

## A Achieving the national broadband objective

The coverage objective of the National Broadband Network is to ensure all Australian homes, schools and workplaces have access to affordable, high-speed broadband services. Government has set an objective that 90 percent of premises will receive superfast fibre-to-the-premises (FTTP) connections providing data rates of 100 Mbps. All other premises will be able to access high-speed broadband services providing at least 12 Mbps peak data rates, through a combination of next-generation wireless and satellite technologies.

While NBN Co will be responsible for ensuring coverage to all premises, the network it builds need not be ubiquitous or contiguous. Government's investment in creating an open-access platform for the country will have the greatest value if NBN Co intervenes only where markets have not provided the necessary infrastructure to enable superfast broadband or where the infrastructure that does exist cannot be accessed on affordable terms.

In practice, this means NBN Co should focus on two key bottleneck assets: the customer access network and uncompetitive backhaul routes. Through investments in the construction of—or the acquisition of enduring rights-of-use to—these bottleneck assets, NBN Co can enable retailers to offer superfast products to end users at affordable prices, and deliver against Government's objectives within the initial capital expenditure estimate.

NBN services should be aimed at enhancing competition and innovation amongst service providers. Services should therefore be provided at the level in the Open System Interconnection (OSI) stack that lowers barriers to entry while permitting differentiation and innovation for service providers, large and small. These services should also be modular, so that households are not limited to a single retail service provider, and so that there is flexibility to construct offerings that combine transit capacity with a variety of access services.

Optical fibre is the most future-proof fixed network technology. NBN Co's network design should assume a preference for FTTP technology where consistent with commercial constraints. Detailed cost modelling by the Implementation Study indicates FTTP coverage should be extended beyond Government's initial target of 90 percent, to reach 93 percent of premises by the end of roll-out. NBN Co should endeavour to build a passive network topology which anticipates future services, plausible evolutions of market structure and regulatory developments. In particular, this topology should anticipate the need to provide competition at the active layer over a significant portion of the fibre footprint. NBN Co should also ensure that its initial basic service offering represents a significant improvement on existing services, to substantiate the promise of the fibre technology.

In the non-fibre areas, a separate tender process should be employed to secure third-party provision of fixed-wireless services. Cost modelling by the Implementation Study indicates this fixed-wireless network should extend to roughly 4 percent of premises between the 93<sup>rd</sup> and 97<sup>th</sup> percentiles. NBN Co should deploy two next-generation Ka - band satellites to deliver a step change in broadband service performance for the most remote premises, compared with today's remote data solutions.

NBN Co will capture a significant share of the fixed-line revenue pool over time. The superior quality of services offered will bolster the growth of fixed broadband services. Superfast broadband will increasingly become an essential utility for households and businesses, and their requirements are expected to exceed the capabilities of mobile networks over time.

In the early years, NBN Co should optimise pricing to drive take-up, acknowledging that other networks can still meet many of the needs of today's customers. Over time, the perceived value of superfast services will grow, yielding higher ARPUs. The long-term business case for the project generates a return exceeding the assumed Government bond rate under most reasonable assumptions for cost and revenue as described in Part B.

Part A consists of five chapters:

- Chapter 2 proposes a mandate for NBN Co—the extent of its network build, the premises it should cover, the approach it should take to pricing and the network architecture choices that will deliver the desired competition outcomes
- Chapter 3 describes the types of end-user services and business models that the NBN will enable and the implications for the wholesale service NBN Co should offer
- Chapters 4, 5 and 6 discuss the technical, operational and competition issues relating to the design and implementation of the fibre access network, non-fibre access networks and transit backhaul network respectively.

## 2 Establishing a mandate for NBN Co

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### SUMMARY

- Government should set NBN Co an objective to provide wholesale-only FTTP coverage to 93 percent of Australian premises and wholesale-only satellite coverage to the remaining 7 percent of premises. A separate tender process should be run for a commercial operator to provide fixed-wireless service to premises in the 94<sup>th</sup> to 97<sup>th</sup> percentiles.
  - By the end of network roll-out, NBN Co should ensure availability of wholesale broadband NBN services (or acceptable equivalents) to all homes, schools and workplaces in Australia, including those constructed during the roll-out period. During the network build, NBN Co should implement a transparent, public process for communicating its progress against this goal via a coverage register.
  - Government should permit NBN Co to provide connections to non-premises locations on a commercial basis, and retain the option to require NBN Co to cover specified classes of non-premises on terms approved by Government.
  - NBN Co should intervene in markets only where necessary to ensure end-user access to NBN services and that retail service providers have affordable and equivalent access to bottleneck assets. In practice, this means limiting NBN Co's participation to the access network and transit backhaul on monopoly backhaul routes.
  - NBN Co should create a set of enduring assets (through ownership or long-term rights of access) which accommodate population and demand growth and technology innovation. FTTP should be the preferred fixed-line technology, however hybrid-fibre-coaxial (HFC) technology could be used for an interim period if it provides open-access services meeting NBN specifications.
  - NBN Co should price its wholesale services to ensure affordable access to all end users and encourage take-up.
  - End-user disruption should be minimised during the transition to fibre services, with legacy services continued where necessary and legacy networks deactivated in a managed fashion including sufficient notice for users and service providers.
  - As future custodian of Australia's predominant broadband platform, NBN Co should consider the needs of consumers, businesses, public institutions, service providers, employees, suppliers and other partners in designing and operating its network. This should include regular, transparent consultations with relevant stakeholders.
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Government has established NBN Co as the primary vehicle for deploying the National Broadband Network to meet Government's coverage objectives, deliver affordable broadband services and manage the transition to a new industry structure. This chapter discusses how NBN Co should fulfil its mandate, laid out in 5 sections.

2.1 Implementing the coverage objective

2.2 Creating a platform to meet future needs

2.3 Ensuring affordability and encouraging take-up

2.4 Managing a smooth transition from today's services and networks

2.5 Aligning NBN Co operations with stakeholder needs.

## 2.1 Implementing the coverage objective

Government has set an objective for the NBN initiative of delivering FTTP services enabling speeds of up to 100 Mbps to at least 90 percent of premises in Australia, with the final 10 percent provided speeds of at least 12 Mbps. NBN Co will act as the primary vehicle for achieving this coverage objective and should ensure services are available to all valid premises in Australia, addressing infrastructure gaps and bottlenecks where necessary.

A first step is to define premises for the purpose of the coverage objective. This is key to estimating costs and planning for roll-out. This section considers the criteria that should apply for all homes, schools and workplaces, including hospitals, in Australia.

A further step is to understand the number and location of premises in Australia. The Department of Broadband, Communications and the Digital Economy estimates that there were 10.7 million premises in Australia as of November 2009. The NBN will also need to account for new premises constructed during the planned 8-year roll-out. The Implementation Study estimates that approximately 1.3 million new premises will be constructed by the end of 2018.

Within the coverage objective, there will also be some premises for which NBN Co need not provide all new network elements—for example, premises that are covered by an existing fibre network.

In the following, NBN Co's proposed obligations to deliver the coverage objectives are outlined:

- 2.1.1 Delivering NBN services to all Australians
- 2.1.2 Classifying fibre and non-fibre areas
- 2.1.3 Maximising fibre availability to multi-dwelling units
- 2.1.4 Catering for new premises
- 2.1.5 Monitoring NBN Co's progress.

### 2.1.1 DELIVERING NBN SERVICES TO ALL AUSTRALIANS

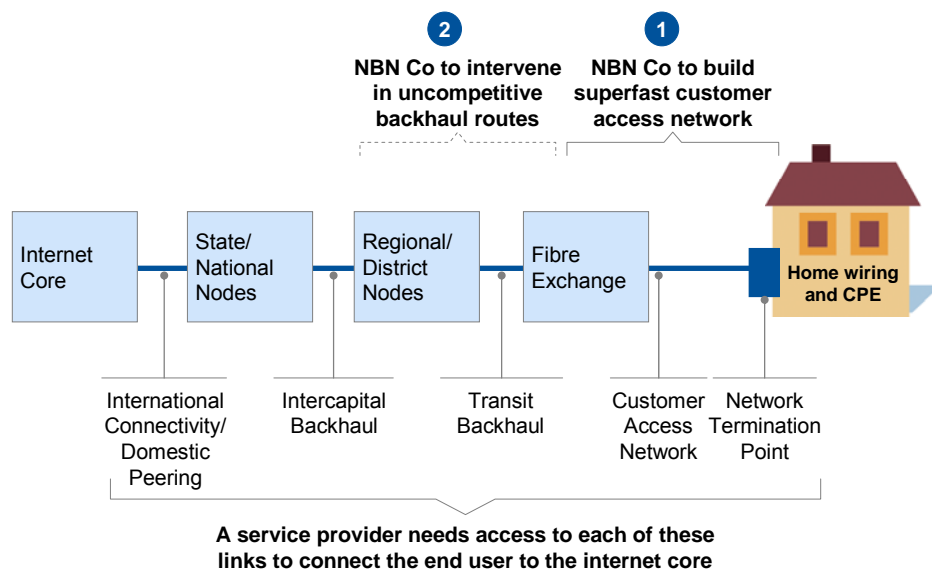
The NBN initiative aims to ensure that ‘every house, school and business in Australia will get access to affordable fast broadband’.<sup>1</sup> However as Australia’s first national wholesale-only, open-access broadband network, NBN Co will not deliver retail services directly to end users. Government’s vision for the NBN is that it will provide a platform that allows service providers to compete on a level playing field to deliver retail services to end users.

#### Delivering a national open-access network through efficient intervention

Government has specified that the NBN will be a ‘national wholesale-only, open-access network.’ The conclusion of the Implementation Study is that NBN Co does not have to build a ubiquitous network across the nation to deliver on this objective, and that doing so would be an inefficient use of funds. Rather, NBN Co should focus on those areas of the network that represent bottlenecks today, and where provision of superfast connectivity at competitive wholesale prices will open the market to retail access seekers.

To deliver superfast services, service providers must construct or purchase a range of inputs that form links in the connectivity chain from an end user to the core of the Internet (Exhibit 2–1).

Exhibit 2–1. Network components for delivering superfast broadband



SOURCE: Implementation Study

<sup>1</sup> K Rudd, W Swan, L Tanner, S Conroy (Prime Minister, Treasurer, Minister for Finance, Minister for Broadband), *New National Broadband Network*, media release, Canberra, 7 April 2009

Two principal issues may prevent a competitive retail market emerging for the provision of superfast broadband services:

- **Missing links.** On some links, there is insufficient infrastructure to support superfast broadband services.
- **Restricted access to bottleneck assets.** Where the infrastructure providing a link in the chain of connectivity is controlled by only one or two providers, there may be insufficient competition to deliver wholesale services at reasonable prices to retail service providers. This problem is exacerbated where the owner of the bottleneck asset is vertically integrated and hence competes with the service providers seeking access to its asset. In this situation the owner of the bottleneck asset has an incentive to frustrate or over-price third party access.

For most end users, the customer access network is a missing link in superfast broadband connectivity. The legacy copper customer access network is insufficient to deliver superfast broadband speeds to all but a few premises. DSL technologies (such as ADSL 2+) are capable of delivering data at broadband speeds over standard copper pairs for premises that are within about 5 km of an exchange. For those premises located extremely close to the exchange, speeds of 20 Mbps or more may be possible, but this is true for a small minority of homes and businesses. Faster speeds can be delivered over very short copper runs—for example; symmetric speeds of up to 100 Mbps can be delivered using VDSL2 technology, sometimes deployed in multi-dwelling units (MDUs) where fibre is taken to the building basement and copper is used to deliver the service to individual units.<sup>2</sup>

To achieve the desired speeds of up to 100 Mbps across the majority of premises in Australia, fibre infrastructure is the most reliable technology. The electronics deployed on fibre can deliver speeds well in excess of 100 Mbps today, with an upgrade path to much faster speeds over time. Currently, only around one percent of residential premises are served by fibre-to-the-premises (FTTP).

The high cost of constructing an Australia-wide FTTP access network makes it likely that such a network, once constructed, will become a bottleneck asset. Government has stipulated that NBN Co offer wholesale services to all access seekers on an equivalent basis, in an attempt to ensure that all retail service providers will be able to gain reasonable access to its bottleneck asset.

Government's announcement also envisaged that NBN Co would provide fibre optic transmission links or backhaul routes to connect cities, regional centres and towns. Existing backhaul networks in Australia, with appropriate upgrades of electronics, have sufficient capacity to service the superfast FTTP network to be deployed by NBN Co. However some backhaul routes that will service the fibre exchanges—analogueous to

<sup>2</sup> International Telecommunications Union 2006, *ITU-T Standard G.993.2: Very high speed digital subscriber line transceivers 2 (VDSL2)*, Geneva

today's copper exchanges—are served by only one or two vertically-integrated providers, third parties have struggled to gain commercial access. To ensure service providers can deliver superfast broadband at affordable prices, NBN Co will need to ensure availability of backhaul services at affordable prices by purchasing or constructing infrastructure over uncompetitive links, or acquiring appropriate rights of use, as discussed in Chapter 6.

NBN Co should not construct an end-to-end network across the country. Where the market already provides the necessary infrastructure to enable superfast broadband services, and retailers can access that infrastructure at reasonable prices, NBN Co should not enter. Entry by NBN Co into these markets would be an inefficient use of funds, provided that a market emerges to support adequate national connectivity for those service providers who desire it. The Implementation Study believes such a market will develop, and this issue is dealt with in more detail in Chapter 9.

Similarly, NBN Co should not enter the market for providing international connectivity, where the market provides sufficient competing infrastructure to enable superfast connectivity and prevent bottleneck pricing.

**Recommendation 1.** That NBN Co only enter markets where there is insufficient infrastructure to support superfast broadband or where retail service providers are unable to access bottleneck assets on reasonable terms.

### Defining coverage

Premises should be considered 'covered' for the purposes of NBN Co's coverage objective if the company offers a wholesale service over a customer access network capable of supporting superfast broadband services to those premises. NBN Co may own the customer access network serving these premises or may have acquired access from the owner of an existing access network. Premises should be considered 'activated' once a service is being delivered by a retail service provider. Some commentators have used the term 'connected', which is ambiguous—it does not refer to actual service activation, but could be misinterpreted as a requirement to connect the premises physically without owner consent, prior to services being ordered. The Implementation Study uses the terms 'covered' and 'activated' to avoid this ambiguity.

The existing customer service guarantee (CSG) outlines the maximum number of days it should take to activate a service for a customer to a standard fixed-line telephone service 'where in close proximity to facilities with available capacity'. The timeframe varies according to whether the house is physically connected or passed by the network, and the size of the community in which the premises are located (Exhibit 2–2). This guideline is established and well understood, and should be used as the test for when premises should be considered covered by the NBN.

Exhibit 2–2. Times for telephone service activation under the Customer Service Guarantee

Connection type	Community location	Community size (people)	Connection time after customer application received (working days) <sup>a</sup>
In-place connection	All	All	within 2
No in-place connection ( <i>close to available infrastructure</i> )	Urban	=> 10,000	within 5
	Major rural	2,500–10,000	within 10
	Minor rural and remote	Up to 2,500	within 15

a. If customer's phone company commits to connect in shorter time, the reduced time becomes the connection time

Source: ACMA 2009, Customer Service Guarantee Standard 2000(No. 2) Fact Sheet

By analogy, NBN Co should be required to pass premises with its network infrastructure in such a way that a service can be activated within agreed timeframes when a retail service provider requests a service on behalf of an end user. Exhibit 2–3 outlines the minimum extent of network installation that should be required to consider various premises covered by the NBN.

Exhibit 2–3. Suggested extent of network installation required to cover premises

Coverage type	Extent of network installation to meet coverage objective
Single-dwelling unit in FTTP network	Fibre distribution cable deployed along the street. One fibre separated from the distribution cable and terminated in a fibre distribution terminal (FDT) at the street in either a pit for underground deployments or on a street pole for aerial deployments.
Multi-dwelling unit in FTTP network	Fibre distribution cable deployed along the street. Distribution cable extended into basement. Separate fibres for each unit deployed from the basement. Fibre for each unit terminated in an FDT positioned to enable easy access for final connection.
Fixed-wireless coverage area	Wireless base station and radio equipment installed in sufficient proximity to premises that with installation of a fixed external antenna, premises would be capable of receiving 12 Mbps peak speeds at specified average data rates.
Satellite coverage area	Premises falls within a satellite beam such that with installation of satellite CPE the premises would be capable of receiving 12 Mbps peak speeds at specified average data rates

Source: Implementation Study; Industry interviews

The recommended extent of installation outlined in Exhibit 2–3 does not require NBN Co to connect premises physically to meet the coverage objective. In the case of the FTTP network, connecting premises would require NBN Co to enter the relevant land to install the drop cable and optical network termination (ONT), which is the customer premises equipment that enables a customer to connect to the network.

Where the drop cable is deployed underground and an existing conduit is not available, a trench will need to be dug from the fibre distribution cable running along the street to the side of the premises. Installing the ONT would generally require internal access to the premises (Chapter 4).

Requiring NBN Co to complete the physical connection to premises for them to be deemed ‘covered’ would be inadvisable:

- Physical connection of premises without owner consent would not be feasible;
- It would involve significant additional cost to connect users who do not want an NBN service;
- The additional deployment work involved would delay the roll-out.

For satellite and wireless services the economic objection to full pre-emptive installation is more obvious—it would make little sense to install a satellite dish or a high-gain antenna until an end user has ordered a service to be activated.

Government should therefore not require NBN Co to install any customer CPE such as an ONT, a high-gain antenna or a satellite dish to meet its coverage objective. For fibre, it should also not require the network to reach the actual building—a fibre separated from the distribution cable and terminated in an FDT is sufficient.

As NBN Co rolls out the distribution network to provide coverage to premises in the FTTP footprint, it should anticipate that some premises may request multiple connections. NBN Co should ensure the distribution network can support this. NBN Co should be permitted to charge a commercial installation fee for additional connections.

There may be situations where premises are already served by a customer access network which meets Government’s performance and competition objectives. In these situations, requiring NBN Co to enter and provide services over the network would be an unnecessary duplication, and the services should be deemed ‘covered’.

The ACCC should be authorised, at NBN Co’s request, to declare an area as ‘adequately served’ and relieve NBN Co of the obligation to offer services to premises in that area in pursuit of its coverage objective. A request would need to specify whether the existing access network should be assessed against the requirements for NBN Co’s FTTP customer access network or the non-fibre customer access network.

Conditions for adequate service in an area should be limited to:

- **Performance meets Government’s objectives.** If assessed against the requirements of the FTTP footprint, the existing access network would need to be an FTTP network capable of delivering broadband speeds of 100 Mbps to end users. It would also be required to support an upgrade path that is in line with NBN Co’s FTTP network.
- **Open-access wholesale arrangements or FTTP infrastructure competition in place.** High speeds in themselves are not sufficient to achieve Government’s objectives. Without open-access wholesale arrangements and the confidence that prices will be affordable, an alternative bottleneck FTTP network will not deliver the NBN policy of achieving a national wholesale-only, open-access network. FTTP infrastructure-based competition provides an alternative and adequate competitive framework, although limited largely to CBDs.
- **Wholesale prices competitive with NBN Co services.** The wholesale services or, in the case of areas experiencing FTTP infrastructure-based competition, retail services, should be priced at a reasonable level. The ACCC should consider the wholesale services reasonably priced if they are comparable with those offered by NBN Co over its FTTP network, and retail services reasonably priced if they are comparable with those offered by retail service providers over the NBN Co FTTP network.
- **No gaps in coverage footprint.** The network should provide comprehensive coverage in the area. If a premises is not covered but is surrounded by the access network, declaring the area as adequately served and so removing them from NBN Co’s coverage objective would put these premises at risk of never receiving coverage in line with Government objectives. Before declaring an area to be adequately served, it should be considered how premises falling in coverage gaps will be served. It may be that small coverage gaps can be filled in through extensions of the existing access network, or there may be alternative networks offering sufficient coverage (e.g. wireless operators). In the situation that in-fill is not feasible and there is not an adequate alternative network, coverage could be provided by NBN Co’s satellite network rather than extending fibre to a small area.

