comprise one or more Fibre Serving Areas.

Fibre Access Node – A facility that houses the active equipment providing services to a Fibre Serving Area (FSA).

Fibre Serving Area (FSA) – The area served by a Fibre Access Node (FAN) site.

Gigabit Passive Optical Networking (GPON) – An optical-access system based on Internet Protocol (IP) that lets multiple homes or businesses in a neighbourhood share fibre from a service provider's central office.

Point of Interconnect (POI) – The connection point that allows Retail Service Providers (RSPs) and Wholesale Service Providers (WSPs) to connect to NBN Co's network.



Level 11, 100 Arthur Street
North Sydney 2060

Phone 02 9926 1900
info@nbnco.com.au

www.nbnco.com.au

ATTACHMENT B

Long-term interests of end-users

In considering the promotion of the LTIE under Part XIC of the TPA, the ACCC will have regard only to the extent to which something achieves 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; and
- encouraging the economically efficient use of, and the economically efficient investment in: (i) the infrastructure by which listed services are supplied; and (ii) any other infrastructure by which listed services are, or are likely to become, capable of being supplied.²⁵

Promoting competition

Competition is the process of rivalry between firms, where each market participant is constrained in its price and output decisions by the activity of other market participants. The benefits of competition to end-users are lower prices, better quality and a better range of services over time.

Below are some concepts relevant to the consideration of promoting competition in the markets for listed services.

Market Power

Competition may be inhibited where the structure of the market gives rise to market power. Market power is the ability of a firm or firms to constrain or manipulate the supply of products from the levels and quality that would be observed in a competitive market for a significant period of time.

Competition will be promoted when market structures are altered such that the exercise of market power becomes more difficult. For example, barriers to entry may have been lowered (permitting more efficient competitors to enter a market and thereby constraining the pricing behaviour of the incumbents) or because the ability of firms to raise rivals' costs is restricted.

Identifying the relevant markets

To assist in determining the impact of a particular thing on markets, the ACCC will first need to identify the relevant market(s) and then assess the likely effect on competition in each market.

Section 4E of the TPA provides that the term 'market' includes a market for the goods or services under consideration as well as any other goods or services that are substitutable for, or otherwise competitive with, those goods or services. The ACCC's approach to market definition is discussed in its 2008 Merger Guidelines, is canvassed in its information paper, *Anti-competitive conduct in telecommunications markets*, August 1999 and is also explored in the ACCC's second *Fixed Services Review position paper*, April 2007.

²⁵ Section 152AB(2) of the TPA.

Assessing the impact of the declaration on relevant markets

Once markets have been identified, the next step is to assess the likely effect of the particular thing on competition in each relevant market. Subsection 152AB(4) of the TPA requires that regard must be had to the extent to which a particular thing will remove obstacles to end-users gaining access to listed services.

Any-to-any connectivity

Subsection 152AB(8) of the TPA states that the objective of any-to-any connectivity is achieved if, and only if, each end-user who is supplied with a carriage service that involves communication between end-users is able to communicate, by means of that service, or a similar service, with other end-users whether or not they are connected to the same network.

The any-to-any connectivity requirement is particularly relevant when considering services that involve communications between end-users. When considering services which do not require user-to-user connections (such as carriage services that are inputs to an end-to-end service or distribution services, such as the carriage of pay television), the ACCC generally gives less weight to this criterion.

Efficient use of, and investment in, infrastructure

In considering what is efficient use of, and investment in, infrastructure, regard must be had (but is not limited) to the technical feasibility of providing the service, the legitimate commercial interests of the supplier, and the incentives for investment in infrastructure.

Economic efficiency has three components:

- *Productive efficiency* refers to the efficient use of resources within each firm to produce goods and services using the least cost combination of inputs.
- *Allocative efficiency* is the efficient allocation of resources across the economy to produce goods and services that are most valued by consumers. It also refers to the distribution of production costs amongst firms within an industry to minimise industry-wide costs.
- *Dynamic efficiency* refers to efficiencies flowing from innovation leading to the development of new services, or improvements in production techniques. It also refers to the efficient deployment of resources between present and future uses, such that the welfare of society is maximised over time.

Paragraph 152AB(6)(a) of the TPA requires the ACCC to have regard to a number of specific matters in examining whether declaration will lead to achievement of this objective. Some of these are outlined below.

Technical feasibility

In assessing the technical feasibility of supplying and charging for a service, the ACCC will consider the:

- technology that is in use, available or likely to become available,
- costs involved, and whether it is reasonable or likely to become reasonable, and

- effects or likely effects on the operation or performance of telecommunications networks.

The ACCC will look to an access provider to assess whether it is technically feasible to supply the relevant service, and will also consider experiences in other jurisdictions.

The legitimate commercial interests of the supplier

A supplier's legitimate commercial interests are its obligations to the owners of the firm, including the need to recover the cost of providing services and to earn a normal commercial return on the investment in infrastructure. The ACCC considers that allowing for a normal commercial return on investment will provide an appropriate incentive for the access provider to maintain, improve and invest in the efficient provision of the service.

Paragraph 152AB(6)(b) of the TPA also requires the ACCC to have regard to whether the access arrangement may affect the owner's ability to realise economies of scale or scope. Economies of scale arise from a production process in which the average (or per unit) cost of production decreases as the firm's output increases. Economies of scope arise from a production process where it is less costly for one firm to produce two (or more) products than it is for two (or more) firms to each separately produce the relevant products.

The ACCC will assess the effects on the supplier's ability to exploit both economies of scale and scope on a case-by-case basis.

Incentives for investment

Firms should have the incentive to invest efficiently in infrastructure. The ACCC must also consider the effects of any expected disincentives to invest arising from anticipated increases in competition.

These objectives are interrelated. In many cases the LTIE may be promoted through the achievement of two or all three of these considerations simultaneously. In other cases, there may be some trade-off between the different aspects and the ACCC will need to weigh up the different effects. In this regard, the ACCC will interpret 'long-term' to mean a balancing of the flow of costs and benefits to end-users over time in relation to the objectives. Thus, it may be a promotion of the LTIE to receive a benefit for even a short period of time if its effect is not outweighed by any longer term cost.