NBN Co will ultimately cover the majority of premises across Australia, as few existing access networks are likely to be declared as adequately serving an area. The most likely exceptions would be greenfield FTTP networks and CBD or business park areas where FTTP infrastructure-based competition exists.

Some industry participants have suggested that NBN Co should not provide services to enterprise premises already served by FTTP access networks. A competitive market exists today for point-to-point FTTP connections to large commercial buildings in major CBDs around Australia. A number of participants have installed optical fibre rings that offer managed Ethernet services. Speeds can range up to 1 Gbps. Some participants, including PIPE Networks have even begun to offer customers dark fibre products.

Premises connected in this way are already receiving services that meet (and sometimes exceed) Government's NBN performance specifications. While the infrastructure in these areas is not available on a wholesale, open-access basis, in many cases there is sufficient infrastructure-based competition resulting in choice for end users.

Where enterprise premises are deemed by the ACCC to be 'adequately served' by competing FTTP networks, NBN Co should not be obliged to provide additional services in pursuit of the FTTP coverage objective.

However, this is likely to be limited to areas where there is a highly profitable concentration of enterprise customers—that is, CBDs and business parks. Outside these areas, the enterprise FTTP market looks very different. FTTP connections exist, but speeds vary greatly. For example, DEEWR reports that although 47 percent of schools have FTTP connections, 67.5 percent of schools use download speeds of 4 Mbps or less, and 29.7 percent of schools use download speeds of 5–20 Mbps.<sup>3</sup> Infrastructure-based competition in these areas is limited.

The incremental cost of NBN Co providing coverage to these areas is relatively small outside CBDs and business parks, because enterprise premises are typically interspersed among residential premises. The Implementation Study sees no rationale to exclude such enterprise premises from the coverage objective.

The assessment of areas that are already 'adequately served' by the market should occur at the time of planning a roll-out for a geographic region. This allows for the possibility of a new, high-speed broadband network being rolled out before NBN Co enters an area.

**Recommendation 2.** That Government's objective of providing superfast broadband to premises be measured in terms of coverage, with premises considered covered by the NBN where:

1. NBN Co is able to provide a wholesale service to those premises at the request of a retail service provider within a maximum number of days, specified by Government. For premises to be defined as 'covered', NBN Co should not be required to install CPE, or for fibre to perform the 'drop' and install the ONT. NBN Co should not perform the 'drop' and install the ONT until services are ordered via a retail service provider;
2. The ACCC or appropriate agency has declared the premises to be 'adequately served' by other providers where premises already have access to last-mile services of the required speed, with infrastructure-based competition and/or open-access wholesale arrangements in place, and with pricing comparable with NBN services; that to the extent that premises are deemed to be 'adequately served' by FTTP infrastructure, these should be counted towards the FTTP coverage objective.

<sup>3</sup> Department of Education, Employment and Workplace Relations 2009, *High speed broadband to schools overview*, viewed 11 January 2010, <<http://www.deewr.gov.au/Schooling/DigitalEducationRevolution/HighSpeedBroadband/Pages/HighSpeedBroadbandToSchoolsOverview.aspx>>

## Identifying the premises NBN Co is required to cover

Government has made it clear in its policy announcement that all premises—defined as homes, schools and workplaces—in Australia should be covered by the NBN. As such, to define the coverage requirement, Government should provide NBN Co with clear guidance as to the criteria which should be used for determining whether a building (or part of building) is a home, school or workplace.

Telstra applies a test, reproduced in Exhibit 2–4, for the purpose of identifying homes and workplaces eligible for the provision of a standard telephone service (STS) under the universal service obligation (USO). The USO guarantees the provision of voice services to all people in Australia ‘regardless of where they live or conduct business’.<sup>4</sup>

### Exhibit 2–4. Test for premises eligible for a Standard Telephone Service under USO

#### Test for premises under the current USO

In determining whether a person requesting a standard telephone service already has reasonable access to a standard telephone service, Telstra will consider the following general factors together with any other relevant circumstances:

- Is a standard telephone service already provided at the place of residence or place of business where the standard telephone service is requested?
- Does the place of residence or place of business where the standard telephone service is requested meet with any applicable ordinary principles of the meaning of a residence or business, for example, local planning laws?
- Is the place of residence self-contained? In other words, does it contain facilities to support independent living, for example, a separate kitchen and bathroom as opposed to shared facilities?
- Has the standard telephone service been requested for non-voice purposes? A service requested for telemetry purposes, for example, water level, weather data or traffic flow and the like will not be supplied under the universal service obligation.
- Has the standard telephone service been requested for a temporary site, for example, a mining exploration site? For temporary sites, Telstra will consider the supply of an interim service for the duration of the customer’s stay to ensure the universal service obligation is fulfilled in an efficient and economic manner.
- Is there sufficient physical security for telecommunications equipment, particularly at properties in remote areas or that are not permanently occupied?
- Is the standard telephone service able to be supplied in an effective, efficient and economic manner?

Source: Telstra 2005, Universal Service Obligation Policy Statement; Telstra 2005, Universal Service Obligation Standard Marketing Plan

<sup>4</sup> Telstra 2005, *Universal Service Obligation Policy Statement*

The complexity of Telstra's test shows that it can be difficult to formulate a simple set of criteria for identifying homes and workplaces.

In formulating a test for NBN Co, the aim is to ensure NBN coverage for the following:

- All residences or businesses that currently have a standard telephone service activated as defined under the USO;
- Any premises that currently have a fixed-line residential or business broadband product activated;
- Buildings used continuously for residential, business or educational purposes but currently do not have a telecommunications connection (or are newly constructed premises).

Schools are currently not defined for the purposes of the USO. While schools will likely be captured by the criteria for a workplace, having a clear mechanism for identifying schools ensures that the NBN achieves Government's policy of facilitating greater access to high-speed broadband connections for schools under the Digital Education Revolution.<sup>5</sup> To identify schools, NBN Co should rely on the definition of a school provided by the Department of Education, Employment and Workplace Relations. Hospitals and other premises where health services are delivered would be considered as being used for business purposes.

**Recommendation 3.** For the purposes of NBN Co's coverage requirement, that premises be defined, to mean any building (or part of a building) that meets one of the following criteria:

1. Currently has a standard telephone service activated as defined under the USO;
2. Currently has a fixed-line residential or business broadband product activated;
3. Is used on an ongoing basis for residential, business, health or educational purposes; or,
4. Is defined as a school by the Department of Education, Employment and Workplace Relations.

Exhibit 2–5 outlines how the recommended definition of premises would be applied to illustrative cases.

<sup>5</sup> Department of Education, Employment and Workplace Relations 2009, *High speed broadband to schools overview*

Exhibit 2–5. Applying the definition of premises to example locations

Location	Premises	Non-premises
House or place of business with existing STS	✓	
Homeowner subscribed to naked DSL service	✓	
School	✓	
Apartment in an apartment building	✓	
Assistance telephones in elevators		✓
Assistance telephones at side of highways		✓
Payphones		✓
ATMs		✓
Weather monitoring stations		✓
Mobile cell site		✓

Source: Implementation Study

### Estimating the number of premises to serve

To develop the coverage objectives, it is necessary to assess the number and location of all premises in Australia. The primary means of doing so is to use databases of address information. For the purposes of mapping the network architecture, the geographical location of each address point should be identified by specific geographic location data (i.e. geocoded).

The most comprehensive database of geocoded address information is the Geocoded National Address File (G-NAF). Its 12.7 million address points include a number that do not meet the coverage criteria proposed earlier in this section, including duplicate addresses and vacant lots of land. Based on its application of a filter to the G-NAF database, the Department of Broadband, Communications and the Digital Economy estimates that there were 10.7 million premises in Australia as at November 2009. Exhibit 2–6 shows the methodology used for creating the database of premises.

NBN Co will also need to cover premises constructed during the course of the roll-out. The Implementation Study's modelling projects that by the end of the 8-year roll-out there will be an additional 1.3 million premises in Australia.

## Exhibit 2–6. Methodology for creating the database of premises

### Methodology for creating the database of premises

DBCDE created a database of premises from the Geocoded National Address File (G-NAF). Maintained by the Public Sector Mapping Agencies (PSMA), the database is compiled from:

- Commonwealth, state and territory mapping agencies and land registries
- Australia Post
- The Electoral Council of Australia and the Australian Electoral Commission.

PSMA assigns location information to each address (geo-coding).

The G-NAF database of 12.7 million address points includes address information for a range of points that do not meet the coverage criteria for NBN. It includes land lots that have been assigned addresses by state agencies in anticipation of future development. It also contains address aliases—where multiple records refer to the same premises. For example, single premises falling on a street corner may have addresses recorded for both street names.

To estimate the number of premises that do meet the NBN coverage criteria, DBCDE:

- Removed address aliases
- Cross-checked with Australia Post’s mailing addresses and the Australian Electoral Commission’s registered voter addresses
- If a G-NAF point matched the address in one or both of these, recorded it as premises for NBN purposes.

The resulting database provides a comprehensive list of geocoded address points that should meet the coverage criteria. The Implementation Study used it to model the architecture and cost of a network that would meet Government’s coverage objectives. In executing the roll-out there will inevitably be some G-NAF points on the database that are not in fact premises. There will also be premises found during the roll-out that were not included as G-NAF points in the database or that were in the database but at the wrong location. However, the Implementation Study believes the overall impact on the accuracy of modelling will be immaterial.

Source: Implementation Study

### Serving non-premises

A large number of fixed lines currently connect to non-premises. Non-premises include locations that are not a home, workplace or school. Exhibit 2–7 gives examples.

Service providers and end users who require services to be delivered to non-premises may request a fibre access connection from NBN Co. Today, most non-premises are not covered by specific service obligations on Telstra or any other carrier, with the exception of public payphones.

Exhibit 2–7. Examples of non-premises telecommunications services

Non-premises service	Scale
Permitted attachment private lines (PAPLs)	Telstra’s plan to shut down all PAPL services by the end of 2009 means they are being migrated over to other networks <sup>a</sup>
Banking communications	180,000 EFTPOS terminals, many of which are located in non-premises locations and 27,000 ATMs <sup>b</sup>
Payphones	~23,000 public payphones <sup>c</sup>
Assistance telephones	Fewer than 50,000 elevator phones <sup>d</sup> , over 1000 roadside phones <sup>e</sup>
Traffic management	~15,000 traffic devices <sup>e</sup>
Weather monitoring	~3,000 flood warning data loggers, 400–600 automatic weather monitoring stations <sup>f</sup>
Mobile cell sites	~15,000 mobile phone towers <sup>g</sup>

a Announcement made on Telstra website in 2009, since removed  
b Australian Payments Clearing Association 2009, *Number of ATMs and EFTPOS terminals*, Sydney  
c Australian Communications and Media Authority, *Communications Report 2007–08*  
d Industry interviews  
e Estimate based on interviews with roads authorities  
f Estimates provided by Australian Bureau of Meteorology  
g Estimate based on a filter applied to ACMA 2009, *Radio communications Record of Licences*, Canberra  
Source: Implementation Study

At present, Telstra supports most of these non-premises with commercially-priced services.<sup>6</sup> Some end users, such as traffic management companies, pay to extend Telstra’s copper network to their equipment.

By definition, none of these locations qualify under the coverage definition for premises set out earlier in this section. As such the Implementation Study believes NBN Co should not be required to cover these locations as part of its roll-out. Such a requirement could slow down the roll-out to premises.

Since these non-premises have activated services today—even though the current regulatory regime does not require carriers to cover them—it is assumed these services are in general profitable for carriers to provide. We also expect that the bulk of services to non-premises delivered over the copper network will continue during the NBN roll-out period. Where Telstra decides, as a result of an NBN Co roll-out in a particular area, to deactivate its copper network and discontinue services to non-premises along with premises, the Implementation Study recommends (Section 2.4) that Government require Telstra to issue a public notice well in advance of such deactivation. This is to allow

<sup>6</sup> Industry interviews

sufficient time for owners of non-premises assets to find alternative ways to connect, either through the NBN or otherwise. In many cases, wireless networks will offer a competitive alternative to the copper network for providing connectivity to non-premises.

However, there are many situations where connecting non-premises with fibre will be the most sensible solution. A clear example is in greenfield developments that are provisioned by NBN Co with FTTP infrastructure but are not served by copper. In such a case non-premises that require fixed-line connections will need to be serviced by fibre. Similarly, in the event that the copper network is deactivated, critical systems for which wireless solutions are inadequate, such as traffic lights, will require a connection to the fibre network.

There may also be situations where NBN Co would be willing to provide fibre connections to non-premises in areas where there is a copper network alternative. This would result in greater choice for end users looking to purchase connections to non-premises. An NBN Co non-premises offering would be an attractive option for non-premises applications such as banking services that can utilise the greater capabilities offered by fibre-based IP solutions.

The Implementation Study therefore recommends that NBN Co be permitted, but not required, to provide wholesale connections to non-premises. As there is competition for the provision of these services from wireless and copper networks, NBN Co should be allowed to price these connections on a commercial basis.

Different considerations apply to mobile base stations and other non-premises that need a fixed-line connection to provide backhaul for a telecommunications service that will compete with NBN Co's access network. For these specified classes of non-premises, Government may need to require NBN Co to provide services on acceptable terms. Chapter 6 discusses these considerations with respect to backhaul and Chapter 10 discusses them more broadly.

**Recommendation 4.** That Government permit NBN Co to provide connections to non-premises on a commercial basis; that Government retain the option to require NBN Co to cover specified classes of non-premises on terms approved by Government.

### Setting NBN Co's coverage requirement

Having identified the specific premises to be covered by the NBN, the next step is to determine which should be served by fibre and which by alternative technologies.

Government's stated objective is that the NBN will 'connect 90 percent of all Australian homes, schools and workplaces with broadband services with speeds up to 100 megabits per second' using a fibre-to-the-premises (FTTP) network and 'connect all other premises

in Australia with next-generation wireless and satellite technologies that will deliver broadband speeds of at least 12 megabits per second'.<sup>7</sup>

As discussed in Chapters 4 and 5, our detailed geospatial and costing analysis indicates that it will be both commercially sensible and feasible within Government's initial expenditure estimate to extend the fibre footprint to 93 percent of premises.

Chapter 5 contains a detailed discussion of the potential technologies available to serve the remaining 7 percent of premises. In summary, Government should run a public tender for a provider to build and operate a fixed-wireless service for premises in the 94<sup>th</sup> through 97<sup>th</sup> percentiles and NBN Co should provide a wholesale-only satellite service covering all 7 percent, but likely to be mostly taken up by the final 3 percent.

The Implementation Study therefore recommends that Government set the following coverage requirement for NBN Co:

**Recommendation 5.** That Government set NBN Co the objective that, once NBN roll-out is complete, all premises in Australia have access to superfast broadband services, specifically that:

1. 93 percent of premises be covered by a fibre-to-the-premises (FTTP) network that can deliver speeds of up to 100 Mbps;
2. All other premises be covered by NBN Co via satellite technologies that deliver peak speeds of at least 12 Mbps;
3. A fixed-wireless network be provided beyond where fibre is deployed to 4 percent of total premises, but that this not be the responsibility of NBN Co unless there are no acceptable tenders by commercial operators;
4. These coverage objectives be reviewed over time based on actual costs of deployment and technology developments.

## Ensuring provision of retail services

NBN Co will deliver wholesale services over any bottleneck asset that it constructs or to which it secures access. However, this will not be of benefit to end users unless there are retail service providers willing to exploit the associated NBN services. Vibrant retail competition is necessary to ensure service innovation and maintain downward pressure on prices.

The creation of fibre access areas that aggregate large numbers of end-user premises and offer wholesale services at affordable prices is expected to form a highly attractive proposition for retail access seekers. Since NBN Co plans to offer services at Layer 2, for reasons discussed in Chapter 3, service providers seeking national connectivity at the

<sup>7</sup> K Rudd, W Swan, L Tanner, S Conroy (Prime Minister, Treasurer, Minister for Finance, Minister for Broadband), *New National Broadband Network*, 7 April 2009

Layer 3 level will need either to purchase capacity on the required non-NBN (competitive) backhaul routes, or rely on Layer 3 wholesale providers to emerge. Our expectation is that a Layer 3 wholesale market will develop over time (Chapter 9).

The willingness of a service provider to enter an area will depend on its belief that there is a viable business case to deliver attractive retail offers for end users over NBN wholesale services. To facilitate this, NBN Co intervention in the access and backhaul markets will stimulate retail competition by:

- **Creating a level playing field.** By providing an open-access network with equivalence for service providers, NBN Co will ensure that retailers compete on an equal footing.
- **Reducing the cost of reaching remote end users.** Chapter 6 outlines how NBN Co can aggregate fibre exchanges to provide points of interconnect that connect to competitive backhaul, so that high-cost uncompetitive backhaul does not prevent service providers from serving customers in regional and rural areas.
- **Providing comparable wholesale prices across the country.** Government has stated that NBN Co will provide wholesale services at affordable prices across the country (Section 2.3). Service providers will face similar network costs to serve customers in all areas.

Regardless of the level of service provider competition on the NBN, end users will retain access to services guaranteed under the USO. In the absence of regulatory change, Telstra will continue to act as the universal service provider and have the flexibility to meet the USO through whichever technology is most appropriate for the premises concerned, including the legacy copper network or the NBN. This obligation does not currently extend to providing broadband—so there is the possibility, albeit unlikely, that some customers are covered by the NBN but are not offered any retail services. If such situations arise, NBN Co should not be required to expand beyond its wholesale-only mandate and become the retailer of last resort. More detail on how these retail obligations could evolve is in Subsection 2.4.4.

### 2.1.2 CLASSIFYING FIBRE AND NON-FIBRE AREAS

As discussed in Chapters 5 and 7, geospatial modelling undertaken by the Implementation Study suggests fibre can, and should, be extended beyond the initial 90 percent target to reach 93 percent of premises by the end of the roll-out. In any event, rules should be established by the company to establish which premises in a given area are covered by fibre and which are covered by other technologies. These rules will be amended over time as NBN Co gains experience.

## **Setting a path to achieving the fibre coverage objective**

It will be challenging initially for NBN Co to determine exactly which premises should be served by FTTP and which should be served by other technologies. Its primary concern will be to select those premises which are the most economical and practical to cover with FTTP to meet its coverage objective.

All other things being equal, the higher the density of premises in an area, the cheaper it is to provide the distribution network for FTTP infrastructure. However, the cost of digging trenches and installing fibre in an area is not the only consideration which should drive roll-out. For example, where there is a pocket of premises which have a higher cost to serve than those surrounding it, it will be practical to cover these higher cost areas and create a contiguous area of FTTP coverage rather than cover a cheaper group of premises which are in a pocket isolated from the existing FTTP network. Once a roll-out team is in an area, there are scale economies in covering all of the premises within that area rather than creating a ‘Swiss cheese’ effect that leaves holes in the coverage footprint. Creating contiguous areas of FTTP coverage also facilitates marketing and ongoing maintenance. In addition, serving an isolated group of premises with FTTP could increase the cost of providing adequate backhaul to serve the FTTP footprint.

Moreover, it is difficult to estimate with accuracy which premises will be the cheapest to cover before the roll-out has commenced, even when considerations are limited to civil works. There is a range of assumptions that drives the estimate of the average cost per premises, and these could change after roll-out teams conduct on-the-ground site assessments on an area-by-area basis. For example, the team may find that the soil type in a specific area presents a greater obstacle to trench construction than was anticipated in initial desk-based modelling.

As NBN Co develops roll-out plans for specific areas, it will need to find a practical methodology for determining which premises should be covered by FTTP. It is important that NBN Co demonstrate to Government that the methodology it is using will result in the 93 percent (or other agreed) FTTP coverage requirement being achieved once the roll-out teams have covered all areas in Australia. However, the identification of specific premises or areas that will fall inside the 93 percent should be at the complete discretion of NBN Co. At all times, NBN Co should have a geospatial model that identifies the planned fibre boundary—this is required for reporting on experienced and expected costs, identifying the premises that will be in scope for the fixed-wireless tender and for evaluating requests for community-funded extensions.

To test the assumptions of the pre-roll-out modelling, the initial phase of the roll-out should aim to include a group of areas around the country that are expected to have different roll-out costs. The areas should have a mix of premises that represent the major cost drivers, for example, different geology, different housing types and densities and different legacy telecommunications infrastructure (e.g. aerial vs. underground). Selecting a representative group of areas for the first phase of the roll-out would be consistent with

Government's expectation that the NBN 'be rolled-out, simultaneously, in metropolitan, regional, and rural areas.'<sup>8</sup> As discussed in Chapter 10, the Implementation Study also recommends that this opportunity be used to explore the costs of alternative network topologies.

Once NBN Co has completed its roll-out to a representative mix of the country, Government should review whether NBN Co is on track to achieving the objective for FTTP coverage. If the results of the first phase of roll-out suggest the FTTP coverage target will not be reached, Government should use its performance management mechanisms to correct the course of the roll-out and/or revise its target. Government should continue to review progress against the FTTP coverage requirement over the course of the roll-out.

**Recommendation 6.** That NBN Co select a number of priority areas for roll-out that together comprise a representative mix of the country; that, once NBN Co has completed its roll-out to these priority areas Government review whether NBN Co is on track to achieving the objective of 93 percent FTTP coverage and use performance management mechanisms as required; that the Minister request NBN Co include details of its progress in achieving the 93 percent FTTP coverage objective in each corporate plan.

### Considering community funded extensions of the fibre footprint

In areas outside the planned fibre footprint, individual end users or groups of end users may be willing to contribute funding to obtain FTTP connections (Exhibit 2–8). If communities are willing to contribute to the cost of extending the roll-out of the fibre network beyond the footprint proposed by NBN Co, then there may be a rationale for NBN Co to extend its FTTP network to cover them. Communities that might be interested in such a scheme could include businesses with high-bandwidth needs (e.g. mining sites) or affluent local municipalities.

The decision to cover communities that are contributing funding should not lead to NBN Co reducing its coverage footprint in other areas. Premises covered under such community-funded extensions should be considered as additional to those that NBN Co would achieve in pursuit of its coverage objectives.

<sup>8</sup> K Rudd, W Swan, L Tanner, S Conroy (Prime Minister, Treasurer, Minister for Finance, Minister for Broadband), *New National Broadband Network*, 7 April 2009

## Exhibit 2–8. Community-funded extension program: OnsNet, the Netherlands

### OnsNet community funded fibre network

Nuenen is a medium density suburban area in the Netherlands with 8000 premises where the cooperative OnsNet network was created to deliver FTTP services to the community. Through OnsNet, Nuenen became the first city in the Netherlands to deploy a municipal FTTP network.

OnsNet was developed with the support of a national research and development program called 'Kenniswijk' (KnowledgeDistrict). Initiated in 2000 by the Dutch Ministry of Economic Affairs, Kenniswijk was designed to encourage network providers to experiment with new ICT services in small trial roll-outs around the country. These would test services and, it was hoped, demonstrate their business case for market-led roll-outs across the country.

In 2003, an organisation called Close the Gap submitted a business plan for building an FTTP network connecting all premises in Nuenen. It was to be implemented through a cooperative consisting of Nuenen residents called OnsNet (Dutch for 'Our Net'). Due to the high cost and uncertainty of returns of FTTP networks, and the reluctance of incumbent telecommunications and cable companies to invest in them, the network qualified for support under Kenniswijk. A subsidy of €800 was offered for each premises in the proposed FTTP roll-out.

The proposal was to construct an FTTP network with a two-fibre point-to-point architecture—i.e. two fibres would be run to each premises. One of the fibres would be dedicated to the transmission of CATV, the other to a point-to-point Ethernet connection capable of delivering symmetrical download and upload speeds of up to 100 Mbps.

The average cost per household activated was about €1500. The funding model for the roll-out involved residents contributing their €800 subsidy to the OnsNet cooperative which used the money to fund a joint venture with the network construction company Reggefiber. OnsNet members hold 95 percent of the shares, with Reggefiber having 5 percent. The remainder of the investment was financed through a loan secured against the proposed network and to be repaid using revenues generated by the cooperative delivering services over the network.

With the incentive of one year's free service, 97 percent of premises owners became cooperative members and contributed their subsidy. Prior to deployment of the FTTP network, Nuenen already had cable and DSL broadband infrastructure. Thus, OnsNet faced significant competition from existing providers. However, even after the first year of free service ended, penetration has remained above 80 percent. Residents pay an ongoing membership fee of €20 per month and the full package of telephone, television and Internet costs €60 per month.

The OnsNet model shows the potential for government and community funding to be combined to fund the roll-out of FTTP infrastructure to areas that would not otherwise be served with fibre. It also demonstrates the importance of high take-up in reducing the average cost of delivering broadband infrastructure to homes.

Source: Sadowski, B. et al. 2009, 'Providing incentives for private investment in municipal broadband Networks: Evidence from the Netherlands', *Telecommunications Policy*, vol. 33, issues 10–11, pp. 582–595; Close the Gap 2009, *Next Generation Broadband: From Dream to Reality*, visited 10 February 2010 <<http://www.closesthegap.nl>>

As described in Subsection 2.1.5, NBN Co should maintain a Coverage Register to track which premises have been covered by the NBN. On this Coverage Register it should be clearly identified that premises have been covered under the community funding scheme, so that they can be excluded from consideration in assessing progress against the 93%

target. If such a mechanism were not introduced, there would be an incentive for NBN Co to bias its demarcation of the fibre footprint on the grounds of community contributions.

If a community-funded program did not cover the full cost of fibre deployment, it would result in an increase in the total capital cost of the NBN roll-out, as costs incurred to deploy FTTP to communities under the program will be in addition to the cost estimated for providing fibre to the areas identified as part of the agreed coverage target set by Government. Government may wish to consider contributing matching funds to encourage such deployment.

However, it is important that any community-funded extensions not disrupt the broader roll-out plans for the network. Community-funded extensions should as far as possible be integrated into the roll-out plan for the area from which the extension will be deployed, so that they are carried out while NBN has its roll-out teams in the area.

To ensure that any such scheme does not endanger NBN Co's primary objectives, NBN Co should retain ultimate discretion over when and how to implement it. For at least the first two years of roll-out, it is likely that NBN Co will not wish to create the distraction of this additional process. When it does create such a process, it will need to establish a materiality threshold for applications, to ensure that its administrative resources are not unduly burdened with, for example, applications for coverage of isolated individual premises and disputes about the costs quoted.

Integrating the community-funding mechanism into the broader NBN roll-out could be achieved in the following manner:

- NBN Co undertakes a field survey of an area;
- NBN Co publishes an area roll-out plan on its website and begins notification process to prepare home and business owners. The area roll-out plan would show the boundary between the fibre and non-fibre networks;
- Communities not covered by proposed FTTP network can contact NBN Co and request a quote for extending the FTTP network, subject to a materiality threshold set by NBN Co;
- The community and NBN Co enter into an agreement to provide for funding. The agreement should specify that ownership of the network remain with NBN Co.

**Recommendation 7.** That NBN Co be permitted to establish a mechanism by which a community can fully or partially fund the extension of the FTTP network to cover its location, provided that these premises will not be counted towards the FTTP coverage objective. This could include financial contributions towards the network extension from businesses, not-for-profit organisations, state and local governments or from Government, independent of its equity investment in NBN Co.

## Setting eligibility criteria for non-fibre solutions

Chapter 5 proposes an approach to serving the final 7 percent of premises in which Government would run a commercial tender for a fixed-wireless network covering the 94<sup>th</sup> to 97<sup>th</sup> percentiles, and NBN Co would offer a wholesale-only, high-throughput satellite service that is available across all 7 percent of premises.

Eligibility for the fixed-wireless service would be set by NBN Co's geospatial modelling. The tender would either be designed to identify the specific premises beyond the 93<sup>rd</sup> percentile and up to the 97<sup>th</sup> percentile, or alternatively, to allow the tenderer to identify those 4 percent of premises it proposes to cover. The successful tenderer would be required to offer both a wholesale service and a retail service to prevent market failure for some customers. Customers falling in this area would qualify for provision of fixed external antennas to be installed to ensure access to broadband at speeds and throughput consistent with Government's objectives for the final 10 percent.

All customers in the final 7 percent of premises would qualify for the provision of the satellite service and associated CPE, to ensure all premises nationally are covered by a wholesale-only offer. Since the fixed-wireless service will offer superior performance to the satellite service (for example due to much lower latency), few premises in the 94<sup>th</sup> to 97<sup>th</sup> percentiles are expected to take up a satellite service. Since both the fixed-wireless and satellite CPE would be provided under the proposed approach, households and businesses that selected one type of service would not subsequently qualify for provision of CPE under a different service.

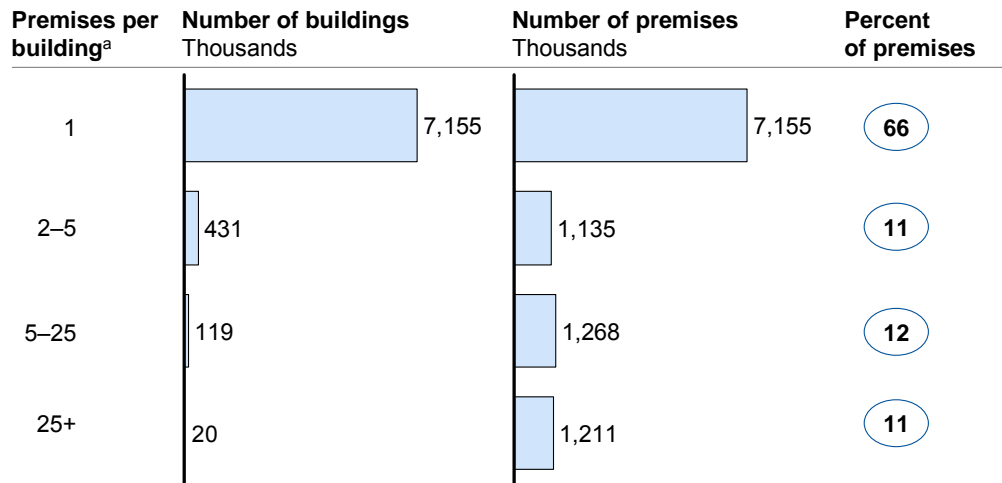
Prior to the FTTP roll-out reaching a given area of the country, the existing rules for eligibility under the Australian Broadband Guarantee (ABG) should continue to apply to determine whether premises are eligible to receive a subsidised satellite service—namely, whether that premises is able to access a metro-equivalent (e.g. DSL) service.

**Recommendation 8.** That until the FTTP roll-out is complete in a given area, only premises that cannot access a metro-equivalent service as defined under the Australian Broadband Guarantee program be eligible for an NBN satellite service.

### 2.1.3 MAXIMISING FIBRE AVAILABILITY TO MULTI-DWELLING UNITS

Multi-dwelling units (MDUs), such as apartments and office blocks, comprise 34 percent of the premises in Australia as at November 2009 (Exhibit 2–9). Due to the higher density of premises in MDU buildings, it is often cheaper to provide FTTP infrastructure to premises within MDUs than it is to provide FTTP infrastructure to single-dwelling units (SDUs), i.e. freestanding houses. Being lower cost and typically found in higher-density areas, most MDUs are likely to fall within the fibre footprint of the NBN and are also likely to be commercially attractive to NBN Co. Providing FTTP coverage to MDUs is therefore important to NBN Co both for its business case and for meeting its FTTP coverage requirement.

Exhibit 2–9. Single dwelling and multi-dwelling units in Australia, November 2009



a. Multiple premises are deemed to be in same building if geographic address points lie within 3 metres of each other on the Implementation Study's filtered G–NAF database.

SOURCE: Implementation Study

MDUs can present unique challenges relative to stand-alone premises during a roll-out of FTTP infrastructure. There are two factors that make MDU installation a greater challenge than installation in detached houses:

- **Intervening property rights.** To provide a service to the owner of a unit within an MDU, NBN Co should first obtain permission from the MDU entity to install the elements of the fibre network through the common areas of the building to reach each customer premises. This differs from freestanding residences, where the owner of the premises generally also owns the land through which the drop cable must be deployed.
- **Variation in the requirements for installation methods.** Because of the variations in physical layout and communications infrastructure in MDUs, the method of installing FTTP can vary widely from one MDU to the next (Exhibit 2–10).

The challenge of catering for MDUs creates a number of risks in the roll-out of the NBN:

- **End users denied access to services even though within network footprint.** MDU entities preventing end users from accessing NBN services by denying permission to NBN Co to install the network through the building will compromise Government's policy objective to provide high-speed broadband access to all Australian premises.
- **Underestimating the cost and time involved in covering MDU premises.** The need to tailor installation of the network to the specific characteristics of an MDU means that it can be difficult to estimate the time and cost of installing the network in an MDU without conducting a site assessment. Until a site assessment is

conducted, there is a risk that NBN Co's estimates of the time and investment required to deploy the new network throughout the building, and the area in which it is located, will be incorrect. Delays could also result from the process of engaging with MDU entities to obtain access to the building. Delays in the roll-out schedule or the need for roll-out teams to revisit areas can increase the cost of the roll-out.

- **Risk to achieving coverage requirement.** NBN Co may be prevented from achieving the FTTP coverage requirement set by Government if a large number of MDU entities deny NBN Co access. If cost overruns related to MDU installation are widespread, this would threaten the ability of NBN Co to achieve the coverage requirement within the Government's initial expenditure estimate.

Exhibit 2–10. Factors that lead to variation in requirements for MDU installation

Factor	How this can change installation method
Density of premises	The density of premises in an MDU will determine the extent of infrastructure that should be deployed in the building in addition to the normal infrastructure provided to detached houses. For lower-density MDUs, it may only be necessary to install additional Fibre Distribution Terminals (FDTs). For high-density MDUs that have a large number of units it may make sense to locate a splitter cabinet in the basement.
Space in risers	In many MDUs, telecommunications wiring is run from the basement to the upper floors of the building through vertical shafts called risers. If there is sufficient space within the risers of an MDU, fibre can be installed by pulling it through. This technique is generally cheaper and quicker than other installation options
Duct capacity	In buildings where existing copper wiring is ducted, retrofitting with fibre can be achieved by blowing fibre through the existing ducts, a cheap and quick process. However, where no ducts exist or there is insufficient space in the ducts, blowing fibre is not an option. To install fibre cables from the telecommunications room to the individual premises, a path should be created either through the building fabric (e.g. installation through walls) or along the external surface of the building (e.g. by laying fibre through conduit attached to the outer wall).
Space in telecommunications or services room	To house shared components of the FTTP installation such as a main distribution frame (MDF) or splitter cabinets, there should be sufficient space in a dedicated and secure telecommunications or services room. Where there is insufficient space, other solutions may be involved.
Space on floors to accommodate floor boxes	One installation method is to place floor boxes on each floor that house the FDTs for all premises located on that floor. When homeowners or businesses request an NBN service, connecting the premises involves running cable from the floor box to the premises. In some buildings there may not be a suitable location for a floor box, preventing this option.
Source: Industry interviews; Implementation Study	

## Giving NBN Co right of access to MDU common spaces

One challenge which will confront NBN Co in its network roll-out is obtaining entry to common spaces in an MDU.

In some MDUs, meetings with residents or bodies corporate may be required in relation to works on the property (Exhibit 2–11). Such processes, if contested, may result in substantial delay and additional cost, if NBN Co is required to return to a neighbourhood where an MDU was bypassed during initial roll-out.

To alleviate this difficulty, it is appropriate that Government enact a right of entry for NBN Co to enter common areas for the purpose of network deployment and maintenance, and a statutory obligation on bodies corporate and building managers to take reasonable steps to assist NBN Co in obtaining access.

*The rights of carriers ...to install cable to allow access to services in strata titled or other multi-owner property should be stronger, in particular, carriers should have the right to install access cables to any tenant or resident who orders a service and such access must not be prevented or frustrated by other tenants or residents.*

Internode (2009)<sup>9</sup>

### Exhibit 2–11. Decision-making structures in multi-dwelling units

#### Decision-making rights over common spaces in MDUs are linked to ownership

**Single owner.** Where the entire building is owned by a single landlord, who leases the units within the building to tenants, decisions over the common spaces are wholly within the domain of the landlord or building owner. This is the case in many commercial office buildings within CBD areas.

**Several owners.** The situation is different where ownership is shared between multiple owners, as is the case in many apartment buildings. Most of these are governed under strata title where the structure of the building, including the concrete supporting structures, services (including electrical, hydraulic, ventilation and communications), most walls and slabs, are owned by a statutory *body corporate* or *owners' corporation*.

Individual owners of apartments usually own the airspace within their apartment only. Each owner of an apartment or unit within the building is a member of the owners' corporation and has voting rights in relation to certain decisions of the owners' corporation. The voting rights of the apartment owners depend on the plans of registration which are registered during the process of developing a strata title building. The body corporate can make decisions regarding common spaces at its annual general meeting. Decision-making is normally by majority vote. Outside the annual general meeting, the decision-making power of the body corporate is normally vested in a committee.

In this report, we use the term 'MDU entity' to refer to the body that has the right to decide whether NBN Co should be granted access to the building to carry out installation of FTTP infrastructure.

Source: Implementation Study

<sup>9</sup> Internode 2009, *Submission to the National Broadband Network Company legislation and access regime*

While some MDU entities might object, common areas in MDUs are analogous to streets in single dwelling neighbourhoods. To allow bodies corporate to block NBN Co's access to common areas would be akin to allowing neighbours to prevent a resident of a single-dwelling premises from obtaining access to NBN services. The proposed right of entry and obligation to assist would not apply to residents' private space within the MDU.

Even with such an obligation, there may be practical challenges in gaining access to an MDU where a building manager is determined to be uncooperative, as enforcement of the obligation will be difficult. However, a statutory obligation would, at the very least, help to resolve disputes within MDU decision-making bodies by removing the discretion to prevent entry.

**Recommendation 9.** That NBN Co be granted a right of access to shared property in multi-dwelling units to undertake the inspection, installation and maintenance of FTTP infrastructure and that an obligation be imposed on building managers and bodies corporate to facilitate NBN Co exercising that right of access.

### **Defining NBN Co's coverage obligation in the event that an MDU entity denies access**

Government should provide clear guidance to NBN Co about how it should respond in the event that an MDU entity denies NBN Co access to deploy the network in the building. Upon receiving a denial of access, Government should require NBN Co to undertake the following steps:

- Undertake a notice process to ensure that the MDU entity is given sufficient information to make a fully-informed decision about denying access.
- If the MDU entity does not grant NBN Co access to the building after the notice process, then NBN Co can list the MDU on the NBN Coverage Register as 'frustrated.'
- If the MDU entity later requests FTTP installation by NBN Co, the building should be removed from the 'frustrated' category of the NBN Coverage Register and NBN Co should be required to cover the premises. However, NBN Co should be given flexibility on the time at which it undertakes this installation so that the broader roll-out process is not compromised. Government could also consider allowing NBN Co to charge an installation fee for these subsequent installations. Exhibit 2–12 summarises the approach used in Singapore, where both cost and schedule incentives are used to encourage MDUs to install fibre as it is rolled past.

**Recommendation 10.** That NBN Co follow a defined process in the event that it cannot install FTTP infrastructure in a multi-dwelling unit (MDU) because it has been denied access to the building; that this process include:

1. NBN Co conducting a notice process to ensure the building entity understands the implications of its decision;
2. If the building entity does not grant NBN Co access to the building after the notice process, then NBN Co can list the MDU on the NBN Coverage Register as ‘frustrated’;
3. If the building entity later invites NBN Co to enter the building and install FTTP infrastructure, NBN Co is to undertake the installation but to have flexibility over when it will do so.

### Preferring FTTP over FTTB in MDUs

Fibre roll-outs in some countries have used fibre-to-the-building (FTTB) combined with VDSL to deploy to MDUs. This involves the placement of a fibre node in the basement of the building and the installation of a DSLAM that converts the optical signal carried by the fibre into an electronic VDSL (or VDSL2) signal that is carried over the existing copper wiring in the building to individual units.

The rationale for a FTTB roll-out to MDUs is that it generally requires less time to install than FTTP, thus increasing the speed of the roll-out. VDSL is also typically cheaper, particularly for larger MDUs, reducing the cost of coverage for premises in MDUs. As the copper length over which the DSL signal runs is short, high speeds can be delivered to end users. For example, VDSL2 systems can deliver 100 Mbps symmetric services.<sup>10</sup>

However, the time and cost savings which can be obtained by choosing a VDSL roll-out come with significant tradeoffs. As FTTB relies on copper to provide the final connection to the premises, it will not follow the same upgrade path as the FTTP network. As FTTP electronics are upgraded, premises activated on FTTB are likely to fall behind in performance. Retrofitting MDUs from FTTB to FTTP would erode the initial cost advantage of FTTB.

FTTB deployments are also difficult to unbundle. To serve customers on a FTTB network, a second provider would need to invest in a DSLAM for each building it wishes to serve. The economics of doing this are challenging because of the small number of premises served by any one DSLAM.

Implementation Study modelling indicates that in many cases providing MDUs with FTTB is comparable to the cost of FTTP. Providing MDUs with FTTP is significantly cheaper on a per-premises basis than providing single-dwelling units with FTTP (because

<sup>10</sup> ITU 2006, *Very high speed digital subscriber line transceivers 2 (VDSL2)*

the cost of distribution is shared over more premises), so it is therefore difficult to justify MDU residents receiving FTTB instead of FTTP.

The Implementation Study therefore recommend that in the initial stages of the roll-out, NBN Co should be required to install FTTP in MDUs and not be permitted to offer FTTB as an option. Should significant problems emerge with achieving FTTP coverage in MDUs in the early stages of the roll-out, then Government may consider reviewing this policy.

**Recommendation 11.** That NBN Co be required to install FTTP in MDUs as opposed to alternative technologies such as VDSL; that Government review this policy if widespread building access problems or cost overruns emerge as NBN Co seeks to cover MDUs in the early phase of the roll-out.

### Implementing an integrated approach to MDUs

NBN Co should consider implementing measures specifically designed to facilitate the roll-out of the FTTP network to MDUs. In particular, NBN Co should:

- **Conduct an early notification and engagement process with MDU entities.** Because of the added complexity of needing access to common spaces within MDUs to undertake the installation, NBN Co should aim to contact MDU entities earlier than they would for owners of individual premises. NBN Co should do this even if it is granted a right of entry into MDUs, since the proactive assistance of the MDU entity will facilitate installation.
- **Develop standard installation approaches for different MDU types.** NBN Co should have the ability to adapt the installation methodology it uses to the specific variations in physical layout and communications infrastructure in MDUs as illustrated by the Singapore example discussed in Exhibit 2–12. International experience demonstrates that it is possible to develop a small number of standard approaches which cover the vast majority of installation scenarios that the FTTP roll-out teams may come across in MDUs. These approaches would provide guidance to roll-out teams on how to cable different types of MDUs. They should be designed in a way that is sensitive to the needs of building owners and premises owners. For example, the installation should utilise existing ducting, entry points and services rooms wherever possible to minimise disruption. Providing these kinds of archetypes is essential for making fibre installation attractive for MDU building entities and owners of premises in MDUs, while ensuring that costs are controlled.

## Exhibit 2–12. Approach to multi-dwelling units in Singapore

### International experience in activating MDUs

OpenNet is leveraging its years of experience in MDUs in Singapore to roll out an FTTP network to 100 percent of premises (about 94 percent of residential premises are MDUs<sup>a</sup>).

**Communicating with owners.** At least three weeks prior to installing fibre in residential and public units, OpenNet sends an initial letter of offer requesting them to sign-up to fibre. End users can also register their interest on OpenNet’s website. They are then notified when OpenNet’s teams approach their area.

**Landlord-tenant relationship.** The tenant must obtain permission from the landlord because minor drilling and installation works may take place.

**Installation.** For residential MDUs, OpenNet installs up to the first Termination Point—i.e. the first internal wall outlet that provides access to the FTTP network. Installation takes less than four hours and up to three installers. For non-residential buildings, OpenNet rolls out to the Main Distribution Frame (MDF) room or Telecommunication Equipment Room (TER). The building owner is responsible for connectivity from the MDF to each premises. Installation takes less than four hours and up to four installers.

**Incentives for residents/tenants.** Charges for a first installation during an offer period are waived if the first Termination Point is within a 15 metre fibre-run starting from the door (for high-rise residential) or the gate pillar (for free-standing premises). Beyond 15m, cost-oriented charges apply. Owners who initially refuse and then request a connection pay installation charges of \$220 for residential premises in an MDU and \$450 for free-standing premises.

**Incentives for building owners.** OpenNet waives installation charges up to the MDF/TER rooms when the network first reaches a building. If linked buildings share a postal code, the fibre is deployed to the MDF room that serves that cluster. If an owner denies access after the initial offer, a later installation can be requested for a fee, and the owner may need to accept a much later slot in the roll-out.

**Minimising disruption.** OpenNet minimises disturbance where possible. The installation reuses existing ducts, risers and telecommunications rooms. OpenNet’s contractor consults with the homeowner to determine a location to mount the fibre box and use existing points of entry. OpenNet can arrange to have the installers work between 9am and 5pm.

a. Statistics Singapore 2010, *Resident Households by Type of Dwelling*, viewed 10 February 2010, <http://www.singstat.gov.sg/stats/themes/people/household.html>

Source: OpenNet 2010, *OpenNet*, viewed 12 February 2010, <<http://www.opennet.com.sg>>

- **Develop a guide for planning authorities, developers and builders to adopt when approving new developments.** Providing guidance on the approach NBN Co would recommend for the installation of telecommunications infrastructure in newly constructed premises can ensure that new MDUs are constructed in a way that facilitates cost-effective and consistent installations of FTTP infrastructure. Telstra currently publishes a guide for the purpose of informing property developers on the correct method for installing copper infrastructure in MDUs.<sup>11</sup>

<sup>11</sup> Telstra 2009, *Cabling of multi-storey residential buildings*

- **Establish a team specialising in MDU roll-outs.** Because of the special considerations which should be taken into account in undertaking roll-outs to MDUs, NBN Co should consider establishing a specialist MDU team that would be dedicated to managing relationships with MDU entities and building management and addressing specific technical issues arising from installing FTTP infrastructure in MDUs. Having a centre of expertise and dedicated point of contact for MDUs would improve the experience for MDU entities, tenants and owners of individual premises and reduce the average time required for MDU roll-outs.

**Advice.** Given the added complexity of MDU installation, that the NBN Co Board ensure that measures to facilitate MDU installation are implemented by NBN Co's roll-out team. These could include:

1. Early notification to MDU entities of the intention to roll out FTTP infrastructure in their area requesting permission to access the building to execute the installation;
2. Potential establishment of a specialist MDU roll-out team that is dedicated to managing relationships with building management and addressing specific technical issues arising from installing FTTP infrastructure in MDUs;
3. The development of standard approaches to installing FTTP in MDUs, which would provide guidance to NBN Co roll-out teams on how to cable different types of MDUs. The standard approaches should aim to maximise the use of existing points of entry for telecommunications services and minimise disruption to residents/tenants during the installation process;
4. The development of standard approaches for planning and building authorities to adopt when approving new developments.

### Ensuring open-access to shared assets in MDUs

The part of the FTTP network installed in an MDU that is shared by multiple residents is a bottleneck asset. A provider that controls the shared infrastructure in an MDU could use that control to restrict choice of fixed-line providers for building residents.

Examples of this behaviour have emerged in the United States where local incumbent cable and telecommunications providers have limited competitor entry by denying access to the wiring that they have installed in MDUs. If a competitor wanted to offer services for residents in an MDU, they needed to install their own wiring in each building. In response the FCC issued a ruling making it clear that incumbents must give competitors access to this wiring.<sup>12</sup>

Under Australian law, ownership of internal wiring running through an MDU depends on the network medium. In a copper network, the carrier owns all wiring up to the Main Distribution Frame (MDF), which is generally located in a telecommunications room in

<sup>12</sup> Federal Communications Commission 2007, *Report and Order and Declaratory Ruling: FCC 07-111*, CS Docket No. 95-184, MM Docket No. 92-260, WC Docket No. 01-338, Washington, D.C.

the basement of the building. Wiring running from the MDF to the individual premises in the building is classed as ‘customer cabling’ and belongs to the building owner(s).

The situation is different for an FTTP network. For these networks, the carrier owns all cabling up to the Network Termination Device (NTD).<sup>13</sup> This means that under current regulation, NBN Co would own all optical fibre cabling up to the point where it connects to the Optical Network Termination (ONT). Cabling installed on the customer side of the ONT would be owned by the customer. This is the case, even if the building has an MDF, since the MDF is not defined by the ACMA Cabling Rules for optical fibre networks.

The current regulations would ensure that NBN Co has ownership of the internal cabling within an MDU, which is the potential bottleneck asset. Access to these assets will be included in NBN Co’s access service, which is defined in Chapter 4 as running from the fibre exchange to the ONT.

### **Serving MDUs beyond the FTTP footprint**

There are likely to be some MDUs which fall outside the FTTP footprint of NBN Co. To meet its coverage requirement, NBN Co will need to provide coverage to these premises in the same way it covers other premises in the non-fibre customer access network. As with the FTTP network, MDUs can present unique challenges to the deployment of non-fibre solutions. For example, due to the configuration of the building some premises may not be able to install CPE which can obtain a wireless or satellite signal.

To meet the coverage requirement for any MDUs outside the FTTP footprint, it may be necessary to install a common aerial or satellite receiver for the building, and install internal wiring from this equipment to each premises within the building. Such a situation presents similar challenges to those outlined for FTTP installation in MDUs, and the recommendations and advice outlined in relation to MDUs in the FTTP footprint should also apply to MDUs beyond the FTTP footprint. In addition, NBN Co will need to consider standard approaches for overcoming the challenges of providing coverage to MDU premises with wireless or satellite technologies.

<sup>13</sup> Australian Communications Industry Forum 2006, *AS/ACIF Standard S009:2006: Installation requirements for customer cabling (Wiring rules)*, Canberra

### 2.1.4 CATERING FOR NEW PREMISES

Australia's population is growing. By the end of 2018–19, when the NBN roll-out is targeted for completion, it is estimated that there will be an additional 1.3 million new premises, including those constructed in both greenfield and brownfield developments (Exhibit 2–13). These new premises will constitute 11 percent of projected total premises in 2018–19.

To meet Government's policy objective of providing superfast broadband to all Australian premises, premises constructed during the roll-out period should be included in NBN Co's coverage requirement. Recognising this, the Minister for Broadband, Communications and the Digital Economy released for comment an exposure draft of legislation 'to support the roll-out of fibre optic networks in new developments around Australia.'<sup>14</sup> If enacted, the legislation would require fixed telecommunications lines installed in new developments to be optical fibre. While the scope of the draft legislation is broad and applies to both greenfield and brownfield developments, there is provision for the Minister to outline exemptions to the requirement. The outline accompanying the draft legislation makes it clear that the Minister would specify developments, or classes of developments, to which the legislation is to apply in a Ministerial declaration.

The policy framework for these new premises should require NBN Co to provide fibre when it has fibre infrastructure sufficiently close to be able to deploy fibre to the new development economically. If NBN Co has not yet deployed close enough, then Government should encourage the most efficient transition path to those developments having fibre by the end of the roll-out.

#### Exhibit 2–13. What are greenfield and brownfield sites

##### Greenfield and brownfield developments

Development can occur on greenfield or brownfield sites. In the Australian urban development industry, a brownfield site is a parcel of land that has previously been used for urban development and is being redeveloped. A greenfield site is a parcel of land where urban development occurs for the first time. The National Housing Supply Council defines greenfield sites as 'former agricultural or undeveloped natural land on the periphery of towns and cities that has been rezoned for urban development.'<sup>a</sup> This is sometimes referred to as 'new release' land.

a. Department of Families, Housing, Community Services and Indigenous Affairs 2009, *State of Supply Report 2008*, National Housing Supply Council, Canberra

Source: Implementation Study

<sup>14</sup> Australia, House of Representatives 2009, Telecommunications Legislation Amendment (Fibre Deployment) Bill 2009 (Exposure draft), Canberra

The priority where NBN Co cannot provide the fibre should be to encourage fibre to be deployed, but in a way that makes integration with NBN Co's network simple. This requires setting specifications for a fibre provider to comply with so that the network can be integrated as is or so that the underlying fibre can be used with NBN Co electronics.

Where fibre is not deployed, the objective should be to ensure that costs for NBN Co to deploy fibre subsequently are minimised. This requires insisting that all new premises are built with duct, pit and pipe infrastructure that NBN Co can use to deploy fibre to each of the premises in the new development.

Implementing this policy framework is quite complicated in practice, and is laid out below in the following sections:

- Including new premises in NBN Co coverage objective and roll-out;
- Establishing a national standard for FTTP networks to enable integration with the NBN;
- Minimising the cost of subsequently providing fibre where it is not deployed upfront.

### **Including new premises in NBN Co's coverage objective and roll-out plans**

Currently, the vast majority of newly constructed premises are provided with telecommunications services by Telstra. Telstra estimates that every year it provides infrastructure for approximately 90,000 greenfield building lots and for a further 90,000 brownfield building lots.<sup>15</sup>

Only around 10 percent of these greenfield lots are currently provisioned with FTTP. The remaining greenfield and brownfield lots are generally served through extensions of the copper network. This is because bespoke FTTP infrastructure is more expensive to install than an incremental extension of an existing, large-scale copper network. The difference is magnified to developers, who only pay for the costs of digging the trenches for the copper network.

From NBN Co perspective, once it has deployed its customer access network nearby, greenfields and brownfield developments are typically relatively cheap to deploy to, as is summarised in Exhibit 2–14. While it is envisaged by Government that the provision of FTTP to new developments will be competitive,<sup>16</sup> NBN Co would be the natural party to provide FTTP if it has deployed its customer access network nearby.

<sup>15</sup> Telstra 2009, *Submission to DBCDE's FTTP in greenfield estates consultation process*

<sup>16</sup> Department of Broadband, Communications and the Digital Economy 2009, *National Broadband Network: Fibre-to-the-premises in greenfield estates consultation paper*, Canberra

**Exhibit 2-14. The economics of serving greenfield and brownfield sites with FTTP****Greenfield and brownfield economics**

When NBN Co provides FTTP services to the existing stock of premises during the national roll-out, it will need to build exchanges, lay feeder and distribution cables, and for premises that choose to take a connection, install a drop cable and an ONT. During the roll-out, NBN Co should over-provision the network, by laying additional fibre to cater for new premises growth (discussed further in Subsection 2.2.2).

After NBN Co's fibre access network is deployed, serving brownfield sites which occur within the fibre access network is relatively low cost: only the drop and ONT need to be installed—the costs of the exchange and feeder/distribution have already been incurred. An exception is where a brownfield development involves subdivision of a large area of land into smaller blocks served by a new road network. For example, the conversion of an industrial estate into residential housing. Here, the deployment of FTTP infrastructure more closely resembles a greenfield.

Greenfield estates adjacent to NBN Co's fibre access network would typically be provided with FTTP at a much lower cost per premises than retrofitting existing housing stock. In most cases, the new premises could be served by an existing fibre exchange (the only cost being additional line cards if the OLT needs extra capacity). If the network has been over-provisioned, feeder cables could be extended from the edge of the fibre access network into the new estate. Civil works would need to be conducted to extend the feeder network and install a distribution network, but these could typically be done at the same time as the road network is constructed and other utilities (including power and water) are installed. A drop cable would need to be installed to each premises in the new estate. This could also be done using pit and pipe infrastructure that is installed during construction, rather than retrofitted.

Greenfield estates which are not adjacent to an existing fibre network can be expensive to serve. A new fibre exchange may be required, and connecting the exchange to a competitively-priced backhaul network may require an long and expensive link to reach existing backhaul links.

If FTTP is deployed during the construction of a greenfield estate which is adjacent to the fibre access network, then the economics for an FTTP provider are typically very favourable: the cost to install the fibre is relatively low and because FTTP is the only fixed-line infrastructure available, penetration will be high. Today, many premises on greenfield estates with FTTP are sold with a fixed-line connection included, and penetration is 100%.

Source: Implementation Study; Industry interviews

In fact, once NBN Co has deployed its access network in an area, it should be required by Government to act as the network provider of last resort for greenfield developments which are required to install fibre. However, it would be an unreasonable expectation for NBN Co to serve new premises constructed in areas where it has yet to deploy its access network. Serving dispersed pockets of new premises would be a significant distraction to the broader NBN Co roll-out, potentially leading to cost overruns and time delays.

*[New] developments by nature occur on a random basis, location and size. Installing fibre in vastly isolated pockets of varying sizes requires premature investment in infrastructure which will struggle to secure sufficient initial return until neighbouring areas have fibre installed*

Christchurch City Networks (2009)<sup>17</sup>

Nevertheless, NBN Co should, by the end of the roll-out period, have either provided a wholesale access service to all new premises or received confirmation from ACMA that new premises are adequately served. In doing so, NBN Co will have fulfilled its mandate to ensure that all premises in Australia have access to superfast broadband services by the end of its roll-out.

**Recommendation 12.** That NBN Co's coverage objective include new premises that are constructed during the period of the roll-out; however, that NBN Co not be expected to cover these new premises prior to the NBN access network being deployed to that geographic area.

Due to the commercial attractiveness of some greenfield estates, it may make sense for NBN Co to serve greenfield developments in areas where it has not yet deployed its fibre access network. This would be a commercial decision for NBN Co and could include planning its roll-out schedule to cover high growth areas early. Alternatively, NBN Co could establish a Build-Operate-Transfer (BOT) contract with a network provider who would deploy FTTP networks in greenfield areas, operate them for a set period and then transfer operations and ownership to NBN Co at the relevant time during its roll-out. Such an arrangement could be made with Telstra, for example, as part of a broader agreement to migrate its customers to the NBN.

Exhibit 2–15 shows the likely coverage outcomes for new premises under the proposed approach to implementing NBN Co's coverage objectives for new premises. Three classes of new premises are described: those within NBN Co's FTTP footprint, those outside the FTTP footprint but likely to be covered by the copper network, and those beyond both the FTTP footprint and the copper footprint. The expected coverage outcomes are described for each class of premises, should they be constructed prior to the deployment of the NBN in their area and if they are constructed after the deployment of the NBN in their area.

<sup>17</sup> Christchurch City Networks Limited 2009, *Submission on 'Broadband Investment Proposal'*

Exhibit 2–15. Coverage outcomes for different classes of new premises constructed before and after NBN deployment in an area

		NBN deployment at time of construction	
		NBN not deployed in area	NBN deployed in area
Likely NBN coverage by end of roll-out	<b>FTTP footprint</b> 93% of brownfields ~100% of greenfields <sup>a</sup>	<ul style="list-style-type: none"> <li>▪ Served by copper or developer-funded FTTP (likely Telstra)</li> <li>▪ NBN FTTP installed later</li> <li>▪ Fibre-ready duct, pit and pipe to facilitate NBN retrofit</li> </ul>	<ul style="list-style-type: none"> <li>▪ NBN Co install FTTP</li> <li>▪ Developer covers cost of trenching, duct, pit and pipe</li> <li>▪ Option to choose alternative provider to install FTTP</li> </ul>
	<b>Non-FTTP footprint, copper available</b> 6% of brownfields	<ul style="list-style-type: none"> <li>▪ Served by copper</li> <li>▪ Covered by NBN non-fibre as deployed</li> <li>▪ Fibre-ready duct and pipe within premises boundaries to give option for cost-effective overbuild with FTTP</li> </ul>	<ul style="list-style-type: none"> <li>▪ Served by copper and NBN non-fibre</li> <li>▪ Fibre-ready duct and pipe within premises boundaries to give option for cost-effective overbuild with FTTP</li> </ul>
	<b>Non-FTTP footprint, no copper available</b> <1% of brownfields	<ul style="list-style-type: none"> <li>▪ Served by other providers</li> <li>▪ Covered by NBN non-fibre as deployed</li> <li>▪ No requirement to install ducts, pits and pipes</li> </ul>	<ul style="list-style-type: none"> <li>▪ Served by NBN non-fibre, satellite or other 'bespoke' solutions</li> <li>▪ No requirement to install ducts, pits and pipes</li> </ul>

a. Some limited small-scale greenfield developments may occur beyond the final NBN FTTP footprint, however extremely rare  
SOURCE: Implementation Study

Exhibit 2–16 outlines a model for NBN Co to serve greenfield developments in an area where it has become the provider of last resort. Developers will continue to be required to cover the costs of trenching and the duct, pit and pipe network. However, in these areas NBN Co would cover the costs of installing all other FTTP network infrastructure up to the network boundary. For residential premises, this will involve all installation up to the first wall outlet. A different level of installation may be required in commercial premises, depending on the model of installation developed for them.

This model aims to replicate the responsibilities and funding arrangements currently in place when new premises are connected with copper infrastructure. This has the advantage of providing continuity for developers and local councils as well as preventing any additional impost being placed on the developer that could exert upward pressure on house prices. However, it can only apply once NBN Co is in a position to extend its existing network.

For brownfield developments in the vicinity of NBN Co's access network, only Phase 3 of Exhibit 2–16 applies. In all cases, NBN Co can choose to charge a connection fee to owners of premises. Today, Telstra's fee to connect new premises to the copper network is \$299.<sup>18</sup>

<sup>18</sup> Telstra, viewed 1 March 2010, <<http://www.telstra.com.au/homephone/connections>>

Exhibit 2–16. Responsibilities and funding for greenfield FTTP roll-outs in area where NBN Co has deployed its network

	Phase 1—trenching and headworks	Phase 2—passing homes	Phase 3—connecting homes (as built)
<b>Elements of network</b>	<ul style="list-style-type: none"> <li>Trenches to premises boundaries</li> <li>Feeder line and connection to fibre exchange</li> </ul>	<ul style="list-style-type: none"> <li>Ducts, pits, pipes</li> <li>Fibre roll-out to FDT<sup>a</sup></li> <li>OLT</li> <li>Other network elements up to FDT</li> </ul>	<ul style="list-style-type: none"> <li>Home wiring</li> <li>Trenches and ducts on premises</li> <li>Drop cable</li> <li>ONT</li> </ul>
<b>Party responsible</b>	<ul style="list-style-type: none"> <li>Developer (trenches)</li> <li>NBN Co (feeder line, fibre exchange)</li> </ul>	<ul style="list-style-type: none"> <li>Developer (ducts, pits, pipes)</li> <li>NBN Co (all other)</li> </ul>	<ul style="list-style-type: none"> <li>Developer (home wiring, trenches, ducts)</li> <li>NBN Co (drop cable and ONT)</li> </ul>
<b>Costs</b>	<ul style="list-style-type: none"> <li>Developer passes through to homebuyer</li> <li>NBN Co</li> </ul>	<ul style="list-style-type: none"> <li>Developer passes through to homebuyer</li> <li>NBN Co</li> </ul>	<ul style="list-style-type: none"> <li>Home builder and developer pass through to homebuyer</li> <li>NBN Co covers costs, charges homeowner connection fee</li> </ul>

a. Fibre Distribution Terminal. The point, on a pole or in a pit, where the drop cable will connect to the distribution cable  
 SOURCE: Implementation Study

Outside the fibre footprint, the responsibility of NBN Co in greenfields estates would be limited to the provision of satellite broadband services, based on the approach to the final 10 percent proposed by the Implementation Study. Since serving newly-built premises in this footprint requires installing the same CPE as for existing buildings (i.e. satellite dish or fixed-wireless antenna, modem) with no additional trenching or cabling, no unique requirement needs to be specified for greenfields in these areas.

**Recommendation 13.** That NBN Co be required to act as the network provider of last resort for premises constructed within, or adjacent to, NBN Co’s fibre access network; that developers be required to cover the costs of trenching and providing the duct, pit and pipe network; that NBN Co cover the costs of installing all other FTTP network infrastructure up to the premises.

### Establishing a national standard for FTTP networks to enable integration with the NBN

Providers other than NBN Co will play an important role in serving developments that choose to install FTTP infrastructure. With multiple providers installing FTTP throughout the country, there is a risk of inconsistent architectures being deployed. This would make it difficult to ensure that the FTTP networks installed will be capable of satisfying Government’s performance specifications for premises within the fibre footprint and will make upgrades more challenging. There would be a risk that greenfields could become tomorrow’s broadband access blackspots.

To ensure consistency in the fibre footprint, Government should require that where FTTP access networks are installed they should comply with national FTTP design standards administered by ACMA with the aim of advancing Government's broadband policy objectives. The design standards would ensure that where FTTP infrastructure is installed by another provider, the infrastructure will be of the same standard as the architecture that will be deployed by NBN Co. ACMA should consult closely with NBN Co in the development of these standards.

**Recommendation 14.** That ACMA be tasked with issuing national FTTP design standards that all parties should adhere to when deploying an FTTP network for the purposes of providing telecommunications services to the public; that these standards should align with the network architecture deployed by NBN Co in its roll-out; that Government and NBN Co work with state governments to reference the design standards in state planning and building controls.

A national FTTP standard will ensure that the passive and active infrastructure provided over new FTTP networks is consistent with the architecture that will be used by NBN Co. A greenfield FTTP access network that is provided in a new development is likely to be a bottleneck asset, because it is unlikely to be duplicated and thus will be the only network enabling the delivery of superfast broadband to premises within its footprint. To comply with Government's broader NBN initiative, the network operator needs to offer wholesale products and pricing that enable service providers to enter and deliver services that meet Government's policy objectives.

Existing greenfield FTTP networks vary in the level to which they offer wholesale services on an open-access basis. While some providers operate wholesale-only, open-access networks, this is not the case for all. Some provide wholesale access to competitors as well as providing retail services themselves. The largest FTTP provider, Telstra, does not offer wholesale access to competitors.<sup>19</sup> Where Telstra's FTTP network is the only fixed network serving the area (i.e. there is no copper), these end users must choose between buying fixed-line services from Telstra or not buying a fixed-line service at all.

To facilitate the achievement of its policy goals, Government should require that FTTP networks installed in new developments provide an open-access, Layer 2, wholesale service to service providers on terms that meet the test of equivalence. This could be achieved either through the legislation for new developments or through the insertion of a requirement in the licence conditions (Chapter 10).

Product and price specifications should be regulated to meet the standards of NBN policy under the supervision of the ACCC. Nevertheless, the product specifications may

<sup>19</sup> Crozier, R 2010, 'Telstra Velocity fibre network remains closed shop', *itNews*, 15 February, viewed 16 February 2010 <<http://www.itnews.com.au/News/167270,telstra-velocity-fibre-network-remains-closed-shop.aspx>>

differ from NBN Co's and the active equipment used may not enable integration with the NBN. Rather than this meaning NBN Co would need to completely overbuild in such an estate, flexibility can be preserved by imposing a dark-fibre unbundling requirement on these third-party networks. With access to dark fibre, NBN Co will have the option of installing its own active equipment, enabling it to offer its national, wholesale service.

To enable unbundling to dark fibre, greenfield fibre providers should be required to deploy a home-run fibre topology under the national FTTP design standards. As discussed in Chapter 4, a home-run fibre topology is the best way of ensuring that the network can be unbundled to provide dark fibre services, provided that it is affordable. The biggest cost in providing home-run fibre is the creation of sufficiently large ducts—the additional cost of providing these ducts in greenfield developments is minimal. Hence requiring the installation of home-run fibre in greenfields is the best option for ensuring that these areas will receive wholesale services consistent with the rest of the NBN. The pathway to unbundling is described further in Chapter 10, and once the topology for the full network has been determined, Greenfield requirements should be aligned.

**Recommendation 15.** That the national FTTP standards require that the topology deployed in new developments be home-run and not shared; that this requirement be reviewed in conjunction with the broader review of topologies to be completed by the earlier of:

1. Coverage of 15 percent of premises within the proposed fibre footprint;
2. 31 December 2013.

Therefore, as NBN Co enters an area already covered by a third party FTTP network, to maximise the reuse of third party greenfield networks where possible, it should follow the sequence laid out in the recommendation below. Where the premises are adequately served, NBN Co may consider acquiring the local access network on a commercial basis.

**Recommendation 16.** That NBN Co overbuild third party FTTP networks that do not comply with the FTTP design standards; that, where a deployment does comply with the FTTP design standards established by Government, NBN Co may:

1. Apply to ACMA to have the premises declared 'adequately served';
2. Attempt to secure access from the network owner that would allow NBN Co to offer wholesale services over the network;
3. Overbuild the network where NBN Co is unable to secure necessary access and the premises are not declared 'adequately served'.

Telstra has suggested that where an FTTP network is deployed in a greenfields area, the USO be transferred to the operator of that network<sup>20</sup>. This issue should be part of a broader review of USO legislation. The current USO regulations give the universal

<sup>20</sup> Telstra 2009, *Submission to DBCDE's FTTP in greenfield estates consultation process*

service provider flexibility as to the technology platform used to deliver USO services. To ensure consistency with NBN Co architecture, the national FTTP standards should require that all FTTP networks deployed in new developments be capable of providing voice services. As these networks would be open-access, it would be open to the USO provider to provide standard telephone services over the FTTP network using wholesale services.

### **Minimising the cost of subsequently providing fibre where it is not deployed upfront**

New developments that are not required, and elect not, to deploy fibre will be provided a standard telephone service by Telstra under the USO. This is likely to include developments smaller than the threshold contemplated by the legislation and also those where no commercial provider including NBN Co is willing to provide a service on commercial terms in these developments. One reason for this could be the lack of competitive backhaul to the area making the economics for an independent access network unviable.

These new areas served by copper when initially built during the roll-out period, but which fall within the future fibre footprint, will nonetheless later be overbuilt by NBN Co as part of its broader retrofit of copper areas. Government can take steps today to minimise the cost of this retrofit by requiring that any trenches dug and any duct, pit and pipe infrastructure deployed at the time of the new build be designed to provide sufficient space to allow for the retrofit with FTTP infrastructure.

This will greatly reduce the costs of NBN Co in retrofitting the area and reduce the time and disruption required to provide FTTP coverage to the estate. The additional cost to greenfield developers of complying with this regulation would be small, as the infrastructure currently deployed to house the copper network would require only minor adjustments to be suitable for fibre retrofit.

The requirement will differ depending on the type of development. For example, in the case of a brownfield development where a single new premises is constructed after subdividing a suburban block, the requirement should be to lay sufficient duct and pipe from the property boundary to the wall of the premises. Since no development occurs along the street, the requirement should not extend to deploying ducts, pits or pipes beyond the premises boundary.

Government should require all new developments served by copper to provide sufficient space for a fibre retrofit in this manner. Since the exact extent of the future fibre footprint will not be known at the outset, this means that some new developments that fall outside the fibre coverage areas will be future-proofed in this way even though they are not overbuilt with fibre as part of NBN Co's roll-out to achieve its FTTP coverage objective. This approach is still preferred however, since the number of premises falling into this

category is expected to be small, and having the capacity to retrofit with fibre increases the chances of expanding the footprint further, should Government decide to do so.

Finally, an exemption should be considered for premises which are so remote that no fixed-line telecommunications infrastructure is installed at the time of build (e.g. those premises where Telstra chooses to fulfil its USO obligations through alternative technologies such as concentrated radio or satellite telephone). For these premises, requiring duct, pit and pipe infrastructure to be built is unnecessary as they are unlikely to be retrofitted with FTTP.

**Recommendation 17.** That all new developments where fixed telecommunications infrastructure is deployed be required to provide a duct, pit and pipe network with sufficient additional capacity to allow for an FTTP deployment by NBN Co; that this infrastructure be provided at the developer's expense—an exemption being made for new premises where no fixed-line telecommunications infrastructure is installed.

It is important that compliance with the requirement to install duct, pit and pipe infrastructure be assessed while the services trenches in a new development are still open. If not, there is a risk that non-compliance may only be identified when NBN Co comes to use the ducts in a development and finds them absent. In such circumstances, NBN Co should have the right to seek compensation from the developer for the additional costs it will incur. NBN Co should establish a team that provides a point of contact for developers seeking advice on how to comply with the requirement and undertakes site visits to verify that new developments have installed the required duct, pit and pipe infrastructure.

**Advice.** That the NBN Co Board ensure the company establishes a team that provides advice to developers on the necessary steps for complying with the requirement to install duct, pit and pipe infrastructure and to undertake site visits to verify that the correct duct, pit and pipe infrastructure is installed.

Finally, where new internal wiring is installed in new premises, it should be done to enable fibre-based services to operate effectively. The speeds that can be realised by an end user are affected by the medium over which data is transferred from the ONT or residential gateway to other devices in the home. If low-grade copper wiring is installed in a house in the fibre footprint, the performance the home is able to access will be constrained. The FTTP design standards should include a requirement that internal wiring installed in new premises be capable of high-speed data transfer (e.g. CAT 5 or CAT 6 cables).

**Recommendation 18.** That the national FTTP design standards include a requirement, to come into effect after a sufficient notice period, that internal wiring installed in all new premises be of a standard that allows high-speed data transfer, e.g. CAT 5 or CAT 6.

### 2.1.5 MONITORING NBN CO'S PROGRESS

There are two key measures of progress that should be tracked for NBN Co. The first is how many premises have been covered by the end-user premises network. The second is whether it has provided access in non-competitive backhaul markets. Government needs to establish clear mechanisms by which it can monitor NBN Co's progress against achieving these objectives so that it can assess whether its policy objectives are being achieved at an adequate pace and respond to any issues.

#### Maintaining a Coverage Register

To ensure transparency into the company's progress in meeting its coverage requirement for the high-speed customer access network, Government should require NBN Co to maintain an NBN Coverage Register. The Coverage Register would be a register of all premises in Australia, with each premises identified by its specific geographical location data. NBN Co should record those premises it has covered with its customer access networks and those that remain to be covered. Exhibit 2–17 describes some example categories that Government may wish to include on the register.

The coverage register should be made publicly available, subject to a review of compliance with privacy obligations. By doing so, Government ensures that there is an audit trail for NBN Co's activities. If premises are mistakenly listed as covered when the owner is in fact unable to access NBN services, it will be possible for the end user to request a correction. Publicity will also protect NBN Co from undue criticism, because end users who could not be covered for some reason of frustration can clearly see the reasons that they are not able to access NBN services. Identification of frustrated premises should also encourage MDUs to facilitate connection as it could be expected to impact real estate value.

The register could also be the basis for advising service providers on the premises that have been covered by the NBN at any point in time, for the purposes of marketing retail services. Similarly the Register could be used to create an online tool that end users can use to determine whether NBN services are available in their area. For example, in Singapore, the company responsible for the roll-out of the country's national FTTP broadband network provides a Coverage Check portal on its home page ([www.opennet.com.sg](http://www.opennet.com.sg)), allowing home owners to check availability of FTTP services in their area by entering their post code or by registering for an alert when fibre does reach their area or building.

Exhibit 2–17. Example categories that may be included in the NBN Coverage Register

Category	Description
Total estimated premises	Estimate of all premises in Australia.
Covered by competitive markets	Premises in areas where it is determined that the services provided by the market satisfy Government's objectives.

Covered by NBN Co FTTP customer access network	Premises for which a fibre distribution terminal (FDT) has been provided.
Covered via community-funded extension	Premises for which a fibre distribution terminal (FDT) has been provided as a community-funded extension of FTTP.
Covered by NBN fixed-wireless access network	Premises within a defined distance from a NBN fixed-wireless base station provided by fixed-wireless provider.
Covered by NBN Co satellite access network	Premises within the range of NBN Co's satellite beam.
Coverage not possible due to frustration	Premises to which NBN Co has made reasonable attempts to deploy its customer access network but has been frustrated in doing so. NBN Co should be required to list how the coverage attempt for premises has been frustrated. Examples: <ul style="list-style-type: none"> <li>■ Access denied</li> <li>■ Local authority has not granted planning permission</li> </ul>
Estimated premises remaining to be covered	Total premises less those covered by an NBN customer access networks or served by competitors. Premises that have been frustrated will be removed from this total.
Source: Industry interviews	

**Recommendation 19.** That a register (the NBN Coverage Register) be maintained of all premises in Australia; that the register meet the following requirements:

1. Be publicly available through mechanisms approved by Government;
2. List premises in specific categories that detail the coverage status of each premises;
3. Be updated at regular intervals;
4. Identify premises with specific geographical location data.

## Measuring progress on backhaul

As discussed in Subsection 2.1.1 and Chapter 6, NBN Co should intervene selectively in the backhaul market by providing transit backhaul capacity to points where competitive backhaul is available. A list of monopoly routes should be identified by the ACCC and NBN Co should report on which of these routes it has secured access to and offered services on. The backhaul routes register should be made accessible to NBN Co's wholesale customers.

**Recommendation 20.** That a register be maintained of all monopoly transit backhaul routes between NBN Co's proposed fibre exchanges and POIs, on which NBN Co intends to build or purchase capacity; that NBN Co be required to update this register as it secures access to and offers services over each backhaul route; that the backhaul register be made accessible to wholesale customers of NBN Co.

### Verifying progress

NBN Co should be required to detail in its annual report the progress it has made in rolling out its high-speed customer access network and in providing backhaul services on monopoly backhaul routes. Government should require NBN Co to include in these progress reports detailed information on the amount that NBN Co has spent to carry out its mandate. As part of this reporting process, NBN Co should arrange for an independent audit of its progress, which would be appended to the annual report.

In addition to these annual reports, NBN Co should provide such interim progress reports as Government requires.

**Recommendation 21.** That NBN Co be required to deliver in its annual report detail of its progress towards meeting its coverage objective, expenditure incurred in doing so and provide such interim progress reports as Government requires and are reasonable.

## 2.2 Creating a platform to meet future needs

The NBN is a long-term investment that will create a platform to support a vibrant telecommunications sector in Australia for decades to come. The network should therefore be capable of supporting the necessary industry structure and competition outcomes. This has several important implications.

First, NBN Co should secure long-term access to bottleneck assets in the network and offer them on an equivalent basis to access seekers. If these bottlenecks re-emerge, for example, if NBN Co were unable to renegotiate a dark-fibre contract for a backhaul link, then competition outcomes will not be achieved.

Second, the network should be built to accommodate service innovation and growth in bandwidth demands. The majority of the cost for deploying the network will be from civil works—for example the digging of trenches, installation of splitter cabinets and creation of fibre exchanges. The life of the assets created will be far longer than any reasonable attempt to predict future usage or technology, so flexibility is paramount. By ensuring that the physical aspects of the network have sufficient excess capacity and flexibility, NBN Co can avoid repeating costly civil works to upgrade or retrofit the network in the future. The choice of FTTP is an important future-proofing measure, because optical fibre can support huge increases in bandwidth by upgrading the electronics only. Where new ducts and access points are created, these should be accessible and have spare capacity to allow for future expansion.

Third, existing HFC networks should only be used as part of the NBN on an interim basis, due to challenges with providing both near-term services compatible with the rest of the fibre footprint, as well as providing a clear upgrade path consistent with fibre performance.

Finally, the choice of fibre architecture will be critical to enabling long-term innovation and competition on the network. Specifically, to ensure vibrant competition at the active layer (the electronics which send signals down the fibre and hence control bandwidth), the design of the fibre topology should anticipate the need to unbundle the physical fibres and allow competitive providers to introduce their own electronics. This topic is discussed in greater detail in Part C. This move towards unbundling should take place prior to the privatisation of NBN Co, to minimise the risk of anti-competitive actions by a privatised monopoly access provider.

2.2.1 Securing rights to essential network assets

2.2.2 Providing for usage growth and service innovation

2.2.3 Limiting HFC to an interim solution only

### 2.2.1 SECURING RIGHTS TO ESSENTIAL NETWORK ASSETS

To ensure a level playing field for service providers and encourage market entry, NBN Co should facilitate open access to bottleneck assets.

NBN Co could secure access to bottleneck assets through various means. It could construct the asset, as it will for its FTTP customer access network. It could also acquire assets, as may be an option in the case of existing greenfield FTTP networks. In both these cases, NBN Co's ownership of the bottleneck asset will ensure its ability to offer wholesale access to service providers.

NBN Co may also be presented with commercial offers to access bottleneck assets through leases. Consider the case of securing access to dark fibre on a backhaul link. A carrier may be willing to lease access to NBN Co for the purposes of providing transit services to a fibre exchange, but wish to retain ownership of the link for the purposes of serving its mobile network.

Relying on a lease to secure access to a bottleneck asset could present a problem for NBN Co if the lease is of insufficient duration. At the time that the lease expires there will be difficult renegotiation of access terms and conditions. NBN Co would need to bargain for access to an asset that was now essential to its operations, with little negotiating power. If NBN Co chooses to use a lease to secure access to a bottleneck asset, it should therefore ensure that it this lease is of sufficient duration to ensure confidence in the long-term viability of the network. In particular, NBN Co should have a preference for indefeasible rights of use.

**Advice.** That the NBN Co Board ensure that where possible the company's operations are based on managing access to physical assets over which it has indefeasible or long-term rights of use. This may involve legal ownership of the physical asset, or arrangements that guarantee access to the asset for its lifetime or over long time spans. Limited access arrangements should only be used where NBN Co is confident that at the time the arrangement is concluded, renewal of the access rights or a substitute asset will be available for NBN Co to maintain continuity of services over its network.

### 2.2.2 PROVIDING FOR USAGE GROWTH AND SERVICE INNOVATION

Since many of the components of the NBN could last for a generation or more, it is important that the network is planned in a manner that maximises its ability to meet the long-term needs of the country. In 1960, when the national telephone numbering system was proposed in the Community Telephone Plan for Australia, the numbering system was designed to cater for a projected 2010 population of 33 million people—this at a time when the national population was approximately 10 million. The population projection

was deliberately weighted ‘on the liberal side’ to ensure that the country would not run short of telephone numbers prematurely.<sup>21</sup>

A similar degree of foresight as was shown in 1960 needs to be exercised in the planning of the NBN. Over the life of the NBN, the demands on the network are likely to increase due to population growth, increasing penetration of high-speed broadband and the emergence of new services and business models.

### Planning for growth in activations

The network needs to be built to accommodate growing demand for activations. Increasing demand for activations could be driven by three factors:

- **Increasing number of premises.** As it is proposed that NBN Co will act as the network provider of last resort in areas where it has deployed its network, it will need to design its network to accommodate new premises constructed within its network footprint.
- **Increasing penetration of fixed broadband.** As fixed broadband penetration increases, premises which previously did not have a fixed service may request one. Currently, broadband penetration is approximately 62 percent, suggesting there is room for further growth in take-up.
- **Increasing number of activations per premises.** It is foreseeable that premises begin to request multiple NBN activations to meet their increasing connectivity needs.

The steps that need to be taken to provide for increasing numbers of connections differs for the different networks that NBN Co will be operating. For the FTTP network, it will require the over-provisioning of fibre exchanges, splitters and the distribution network to ensure new connections can be supported without having to undertake an expensive retrofit of the central elements of the network.

In the non-fibre footprint, satellite services should be provisioned to anticipate growth in demand over their likely lifetime, and similarly, the tender for a fixed-wireless network provider described in Chapter 5 should stipulate a requirement to cater for expected growth in premises within the coverage area. For example, satellites selected should be able to provide for growth in demand over their likely lifetime, and the launch of replacement satellites with greater capacity should be planned to minimise lags in providing sufficient services to end users. For both satellite and wireless networks, the greater degree to which the network capacity is shared between end users means they must be designed to allow for growth in activations and growth in bandwidth demand.

<sup>21</sup> Director General Posts and Telegraphs 1960, *Community Telephone Plan for Australia 1960*, Canberra

## **Planning for growth in end-user bandwidth demands**

Not only will the NBN need to be designed to accommodate new activations, it needs to be designed to accommodate the increasing bandwidth being used by end users over their connections. The amount of data downloaded each year in Australia is increasing dramatically. The average amount of data downloaded from an Internet connection in Australia grew by 58 percent per annum from 2004 to 2009 (Chapter 3).

By allowing Australians to experience superfast broadband speeds, and by enabling the development of new high-bandwidth services, the NBN is likely to accelerate the growth in demand for bandwidth amongst Australian Internet subscribers. For example, in industry interviews conducted by the Implementation Study it has been suggested that by increasing the availability of enterprise-grade broadband products in the Australian market, the NBN is likely to stimulate greater take-up of these products by the SME segment.

In selecting fibre-to-the-premises (FTTP) as the preferred technology for providing high-speed broadband connections to premises, Government has ensured that the majority of the network will have the capacity to be upgraded successively in response to increasing bandwidth demands. A single optical fibre has the potential for massive increases in speed and capacity through the upgrade of electronics at either end. To ensure that the NBN keeps pace with growing bandwidth demand, NBN Co should plan to upgrade these active electronics (Chapter 10).

Installation of equipment within end-user premises should be designed to accommodate future growth. For example, within the fibre footprint ONTs should be designed so that they can be easily upgraded. Similarly, wireless and satellite CPE have rapid innovation cycles and should be designed and installed in a manner that facilitates future upgrades.

To the extent that new in-home wiring is laid as part of the installation, it should be able to support the higher speeds available over the NBN. If in-home wiring is not upgraded, the speeds that can be obtained by end users may be limited. As outlined in Subsection 2.1.4, newly constructed premises should be required to have home wiring which supports high-speed data transfer within the premises.

## **Providing flexibility for future innovation**

In addition to catering for likely increases in the number of activations and growth in the amount of bandwidth used over each connection, the network needs to be designed in a manner that provides flexibility for future innovation. Without doing so, innovation is likely to be stifled on the network and there is a risk that the network will be unable to support cutting-edge services offered internationally. To support innovation, the design of the NBN should anticipate that innovation can occur along a number of dimensions, including the physical layer of the network, the end-user devices connected to the network and services offered across the network, which is discussed further in Chapter 3.

Exhibit 2–18. Examples of high-speed broadband offers from HFC network operators

HFC network operator	Offers
Cablevision (US)	101 Mbps download and 15 Mbps upload. Other services: Digital television, voice
J:COM (Japan)	160 Mbps download and 10 Mbps upload. Other services: Digital television, voice
ZON Multimedia (Portugal)	200 Mbps download and 10 Mbps upload. Other services: Digital television, voice
Virgin (UK)	50 Mbps download, upload speed not advertised. Launched customer trial involving 100 end users in May 2009 for a service with download speeds of up to 200 Mbps. <sup>a</sup> Other services: Digital television, voice

a. Barnett, E 2009, 'Virgin launches 200 Mb broadband customer pilot scheme in Kent', *Daily Telegraph*, 6 May

Source: Implementation Study

### 2.2.3 LIMITING HFC TO AN INTERIM SOLUTION ONLY

Approximately 2.6 million premises in Australia are currently able to obtain services from HFC networks.<sup>22</sup> In many countries, HFC networks compete effectively with FTTP networks to provide customers with high-speed broadband (Exhibit 2–18). These international examples demonstrate that it is possible to achieve download speeds in excess of 100 Mbps over HFC networks and to deliver voice and television services.

In Australia, Telstra recently announced the completion of the upgrade to its HFC network and now estimates that almost one million households in Melbourne will be able to access download speeds of up to 100 Mbps and upload speeds of up to 2 Mbps.<sup>23</sup> Telstra has also signalled plans for further upgrades to its HFC that could enable download speeds of up to 200 Mbps.<sup>24</sup> However, at present it is unclear to what extent the Telstra upgrade will extend to other cities.<sup>25</sup>

Today, Telstra's network delivers download speeds of up to 30 Mbps and upload speeds up to 1 Mbps for homes in Sydney and download speeds of up to 17 Mbps and upload speeds of up to 256 kbps to homes outside Sydney and Melbourne.<sup>26</sup>

<sup>22</sup> Australian Communications and Media Authority 2009, *Communications report 2008–09*, Canberra

<sup>23</sup> Bingemann, M 2009, 'Telstra completes HFC upgrade', *Australian*, 19 November

<sup>24</sup> Telstra, *Telstra unveils super-fast cable broadband*, media release, Sydney, 10 March 2009

<sup>25</sup> Oakes, D 2009, 'Upgrade halt puts Telstra in for NBN role', *Age*, 21 October

<sup>26</sup> Telstra, *Telstra unveils super-fast cable broadband*, 10 March 2009

Optus has also announced an upgrade to its HFC network to DOCSIS 3.0, and indicated its intention to offer speeds up to 100 Mbps by the middle of 2010.<sup>27</sup> The Optus network offers download speeds of up to 20 Mbps across its network and upload speeds of up to 512 kbps.<sup>28</sup>

International examples and the upgrade of local networks demonstrate that it is possible to deliver services with peak download speeds that meet Government's performance objectives. This raises the prospect that an HFC network could be used to provide NBN coverage to a significant proportion of the country. This could be done either by:

- NBN Co acquiring either full ownership or an indefeasible right of use for one of either Telstra's or Optus' HFC networks, or a combination;
- An HFC network owner designating the network an open-access network and meeting the requirements for an ACMA declaration that the premises it covers are adequately served.

However there are challenges that must be overcome if HFC networks are to be used to deliver NBN services:

- HFC networks have not historically been designed to offer wholesale open-access. While this is viewed as technically possible and is being pursued in Denmark and the Netherlands, the technology solution has not yet been proven in the field;
- While HFC networks are capable of high connection speeds, a download speed of 100 Mbps on HFC is not equivalent to a speed of 100 Mbps on an FTTP network. Due to typically higher rates of contention on HFC networks, end users are likely to experience lower average speeds on HFC than on fibre. HFC also generally offers lower upload speeds than fibre;
- HFC does not have sufficient capabilities to deliver the types of enterprise-grade products that can be delivered over point-to-point fibre connections. To serve these customers, NBN Co would still need to deploy a fibre network in areas where HFC serves residential customers;
- HFC networks may struggle to keep pace with upgrades to the fibre network, particularly in the long term;
- There are challenges in unbundling an HFC network, particularly when it has not been designed with that purpose in mind.

Further detail on these challenges is provided in Exhibit 2–19.

<sup>27</sup> Crozier, R 2010, 'Optus to boost HFC network up to 100 Mbps', *itNews*, 9 February, viewed 10 February 2010, <<http://www.itnews.com.au/News/166775,optus-to-boost-hfc-network-up-to-100-Mbps.aspx>>

<sup>28</sup> Whirlpool 2010, *Broadband choice: OptusNet*, viewed 15 February 2010, <<http://bc.whirlpool.net.au/bc/isp-3/optusnet.htm>>

The challenges of maintaining upgrades in line with FTTP and the difficulty of unbundling on HFC networks however, suggest that NBN Co would need to overbuild HFC networks by the end of the roll-out to provide for future growth. Notwithstanding these points, to the extent that NBN Co can demonstrate that the use of HFC to deliver services will be cost effective in achieving interim coverage sooner, Government should consider permitting its use as part of the NBN technology.

**Recommendation 22.** That NBN Co be permitted to use HFC networks as an interim technology, provided that these networks are capable of providing wholesale open-access services; that NBN Co be required to plan and establish a construction schedule to achieve its FTTP coverage objective by the end of its roll-out, regardless of coverage of HFC networks.

#### Exhibit 2–19. Challenges to using HFC networks to provide NBN coverage

Challenge	Details
<b>Upgrading to meet service requirements in fibre</b>	<p>To meet the performance requirements outlined by the Government for the NBN's FTTP footprint, the HFC networks will need to be upgraded. This will include node splits and upgrade to DOCSIS 3.0.</p> <p>Even with these upgrades, the upload speeds available over HFC are likely to be significantly lower than those available over FTTP. For example, while Telstra's DOCSIS 3.0 upgrade in Melbourne will deliver download speeds of up to 100 Mbps, upload speeds will only be up to 2 Mbps.</p> <p>In the case of Telstra's HFC network, a further upgrade would be required to enable voice services, which it is not currently capable of delivering.</p>
<b>Converting HFC to a ubiquitous platform for an area</b>	<p>HFC networks share bandwidth between end users connected to a node in the HFC network. For this reason performance is influenced by take-up—as more users connect to a node in the HFC network, contention for the bandwidth available on a node increases. Where take-up rates are higher, a greater number of node splits may need to occur to ensure performance for end users.</p> <p>In most markets, HFC is a competitive entrant in broadband—it is difficult to find examples where it is used as the platform for serving all customers in an area. To support higher levels of penetration, a greater investment in the upgrade of the HFC networks will be required.</p>
<b>Catering for business premises</b>	<p>Even with upgrades, HFC networks may not be a sufficient solution to deliver products that business demands due to the lower maximum and guaranteed speeds and greater asymmetry compared to FTTP networks. Cable companies have had limited success in serving business customers overseas.</p> <p>If HFC were used to achieve NBN coverage, NBN Co would likely still need to roll-out FTTP to provide business users with higher specification products. This occurs today when enterprise customers are provided with point-to-point FTTP solutions even though residential customers in the same area only have access to DSL technologies. However NBN Co is likely to aim to roll-out a greater proportion of point-to-point enterprise and connections than currently exist in the market. The incremental cost of</p>

	providing these connections where the whole area is served with fibre is much lower than the cost where residential premises are served by HFC.
<b>Providing open-access wholesale services over HFC</b>	<p>Expert interviews suggest that there should be no reason why an HFC network could not be used as a wholesale open-access network through either bandwidth allocation or channel allocation. However, traditionally cable modems have not been designed to support multiple operators in the home, although such solutions are currently under development.</p> <p>There are currently no international examples of a wholesale open-access HFC network. However in 2009, both the Dutch and Danish Governments announced they would require cable companies to provide wholesale services to competitors.<sup>a</sup> Dutch cable operators Ziggo and UPC are due to offer access to their analogue cable service at prices set by the regulator OPTA in March 2010.</p>
<b>Filling coverage gaps</b>	<p>There are significant gaps in the coverage of HFC networks. The Telstra network is unable to serve about 2 percent of houses within its coverage area.<sup>b</sup> The Optus network has more gaps with 36 percent of houses within its coverage area unserviceable.<sup>c</sup> Optus claims that its coverage gap is comprised of MDUs, distance and heritage overlays.<sup>d</sup> Any solution that relies on the HFC networks would require these gaps to be filled.</p> <p>Filling these gaps may require the rolling of additional coaxial cable to pass streets and connect homes. Alternatively there are solutions which can deliver cable electronics over optical fibre connections to premises.</p>
<b>Managing an uncertain future upgrade path</b>	<p>Fibre has the potential for massive increases in bandwidth and capacity through new electronics.</p> <p>Growth in bandwidth usage in future could lead to customer requirements outstripping the capabilities of HFC networks. While FTTP architecture is a superior technology for serving growing upstream and downstream bandwidth, there is sufficient capacity within HFC technology to provide services that deliver an equivalent experience for residential customers in the medium term through upgrade to DOCSIS 3.0. Node splits can be performed so that fewer customers are served per node, increasing the average speed and capacity for each customer. The life of existing HFC networks may also be extended by improvements in video encoding, reducing the bandwidth demands on the network.</p> <p>Recognition of the greater future-proofing characteristics of FTTP has led the international cable industry to develop a standard that allows cable technology to be delivered on an FTTP network, removing the constraints of the coaxial last mile.</p>
<p>a. European Commission, Commission clears Dutch regulator OPTA's proposal to enhance competition in the broadcasting markets, media release, Brussels, 11 February 2009; Commission endorses new Danish rules to open wholesale access to cable broadband, media release, Brussels, 12 March 2009</p> <p>b. Ergas, H 2008, Wrong Number: Resolving Australia's Telecommunications Impasse, Allen &amp; Unwin, Sydney</p> <p>c. ACMA 2008, Communications Report 2007–08</p> <p>d. ACCC 2008, Telstra's exemption application in respect of the Optus HFC network, Canberra</p> <p>Source: Implementation Study</p>	

## 2.3 Ensuring affordability and encouraging take-up

Government has a policy objective to provide access to broadband to all Australians at an affordable price.

Two aspects of affordability are relevant. First, services need to be offered at affordable prices to drive take-up of broadband. Second, a person's ability to access broadband services should not be dependent on where they live. Currently, the accessibility and affordability of broadband varies significantly across the country. The impact of this is that the quality of broadband offers and hence broadband penetration is lower in more remote areas of Australia.

NBN Co's wholesale services will comprise the majority of service provider costs. Therefore NBN Co will have significant influence over the retail prices that end users pay through the prices it charges service providers for its wholesale access and transit services. By setting its wholesale prices at a level that encourages take-up across the country, NBN Co can enable service providers to deliver affordable broadband throughout Australia.

By creating a competitive retail market across the country the NBN initiative will help ensure that affordable wholesale prices translate through to affordable retail prices. While there are other components required to deliver retail broadband services that are beyond the control of NBN Co (e.g. international backhaul capacity), these represent a relatively small component of the per-customer cost of delivering connectivity.

NBN Co should focus on rapid take-up. Higher penetration means that the costs associated with the construction, maintenance and operation of the shared elements of the network are distributed between a greater number of end users, reducing the average cost of providing services.

*Failure to achieve scale in connections will lead to a high-cost operation which will not be commercially sustainable and will not provide the economic benefits the government desires.*

Ericsson (2009)<sup>29</sup>

2.3.1 Pricing to encourage take-up and usage

2.3.2 Providing affordable prices across the country

<sup>29</sup> Ericsson 2009, *Submission to New Zealand Government Broadband Investment Initiative*

### 2.3.1 PRICING TO ENCOURAGE TAKE-UP AND USAGE

NBN Co should bias towards achieving take-up rather than maximising revenue. Government's investment in the NBN is directed at increasing the access to and availability of high-speed broadband. If services offered over the network are too expensive for end users then the services cannot be considered reasonably available.

There are two take-up considerations that should guide pricing:

- **Stimulating greater household penetration of broadband services.** An affordable price for entry level products can help stimulate greater Internet penetration by bringing Internet services within the reach of a greater number of households.
- **Stimulating take-up of higher speed services by households that already have broadband.** By enabling higher speeds to be delivered for similar prices as lower speed products today, the NBN should stimulate the take-up of faster broadband speeds across the country.

It is difficult to assess what households would consider to be an affordable price for a service delivered over the NBN. The reason for this is that many end users have not yet experienced the kind of broadband speeds and services the NBN will enable. Chapter 3 recommends that NBN Co's prices should enable service providers to offer an entry level product to end users that is comparable in price to an entry-level DSL product but offers significantly faster speeds than the top level ADSL2+ product.

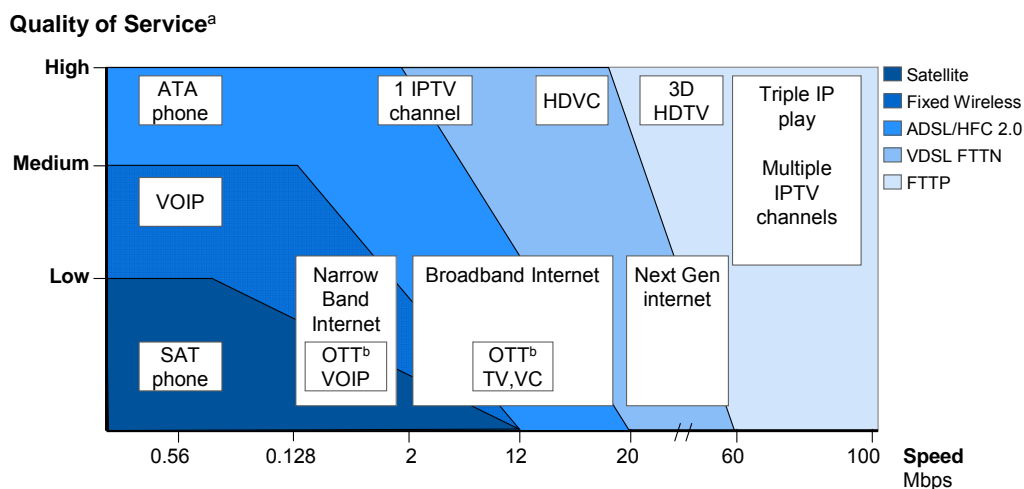
Policies targeted at ensuring reasonable affordability of services across the country should be distinguished from policies that are directed at providing broadband to low-income households. The need for and shape of policies directed at providing broadband to low-income households is a matter for Government beyond the scope of the Implementation Study.

**Recommendation 23.** That NBN Co be directed to set wholesale prices and offer migration incentives with the objective of achieving broadband take-up targets that Government sets at regular intervals and in accordance with the applicable regulatory pricing regime.

### 2.3.2 PROVIDING AFFORDABLE PRICES ACROSS THE COUNTRY

A fundamental principle underlying Government's NBN initiative is that a person's ability to access broadband services should not be dependent on where they live. Providing affordable access to telecommunications and broadband services across Australia has long been a challenge for policy-makers. The wholesale pricing of NBN Co should provide a powerful tool for ensuring broadband is affordable for Australians no matter where they live.

Exhibit 2–20. Capabilities of broadband access technologies



a. Comprises (1) Sustainability of data rate. In shared networks, such as wireless, data rate is not guaranteed but distributed on best effort principle. Hence, quality of service drops as data rate increases to indicate the contention of these networks. (2) Latency, i.e. the time data takes to travel through the network. High latency is highly noticeable in voice, gaming and security enabled services. Satellite networks are extremely susceptible to latency and this caps quality of service.

b. Over The Top

SOURCE: Implementation Study

## Recognising the different capabilities of access network technologies

The NBN will use multiple access technologies to deliver broadband services across Australia. Setting uniform prices (i.e. charging the same price for the same service) across the entire country is not feasible because the technologies are unable to provide the same service. In particular, FTTP is capable of much higher speeds than wireless and satellite.

Wireless and satellite also have higher latency meaning that even when the same download speed is offered on these technologies as on FTTP, the user experience can be very different.

Exhibit 2–20 portrays technical capabilities of different technologies based on data rates and quality of service. Technologies that have a higher data rate and quality of service are able to support a greater range of applications. Importantly, FTTP is able to support a number of applications that satellite and wireless cannot. It is therefore not meaningful to discuss the provision of identical services at the same price over different access technologies.

In addition, the cost for providing services is different for each technology platform. This is particularly relevant in the case of future upgrades to technology. For example, it is far cheaper to double the download speed over fibre than it is to double the download speeds over satellite. To provide NBN Co with an ongoing incentive to fund network upgrades, NBN Co must be able to reflect differences in the costs to upgrade different technologies in its prices.

Within the footprint of an access technology, Government should require uniform wholesale pricing for all access products as the same services can be enabled across the platform. It is also worth noting that the amount of additional revenue that is likely to be realised from charging higher prices for services in more remote areas is limited, since increased prices will harm take-up levels.

**Recommendation 24.** That NBN Co be permitted to apply differentiated wholesale pricing for each technology platform used in its customer access network; that, within each technology platform, uniform wholesale pricing be required for all access products.

### Ensuring affordable entry-level prices for access products across the country

While NBN Co will have different product and price offerings for each access technology platform, entry level products in each access technology should be priced at a similar level of affordability. This adheres with the principle that a person's access to broadband services should not be dependent on where they live.

**Recommendation 25.** That the entry-level services offered over each technology platform in NBN Co's customer access network be available to end users at a comparable but not necessarily identical price; that the same performance specifications of entry level services on different technology platforms not be required.

### Reducing regional backhaul costs

Even if NBN Co charges uniform wholesale prices for the access network, its services are not the only inputs to a retail service, and some of these other input costs are also expected to vary regionally. A major driver of variation in price across geography is the cost of providing backhaul. There are some parts of the country where a significant retail price increase would result from cost-based pricing of backhaul.

The backhaul routes where this would have the greatest impact on retail prices are typically the same routes for which NBN Co will be providing a transit backhaul service. By pricing its transit service at affordable levels, NBN Co can reduce the impact of backhaul costs on the retail prices of services in regional and rural Australia.

Where NBN Co does provide transit backhaul, it should be priced separately from access services. It is important to retain the connection between infrastructure cost and associated service pricing to preserve market signals and enable future investment in backhaul infrastructure. To strike a balance between this consideration and the Government's affordability objective, The Implementation Study recommends that NBN Co, supported by any necessary Government action, set a maximum price of backhaul for given contention rates. The mechanisms for achieving this are explored in greater depth in Chapter 6.

## 2.4 Managing a smooth transition from today's services and networks

Various telecommunications services, including Internet and telephone services, currently operate over the copper customer access network (CAN). These services are provided to millions of customers and are critical to public wellbeing. Providing such essential telecommunication services is part of the mandatory obligations for Telstra and other carriers.

Maximising customer take-up will be vital to the success of the NBN and can only be achieved by minimising customer disruption during the transition to NBN services. In addition to new services, customers must be confident that existing services will be maintained. This means ensuring continuity of essential services such as emergency calls and tele-health. Additionally, existing equipment should be used where possible to avoid customer retraining and the extra cost of replacement equipment. Installation should also be smooth, with minimum time spent at the premises.

Existing services will be less affected by the roll-out of the NBN so long as Telstra continues to operate the copper CAN. However, if Telstra elects to deactivate the copper service—either because it becomes uneconomic to operate or it strikes a deal with NBN Co to migrate its traffic to fibre—then the NBN will become the only fixed-line communications infrastructure available to deliver these services (including to non-premises).

In the event that copper is decommissioned, managing a smooth migration will be pivotal. The migration of telecommunications services from the copper CAN to the optical fibre NBN will be a complex process and must be managed well. The customer migration experience will initially be a measure of the success of the NBN policy implementation.

*End-user migrations processes must provide a good customer experience, protect against inappropriate sales and marketing activities ... and ensure that end users are able to take informed decisions. A process which meets these objectives will give citizen/consumers the confidence to switch and therefore benefit from competition.*

BT (2009)<sup>30</sup>

This section focuses on the actions for Government to take to ensure there is an effective migration process and continuity for existing services in the future.

- 2.4.1 Enabling existing services on the NBN
- 2.4.2 Addressing the needs of security and law enforcement agencies
- 2.4.3 Planning for copper decommissioning
- 2.4.4 Reviewing carrier and carriage service provider obligations.

<sup>30</sup> BT 2009, *Response to Ofcom's consultation document: Next generation networks*

### 2.4.1 ENABLING EXISTING SERVICES ON THE NBN

There are a wide variety of services delivered over today's copper network. In deciding which of these should be supported by the NBN, a balance should be struck between

- Coverage and demand from end users;
- Importance of the service in maintaining public order and wellbeing;
- Cost and complexity of transitioning these services onto the NBN;
- Natural upgrade cycle for equipment and software.

After considering these tradeoffs, The Implementation Study recommends that the NBN should be built to support three specific capabilities in addition to the services described in Chapter 3: PSTN emulation; customer location identification; and lifeline communications to customers identified as having a special requirement by Government.

#### Minimising need to replace copper network customer premises equipment

Many services still operate using plain old telephone services (POTS), including existing PSTN handsets, fax machines, tele-health devices and disability telecommunications equipment. Emulation through an analogue telephone adaptor (ATA) built into an ONT would allow users to keep using most devices.<sup>31</sup> Consequently, customer disruption is minimised as no end-user equipment retraining is required and installation within the premises does not require significant rewiring.

POTS emulation also costs less than alternative migration paths by avoiding the need to replace equipment and rewire premises. If emulation is adopted, no incremental funding is required to replace expensive equipment. Additionally, POTS emulation would avoid the need to rewire premises with CAT 5 cable for certain devices, which would require skilled labour.

It is possible that POTS emulation may not be compatible with a small percentage of legacy devices and these would need to be replaced by the consumer or retail service providers, depending on existing ownership arrangements.

**Recommendation 26.** That NBN Co be required to provide industry standard PSTN emulation at the ONT on all connections to its FTTP access network and bear the associated network costs.

<sup>31</sup> Industry interviews

### Offering lifeline functionality in case of power outages

Existing copper lines provide power to traditional wire-connected handsets allowing them to continue operating during a power outage. This allows emergency calls to be made on such devices during power outages if users are in distress.

Optical fibre does not carry electricity. If devices connected to the FTTP network require electric power to operate they must be connected to the electricity network or have an alternative power supply. In the event of a network power outage, these devices will only continue working if they have a backup source of power. To ensure functionality even during electricity outages, it is possible to provide battery backup for these devices.

Lifeline functionality is not available to all telephone customers today. For example, cordless telephones used by many residential and business customers generally need to be connected to the electricity network to function. If there is a power outage, cordless telephones will not be able to make or receive telephone calls even though they are connected to the copper telephone network.

An alternative way to make emergency calls is on mobile phones, which are now at a penetration of 115 percent in Australia and currently account for over 60 percent of all emergency calls.<sup>32</sup> Furthermore, only 4 percent of Australians claim they need a fixed-line telephone service for emergency call purposes.<sup>33</sup>

Providing battery back-up for all 11 million fixed-line voice subscribers in Australia would cost an additional \$90–150 million each year. This estimate is based on a high-quality sealed lead acid battery, which costs approximately \$40 and has an operational life of 3–5 years.<sup>34</sup>

Furthermore, providing batteries universally would involve disposing of approximately 2–4 million batteries annually. This could cause an environmental hazard if the toxic lead-acid batteries used are not recycled or disposed of safely. If a battery backup approach is pursued, NBN Co should explore available technologies to reduce the cost of the solution—for example, batteries that automatically enter standby mode unless a call is in progress, which reduces the required battery size to provide a given duration of coverage in a power failure.

Given the cost, disposal issues and mobile phone prevalence in households, the Implementation Study considers NBN Co should not be required to provide battery back-up to all Australians. However, NBN Co should provide a power supply unit (PSU) with the option to insert a back-up battery for all FTTP customers.

<sup>32</sup> Ovum 2009, *Australia mobile market statistics and tracker 1H09*

<sup>33</sup> ACMA 2009, *Convergence and communications*, vol. 1, *Australian household consumers' take-up and use of voice communication services*, Canberra

<sup>34</sup> Company websites of battery suppliers and retailers (including Century, Panasonic, Enersys, Farnell, Radio Shack)

If the customer wishes to insert a battery into the slot, then they would be responsible for the battery cost, installation, maintenance and disposal.

Government should establish a program for subsidising the provision of back-up batteries for end users that Government identifies as requiring lifeline services at the time that those customers migrate from the copper network to the NBN. End users that might be subsidised under such a program could include those with special reliance on lifeline communications due to health issues.

Whether an end user requests a back-up battery voluntarily or is provided one by Government under its subsidy scheme, the distribution, installation and ongoing maintenance of the batteries should not be NBN Co's responsibility. NBN Co's wholesale-only nature means that it will not have a relationship with or the necessary information relating to end users that would be required to administer the provision of these batteries. Instead the back-up battery distribution would more suitably be undertaken by service providers, who have a direct relationship with end users.

**Recommendation 27.** That NBN Co be required to provide an ONT power supply unit to all FTTP customers with the potential for a back-up battery to be installed; that Government establish a program for subsidising the provision of back-up batteries for end users that Government identifies as requiring lifeline services at the time that those customers migrate from the copper network to the NBN—with the distribution and maintenance of batteries to be undertaken by retail service providers; that beyond these identified end users, provision of a battery be the choice of the end user and supply and maintenance be the responsibility of the end user.

**Highlight.** Given the adoption of cordless phones and the increasing number of premises that do not have a fixed telephone—neither of which will be addressed by providing battery back-up on NBN Co ONTs—Government may wish to consider alternative ways of ensuring access to emergency services during power outages. One potential option would be to provide a '000' mobile handset to premises which is able to operate across the networks of all wireless carriers and is kept permanently charged. Such a program should be funded and administered by Government as a social service program and not be the responsibility of NBN Co.

### Enabling end-user location identification

At present, emergency call operators, receiving calls over Telstra's copper network, can automatically identify the location of a caller. This significantly improves the response process during emergencies. It is especially important when the caller cannot audibly communicate their location during the emergency call.

Retail service providers are currently required to provide the emergency call operator with the phone number of the caller. The phone number allows the emergency call operator to access the location details in the emergency call service database. Retail service providers are also responsible for entering a new customer's information into the

Integrated Public Number Database (IPND), which is the source of customer location details for the emergency call service.

International experience has demonstrated that this location functionality can be provided over an FTTP network, either by using media access control (MAC) addresses on the ONT or static IP addresses associated with the handset.<sup>35</sup> To enable this on the NBN, the existing regulations regarding the IPND would continue and NBN Co would need to ensure that the service providers can access the information they require regarding customers on its FTTP network to comply with these obligations.

**Recommendation 28.** That NBN Co be required to support retail service providers' ability to provide end-user location information including the enablement of emergency call operators to automatically locate a caller.

## 2.4.2 ADDRESSING THE NEEDS OF SECURITY AND LAW ENFORCEMENT AGENCIES

In designing its network, NBN Co should consult with Commonwealth security and law enforcement agencies to understand the associated national security threats and risks and to develop appropriate strategies to mitigate those risks.

Given the NBN will become part of Australia's critical infrastructure, it is important that the NBN is adequately protected and provides reliable and secure services with appropriate levels of redundancy and resilience.

NBN Co should cooperate with Commonwealth security and law enforcement agencies to identify risks and develop mitigation strategies for the security and resilience of the network. Examples include:

- Redundancy in connections to critical end users including hospitals, utilities and other essential services;
- Appropriate protocols to minimise the impact of a potential fibre access network outage;
- Mechanisms to ensure continuity of voice services and other essential services, especially to those with special needs;
- Robust control systems limiting access by service providers to prevent unauthorised access to NBN control systems, and to maintain the confidentiality and integrity of information traversing the NBN;
- Robust security mechanisms to prevent electronic attacks for denial of service;

<sup>35</sup> Industry interviews

- Protocols on shared fibre systems to ensure end users can only access data addressed to their specific premises;
- Appropriate controls around secure storage of data by NBN Co and supply chain security, especially vendors supplying equipment and services supporting the NBN;
- Consideration of the impact of the NBN on issues related to cyber security.

The network design should also ensure adequate provision of equipment and capability to meet legislative requirements such as the *Telecommunications (Interception and Access) Act 1979*.

**Advice:** That the NBN Co Board ensure the company engages with national security and law enforcement agencies to ensure the network design provides reliable and secure services with appropriate levels of redundancy and resilience.

### 2.4.3 PLANNING FOR COPPER DECOMMISSIONING

#### Providing lead time to transition off copper

The advent of the NBN is likely to hasten the retirement of the copper network, so it is appropriate that Government consider measures to minimise end-user inconvenience through the copper shutdown.

The primary basis for a notice period is to allow retailers and end users to deploy new solutions, which may be complex and require significant resources. There are likely to be lead times for new equipment, and organisational constraints that prevent early action (for example, budgets may not be allocated to migration efforts until a definite shutdown date is announced).

*NGNs should enable evolution and innovation, and while emulation may have a part to play, NGN operators should not be obliged to design their networks so that all legacy equipment continues to work, no matter how old or obsolescent.*

BT (2009)<sup>36</sup>

Only a limited number of end users will have additional costs associated with transitioning off the copper network when it is shutdown as POTS emulation—recommended above—should support most existing devices. Furthermore, during the migration period, there should be growth in the IP-enabled technology market, providing opportunities for customers to naturally upgrade their equipment. As a result, end users should bear the costs associated with transitioning their current services, which is consistent with previous telecommunications network upgrades.

**Recommendation 29.** That a minimum public notice period be required for deactivating any copper exchange; in this context 'deactivating' would mean the withdrawal of a significant proportion of copper services.

<sup>36</sup> BT 2009, *Response to Ofcom's consultation document: Next generation networks*

There is a precedent for enacting such measures. Several countries have declared a notice period prior to altering or switching off legacy infrastructure. There is no consensus on the length of this period, with timeframes varying from 1 to 5 years.<sup>37</sup>

### **Maintaining copper voice service beyond the fibre footprint**

Once deployment of the NBN fibre network is completed, there will remain a set of end users who fall outside the fibre footprint who have copper connections. If it retains the voice USO, Telstra will need to choose whether to continue to supply voice services to these end users over its remaining copper network or by other means, such as wireless.

Telstra has over 99 percent mobile voice coverage today, and with the advent of 4G technologies such as LTE, the quality and reach of its coverage is expected to improve further, to reach 70 km or more from a tower location. The large and increasing share of total voice usage captured by mobile telephones demonstrates that for many users wireless is already an acceptable substitute for fixed-line voice services.

Even with an expanded footprint enabled by 4G radios, a small number of premises will remain that cannot be served by a wireless network, however. Providing voice to these premises remains challenging for the industry. Telstra fulfils its USO obligation for many of these premises today with long copper loops, except for around 20,000 premises where fixed radio solutions are deployed, and an even smaller number where voice is delivered via satellite. As the industry transitions to the NBN, either Telstra will retain the USO for these premises or Government will need to find an alternative USO bearer, as discussed in Section 2.4.4. In either case, a mix of technologies such as those described above will continue to need to be deployed for the foreseeable future.

### **2.4.4 REVIEWING CARRIER AND CARRIAGE SERVICE PROVIDER OBLIGATIONS**

As a vertically-integrated provider, Telstra bears responsibility for end-to-end service delivery of the USO to all its end users. In a future market structure where NBN Co owns the only remaining access network serving most premises, network services will be separated from retail services. Treatment of the USO will need to be re-examined in the context of such a market evolution.

NBN Co's objective of covering 100 percent of premises will form a de facto 'wholesale broadband USO', which may be converted into a binding obligation once network roll-out is complete. However, even with NBN wholesale services available, availability of retail services is not guaranteed. NBN Co has wholesale obligations that do not and should not extend to the provision of retail services. Cases where retail services are

<sup>37</sup> ERG – Report on Next Generation Access 2009; International experts

unavailable should be rare, as NBN services will be designed to enable viable retail business models. However, given the unacceptability of such a situation, some form of retail voice USO will need to be retained even after completion of the NBN.

### Preparing a review of Telstra obligations

The coverage objectives of NBN Co will support the availability of network infrastructure across the country. However, NBN Co, as a wholesale-only operator, cannot replace the role of Telstra as the retail service provider of last resort.

Government will need to review the state of retail service competition in markets across the country to determine the best policy response for ensuring that end users in all areas of the country have a service provider willing to offer them service. While a detailed examination of this topic is beyond the scope of the Implementation Study, in light of Government's intention to hold a subsequent review, Exhibit 2–21 outlines several options that Government may consider to achieve this.

Exhibit 2–21. Options for providing retail services after USO transition

Category	Description
Telstra retains the USO	Telstra would be free to fulfil the obligation using NBN wholesale services. Assuming that NBN wholesale services are priced appropriately, Telstra's net liability should decline significantly over time. Outside the fibre footprint, under the current USO, Telstra would be required to offer voice services over copper, the fixed-wireless network where available, or any other available technology satisfying the obligation.
Reallocate USO through a tender process	At such time as the nature of the retail USO liability can be estimated, Government could seek offers to provide those services within a reasonable subsidy.
Create a new entity to be retailer of last resort	Government creates a new entity that acts as retailer of last resort in situations where no other service provider will provide service.
Source: Industry interviews	

Government will have to consider how to transition a range of existing carrier obligations contained in licence conditions, the *Telecommunications Act 1997* and other legislation, including:

- Standard telephone services and payphones must be reasonably accessible to all Australians on an equitable basis as per the USO outlined in the *Telecommunications (Consumer Protection and Service Standards) Act 1999*. A standard telephone service is defined as a voice telephony service that allows customers to communicate with each other on the same service;

- Disability telecommunications devices. Carriers who provide a standard telephone service must also provide telecommunications equipment for customers with disabilities, as outlined in Part 1 of the *Telecommunications (Consumer Protection and Service Standards) Act 1999* and the *Disability Discrimination Act 1992* requires it. Telstra, as the only universal service provider, is currently obliged to provide equipment through its Disability Equipment Program;
- Emergency call services. All carriers and carriage service providers must provide emergency call services free of charge as outlined in the *Telecommunications (Emergency Call Service) Determination 2002*;
- Integrated public number database (IPND). An industry wide database of telephone numbers and certain details, currently managed by Telstra as part of their *Carrier Licence Conditions (Telstra Corporation Limited) Declaration 1997*;
- Other existing carrier and carriage service provider obligations may also require adaptation or removal, depending on their relevance within the new market structure.

**Recommendation 30.** That a review be undertaken to determine how the universal service regime and other carrier and service provider obligations may apply to NBN Co and other carriers and service providers; that this review be completed by the end of 2011.

## 2.5 Aligning NBN Co operations with stakeholder needs

As custodian of Australia’s principal broadband platform, NBN Co must consider the needs of consumers, business, public institutions, service providers, suppliers and many adjacent industries. The capacity of the NBN to serve the national interest through the economic and social benefits associated with its services will be correlated with responsiveness to stakeholder needs. This Section outlines the priorities of relevant stakeholder groups and suggests how Government and NBN Co should align with them.

This topic is explored in these parts:

- 2.5.1 Operating to serve needs of end users
- 2.5.2 Operating to serve needs of retail service providers
- 2.5.3 Operating to serve needs of content and application service providers
- 2.5.4 Operating to serve needs of suppliers, employees, and partners
- 2.5.5 Instilling operating principles to ensure stakeholders’ interests are served
- 2.5.6 Balancing commerciality with Government guidance on policy.

### 2.5.1 OPERATING TO SERVE NEEDS OF END USERS

As a wholesale-only operator, NBN Co is not intended to directly serve end users, and in general will rely on retail service providers to understand the demands of the market. However NBN Co should still be cognisant of their needs, for example:

- Understanding the home user experience during installation;
- Identifying needs outside those served by traditional service providers (e.g. smart grids);
- Developing wholesale propositions and prices to ensure end users have access to the range of services they require.

End users can be divided into four distinct segments, which differ in scale and needs, as shown in Exhibit 2–22.

Exhibit 2–22. Estimated fixed-line market revenues by segment

Segment	Subscribers	Annual retail revenue (\$ billion)	Annual revenue per subscriber (\$)
Consumer	9,000,000 <sup>a</sup>	9.0	1,000
Small Business	700,000 <sup>b</sup>	4.0	6,000
Enterprise	3,000 <sup>c</sup>	4.0	1,300,000
Public Institutions	12,000 <sup>d</sup>	2.0	160,000

<sup>a</sup> Estimate of residential premises as at 2009 (Department of Families, Housing, Community Services and Indigenous Affairs 2009, *State of Supply Report 2008*, National Housing Supply Council, Canberra)

<sup>b</sup> Estimate of businesses with less than 200 employees (ABS 2009, *Business Use of Information Technology 2007–08*, cat. no. 8129.0)

<sup>c</sup> Estimate of businesses with greater than 200 employees (Ibid.)

<sup>d</sup> Includes federal, state and local government units and government schools, universities, TAFEs (ABS 2004, *Government Technology 2002–03*, cat. no. 8119.0, Canberra)

Note: Revenue estimates indicative, based on company and analyst reports. It is difficult to disaggregate industry revenues into unambiguous segments and product lines due to differences in operators' definitions.

Source: ABS, Buddecomm, company reports

### Residential consumers

As Exhibit 2–22 shows, residential consumers are the largest segment to receive retail services over the NBN. Their interests will centre on availability and pricing of fast broadband, voice and new entertainment services. They are likely to be highly price sensitive and concerned about the physical process of network changeover—trenching, home entry, ONT installation—which should be reflected in NBN Co's planning and operating procedures.

The Implementation Study assesses the requirements and revenue opportunities of the consumer segment in some detail, as it:

- Will comprise the bulk of NBN revenues;
- Has the lowest penetration of fibre, so offers the greatest opportunity to improve the speed of services;
- Requires careful tuning of price points.

### **Small businesses**

There are approximately 700,000 small businesses in Australia. While fewer in number than residential consumers, small businesses are much more valuable on a per line basis, with an estimated average revenue per user of \$6,000 per year compared with \$1,000 for residential consumers. For these end users, fibre connectivity is a productivity enabler, and they are prepared to pay higher amounts if the NBN can support business performance tools and reliability that justify the costs in economic terms. NBN Co should consider the future needs of these users in its network design and operations. For example, the increasing shift towards the use of e-business tools amongst small business could mean that there is increasing demand for enterprise-grade products such as point-to-point connections,<sup>38</sup> with implications for fibre provisioning in the network.

The Implementation Study assesses the small business segment as another part of the ‘mass market’, albeit with different revenues and product requirements to consumers. They are included in all revenue and cost modelling.

### **Corporate and large private institutions**

The complex ICT requirements of corporate and large private institutions have driven the roll-out of FTTP networks in areas such as CBDs and business parks, with many of these end users enjoying the benefits of infrastructure-based competition. Many already have access to fibre—typically with ‘point-to-point’ services. The market is complex, pricing is opaque, and the nature and intensity of competition vary significantly by location. In some areas, wholesale access is available on multiple fibre networks, while some locations are served by a single vertically-integrated provider.

It is important that the capabilities of the NBN be made available to Australia’s large enterprises, to the extent that they are inadequately served by existing services. However, it is difficult to develop a detailed view of the commercial opportunities for NBN Co in this market. For this reason, while an estimate of the costs of connecting enterprise premises has been included, the modelling takes a very conservative approach to including revenue.

### **Public institutions**

A significant element of Government’s rationale for NBN roll-out is its potential for digital delivery of government and social services such as health and education. The institutions that deliver these services have a wide range of requirements for connectivity.

<sup>38</sup> Industry interviews

The Implementation Study specifically addresses future broadband needs for ‘e-government’ services in Chapter 3, and discusses the role of the NBN in meeting those needs.

## **2.5.2 OPERATING TO SERVE NEEDS OF RETAIL SERVICE PROVIDERS**

NBN Co’s customers can broadly be considered ‘service providers’. They will likely range in size from niche small businesses offering specialised applications, to Telstra, the largest telecommunications company in Australia. Today, the market for wholesale network elements—such as ULL—is comprised mainly of carriers and service providers. In the future, many other businesses may choose to exploit NBN wholesale services to deliver content, applications, or services.

### **Fixed-line telecommunications carriers**

The majority of industry revenues are captured by ‘carriers’—integrated providers who operate network equipment and provide services such as calling and data carriage. The two major fixed-line carriers in Australia are Telstra and Optus, who together account for 91 percent of fixed-voice and access revenues.<sup>39</sup>

Currently, both Telstra and Optus operate access and backhaul networks, and use these to deliver retail services. The NBN will therefore constitute both a potential supplier to their retail operations, and as a competitor against elements of their fixed-line infrastructure. A significant challenge for NBN Co is to provide sufficient incentive for these providers to migrate services onto the NBN.

### **ISPs**

ISPs are broadband providers who focus primarily on providing Internet connectivity. Many have evolved from their beginnings as dial-up providers to offer fixed-voice and broadband across multiple access platforms. There has been a trend for ISPs to move away from providing applications and content over time—for example, email is shifting from ISPs to webmail services such as Gmail and Yahoo!. However, ISPs will continue to play an important role in the NBN ecosystem, leveraging their expertise in customer and network management.

While NBN Co will initially supply Layer 2 services over its access network and bottleneck backhaul links, its customers will need to coordinate network elements to deliver connectivity to users. Retailers must balance customer satisfaction with network capacity, and decide where and how to invest in new capacity. Customer support for broadband is a substantial burden—ISPs regularly receive customer complaint calls about

<sup>39</sup> Buddecomm 2008, *Australia – telecoms industry – fixed & mobile statistics*

broadband performance where the cause of the problem is the customer's own computer. There are also significant costs in customer acquisition and OSS/BSS.

The business model that will characterise successful ISPs in the future remains uncertain. It is possible that they will derive profits by playing a role in services, such as IPTV. Alternatively, they may come to resemble utility resellers, primarily billing and managing basic service issues of moves, adds, and service changes. The NBN should be designed to enable either of these possible outcomes.

### **Mobile carriers**

There are three major mobile operators in Australia—Telstra, VHA, and Optus. They are competing aggressively in mobile broadband, driving strong growth in data traffic across their networks. As these data volumes grow, they will require increased backhaul capacity, and are likely to seek to use the NBN fibre network as backhaul where competitively-priced links are unavailable today.

In addition, mobile carriers are exploring the prospects of selling fixed-line services. They have large customer bases, established OSS and BSS systems and substantial marketing and sales capability, so they are well placed to sell fixed-line services. The availability of high quality wholesale services over the NBN may prompt mobile providers to expand their fixed-line operations. Internationally, Vodafone has already built a substantial business offering DSL services over ULL. For example, in New Zealand, Vodafone installed DSLAMs in all 40 exchanges in Auckland within the first year of the local loop unbundling regime in New Zealand. It has plans to extend its Red Network to other cities in New Zealand and has signed a wholesale agreement with retailer Slingshot, which resells Red Network services.<sup>40</sup>

### **2.5.3 OPERATING TO SERVE NEEDS OF CONTENT AND APPLICATION SERVICE PROVIDERS**

Currently, most mass-market applications are delivered 'over the top', via the Internet. Application Service Providers (ASPs), as defined for the purposes of this report, are those application providers whose services cannot be adequately delivered over an Internet connection. They exist widely in the corporate and business segments—for example, secure banking information networks—but are largely nascent in the mass market.

There is speculation in the industry that a mass-market ASP sector may emerge with appropriate Layer 3 service availability. The Implementation Study believes that wholesale Layer 3 services are likely to emerge (Chapter 9) and that these services should develop in a way that supports the provision of services by ASPs across the NBN.

<sup>40</sup> Buddecomm 2010, *Vodafone New Zealand Ltd*

## Television companies

There are three commercial free-to-air operators, two government-owned free-to-air operators and two commercial pay TV providers in Australia. As major content providers, television operators could look to play an increasing role in the provision of high-quality web-based content over the NBN or use their strength in content and national brands to expand into new businesses enabled by the NBN.

The NBN offers a new distribution platform for television services. Free-to-air is delivered mainly over terrestrial broadcast towers. Pay TV is delivered through a combination of HFC and satellite. Fibre-to-the-premises networks are already used to distribute both free-to-air and pay TV content in some greenfield estates. Chapter 3 provides a detailed discussion of how video and television services should be delivered over the NBN.

## Internet-delivered applications and content

Currently a range of providers deliver their applications and content services over-the-top (OTT) of an Internet connection. These OTT providers may exploit the increased bandwidth of FTTP networks to enable enhanced services, or may seek to move to an ASP delivery model on the NBN to allow them to provide higher quality of service applications and ‘always on’ connectivity.

### 2.5.4 OPERATING TO SERVE NEEDS OF SUPPLIERS, EMPLOYEES, AND PARTNERS

The roll-out of the NBN network will be one of the largest infrastructure projects ever seen in Australia. Construction is planned to take place over 8 years, and beyond the roll-out there will be an ongoing industry created to provide the equipment and labour for operating and maintaining the network.

The scale of the project means that NBN Co will need to coordinate a wide network of vendors, contractors, employees and wholesale customers to deliver the network and ensure the prompt delivery of services to end users.

In establishing its operating model for achieving the network roll-out, NBN Co’s first priority should be to achieve the coverage objective of Government within the planned roll-out schedule and funding parameters. However, NBN Co should also be sensitive to the impact that its entry in the market will have on the industry.

The NBN roll-out will transform the telecommunications network construction and maintenance industry in Australia. As such, it is appropriate for NBN Co to consult with industry, government and labour groups. NBN Co will need to work with these groups to ensure that it can attract the large workforce of skilled labour it will need to construct, operate and maintain its network as well as to develop and manage its products, pricing, marketing and customer relationships.

In practice attracting the workforce it needs to achieve the roll-out of the network will require NBN Co to deploy a mix of employees and contract labour. The existing contractor industry has the capacity to provide a range of services relevant to the design, planning, management and construction of the NBN, and this industry will develop to meet NBN Co's demand. Using contractors can help NBN Co access capabilities quickly while managing its fluctuating and geographically mobile requirements for labour during the roll-out period. However, there will also be the need for NBN Co to establish a significant body of in-house employees.

The scale of the project means that opportunities will be created for a range of contractors, from global equipment vendors to SMEs. There will be significant opportunities for Australian businesses, large and small, and because of the national extent of the roll-out, these opportunities will present themselves in all parts of the country. It is in the interests of NBN Co to consult with local businesses prior to roll-out in each area to assess the availability of relevant skilled labour required for deployment and ongoing maintenance of the network.

While the Australian workforce already has significant skills in a range of areas that NBN Co needs, there are likely to be shortfalls in some skilled labour sets (e.g. fibre splicing). Specialised labour such as this can take time to build and NBN Co should, from the start of the roll-out, be proactive in planning to meet its skill requirements for the lifetime of the roll-out. NBN Co should work with trade unions, the education and training sector and Government to align relevant Government programs with the skills required to effect the roll-out.

NBN Co should conduct a rigorous procurement process in choosing the vendors that will supply the equipment and IT systems which will comprise the network, balancing thoroughness against the constraints of its schedule and bearing in mind the substantial long-term implications of its decisions. Managing the supply chain for equipment is essential to preventing delays to the roll-out. NBN Co should quickly establish relationships with suppliers and vendors to enable their early involvement as partners in planning the design and scheduling of the roll-out. NBN Co has already commenced this process, issuing requests for expressions of interest to suppliers of network equipment and OSS/BSS platforms. While many of the vendors will be major international providers, there will be a need to establish local vendor production facilities to reduce supply chain risk. Through this and through the establishment of an NBN facilities such as an integration laboratory, there is the potential to develop Australian capabilities in the sector.

## **2.5.5 INSTILLING OPERATING PRINCIPLES TO ENSURE STAKEHOLDERS' INTERESTS ARE SERVED**

It is important that NBN Co establish a culture of consultation with its stakeholders. NBN Co will not always be able to satisfy the priorities of all stakeholders on all issues,

but it should adopt practices which engender trust, respect, and understanding across the industry.

It is appropriate that NBN Co formulate practices for achieving this level of standing in the industry. As demonstrated by Telecom NZ's Wholesale business over the past three years, it is possible for a wholesale provider to create its own strong culture that is well received by the industry (Exhibit 2–23).

**Recommendation 31.** That NBN Co be directed to develop a Charter that outlines how it will conduct its affairs to best meet the needs of stakeholder groups—for example, the Charter should state a commitment to consultation with the industry and end-user groups.

The charter should incorporate a commitment to transparency, which is a powerful mechanism for ensuring NBN Co serves the interests of its diverse stakeholder group. For example, publishing the coverage status of premises will allow end users and retailers to know when services are available to a given household, and therefore when they can offer or receive services. Similarly, releasing regular product roadmaps will allow small and large retailers alike to anticipate the opportunity to deploy new products.

Availability of information will enhance the quality of industry and regulator engagement. The telecommunications industry is complex and dynamic, and it is difficult to manage the evolution of regulatory regimes in response to changing conditions. Regulators around the world observe that information asymmetry is a major challenge in administering and developing the regulatory framework.

Although these measures may go beyond what is common practice amongst privately held providers today, they can be maintained through privatisation. Once the requirements and norms for transparency are well-established and potentially codified in binding form, future private investors will accept these as pre-existing factors bearing on their investment. This will represent a significant improvement from today's industry norms, in which large infrastructure operators are reluctant to disclose information relating to their assets.

Specific recommendations throughout this report will propose mechanisms to reinforce these principles. Chapter 10 contains specific considerations with respect to competition.

## Exhibit 2–23. Telecom New Zealand Wholesale Charter

### Categorising new premises as fibre or non-fibre

The New Zealand government announced functional separation of Telecom NZ in 2006. Telecom NZ offered to reorganise voluntarily into wholesale and retail. To ensure equality of access to unbundled network services, the government required further separation of the network assets (later named Chorus). Three-part functional separation took effect in 2008.

Telecom NZ's units must uphold the undertakings made with the government. Telecom NZ established an Independent Oversight Group (IOG) to report and advise on its compliance. Prior to separation, the company developed the Telecom Wholesale Charter to work collaboratively with wholesale customers and address end-user experience. Three principles guide customer interaction:

- Consistent end-user service between Telecom NZ retail and other customers
- Consistent Intermediate products between Telecom NZ retail and other customers
- Greater transparency and communication.<sup>a</sup>

The Charter does not legally bind Telecom Wholesale, but aims to establish healthy customer relationships.

The industry response has been positive to Telecom NZ's efforts to comply with the separation undertakings. Customers say that Telecom NZ Wholesale has shifted towards a more transparent and open culture. CallPlus CEO Martin Wylie said: 'I do think there has been a genuine attempt to start consulting and... to try and break the kind of stand-off mentality that had been there previously'.<sup>b</sup>

Telecom NZ Wholesale breached the equivalence of inputs principle in its separation undertakings in 2008 in offering a loyalty discount to wholesale customers. The company subsequently withdrew the offers. A Telecom NZ employee raised the matter through an Honesty Box installed to establish greater transparency. IOG reported that there had been 3800 submissions made by Telecom NZ employees.

a. Telecom NZ Wholesale 2006, *Telecom Wholesale Charter*

b. Hendery, S 2007, 'Next generation arrives on quiet', *NZ Herald*, 15 February

Source: Independent Oversight Group 2009, *IOG Annual Report 2009*

## 2.5.6 BALANCING COMMERCIALITY WITH GOVERNMENT GUIDANCE ON POLICY

NBN Co has been established to achieve a set of policy objectives, through a vehicle that can act in a commercially disciplined way, and eventually be privatised. This raises questions of governance. As shareholder, Government should strike a balance between directing the NBN to achieve various outcomes for the public good, and allowing independent management judgment to steer the company towards more commercial outcomes.

Government's chosen structure for NBN Co recognises the value of a Board and management team who strive to operate commercially, delivering greater efficiency, financial rigor, and decision-making based on sound economics. It is important that, to

the extent possible, Government provide the policy outcomes and framework within which NBN Co should operate, and allow the management team to deliver those outcomes.

There are, however, issues in relation to which NBN Co may wish to seek guidance from Government. Chapter 11 discusses the challenges in accommodating the oversight and support required for NBN Co under approaches more typically applied to well-established GBEs.