



House Standing Committee on Infrastructure and Communications

Inquiry into the role and potential of the National Broadband Network

Private Submission by:

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Moving beyond speed to consider quality as the true enabler of the socio-economic promise the National Broadband Network brings to regional Australia

In Summary

The Submission provides a concise discussion on the importance of moving beyond a sole focus on speed to consider quality as a major factor when seeking to optimise the *impact on regional economic growth and employment opportunities* derived from the investment in the national broadband network (NBN). The material is extracted from a monograph to be published by the DEHub (Bowles 2011) and is, in part, based on international research for Innovation and Business Skills Australia that was completed as part of the University of Tasmania's *Digital Economy and Regional Futures* initiative (Bowles & Wilson 2010). While the submission in no way seeks to undermine the significance of the investment by the Australian Government in the NBN, further detail is added to remove the existing hyperbole to re-emphasise the importance of quality of the broadband connection as distinct from a too-narrow focus on high speed.

Introduction

The current debate about the construction of a national broadband network (NBN) in Australia is characterised by more hyperbole than substance over the network's impact on Australia's competitiveness. Considerations have been confined to technical issues relating to ICT infrastructure as a means for Australia to 'leap ahead' of other nations racing to seize competitive positions in the ever growing global Digital Economy. In addition, the discussion over construction of an NBN to provide an affordable, high-speed and universally accessible network has occurred in a vacuum that lacks the substance a consideration of quality and user needs would provide.

As a result the long-term economic imperative to build the physical infrastructure is seen as an essential stimulus investment that will ensure that at least nine out of ten Australians have access to the 'optimal future-proof technology', fibre-optic broadband (Senator Conroy, cited in Bingemann & Massola, 2010). On the other side there is domestic and international uncertainty about whether those privy to the cost and planning processes for the entire NBN network are fully cognisant of the potential such a network offers for improved social and long-term economic benefits (OECD 2010b: 17; Riley 2010: 1).

The risk exists that the policy and infrastructure planning imperative to connect more than 4800 premises per day over eight years is overly focussed on constructing a high-speed network in high-density population centres (DBCDE 2010: 10). The approach emphasises the importance of Australia 'beating' other countries in the race to connect as many users to a high-speed broadband network as is possible. However, it has de-emphasised the importance of quality in the type of connection available to consumers and the types of services, today and into the future, the connection can carry.

The most recent research and international evidence confirms a direct relationship between improvements to broadband infrastructure and Australia's Gross Domestic Product (GDP). This research reconfirms the critical importance of broadband infrastructure harnessing the latent productive capacity resident in regional and rural locations. International benchmarks now developed independent of each other by The World Bank and UNESCO suggest for each 10% increase in the penetration of broadband (in this case connection over 20Mbps download and 20Mbps upload) across the population will respectively add 1.2% or 1.38% to the annual GDP of an industrialised country such as Australia (Gyarmati, et.al., 2010: 17-18; & Kim, et.al., 2010:2).

Given the July 2010 estimate of Australia's GDP was AUD\$925 billion and growing at an annual rate of 0.50 percent (Trading Economics, July 2010), the estimated failure to connect some 10 to 20 percent of our population living outside inner city suburbs to high speed, quality broadband respectively would cost the Australian economy as much as between \$11 to \$25 billion per annum.

The promise of NBN being a universally accessible, affordable high-speed, high quality network

With less than 25 per cent of landmass covered and access available to 91 per cent of the population Australia has one of the lowest penetrations of xDSL (fixed-line, Digital Subscriber Line) broadband networks comparative to land mass (OECD Broadband Portal, Table 3b October 2009). The cost to connect those living outside high-density populations exacerbates two other factors to weaken broadband availability in non-metropolitan Australia: telecommunication companies invest in infrastructure where they earn the highest returns, and regional and remote users' adoption is heavily contingent on the quality and utility of the services relative to the overall cost (Stenberg et al. 2009: 15). The first point reinforces the assumption that, all other things being equal, it should be less costly on a per-connection basis to deploy broadband to an area that is highly populated than one that is sparsely populated (Turner 2006: 10). The latter point confirms that the cost of access must reflect value in terms of connection quality and the range of services provided to non-technical users.

Alongside the cost issues (DBCDE 2010: 252, 279) replacing broadband delivery by the existing copper cable telephony lines with fibre seems to be one of the prime reasons the *NBN Implementation Study* in May 2010 recommended that fibre fixed-line coverage extend from 90 per cent to 93 per cent of the 12.1 million premises to be connected (DBCDE 2010: 269). The promise of universal coverage seems to suggest the remaining 7 to 10 per cent of Australians not already accessing xDSL services will have access to broadband using either a fixed wireless or a satellite connection with a download speed guaranteed at 12Mbps.

The bandwidth of a broadband network connection available to a subscriber will influence the types of services available. Government, Retail Service Providers (RSPs), Internet Service providers (ISPs) and technology vendors, to avoid technical issues and simplify the message to consumers, have tended to focus on higher 'speed' generating better, more affordable services. This focus has skewed public understanding and useful debate of the NBN rollout as the implication has been that higher speed alone equates with higher quality.

When analysing the economic and social benefits from this investment in high-speed broadband it is essential that the debate on the quality of the connection extends beyond download speed to also consider upload speed, latency, affordability and ubiquitousness. This is vital as relative to other countries Australia's ranking has stagnated or declined when two quality dimensions are assessed: (a) 'readiness' to introduce new applications was considered decidedly average and behind over 50 other countries (BQS 2010: 13), and (b) its overall closing of the digital divide in terms of Broadband quality Score (BQS) and 'gap between quality in the "main cities" and "outside main cities" placed Australia in the lowest 10 nations' (BQS 2010: 15).

In the Digital Age economic advantage and growth in GDP are functions of quality of the available broadband connection, not just a faster speed. As a result the number of people subscribing to quality connections is a more critical indicator of socio-economic advantage than broadband penetration or number of subscriptions without regard to the type of connection.

Comparative global quality of the broadband

According to the *Global Broadband Quality Score Report* for 2009 and 2010, to be competitive with the top 10 ranked nations in the world, Australia would need to not only increase the penetration of broadband, but also have a significant improvement in performance against the three broadband quality score (BQS) benchmarks (averages):

- Downloading speeds over 4.75Mbps
- Uploading speed over 1.3Mbps
- Reduced latency below 170 milliseconds (Vicente et al. 2009: 1)

With nearly 60 per cent of all broadband connections based on Asymmetric Digital Subscriber Line (ADSL) services connecting at an average speed under 1.5Mbps (ABS 2010), Australia lags well behind the OECD average advertised broadband speed for xDSL (any form of Digital Subscriber Line) of over 14Mbps (OECD

2009)¹. With over 20 per cent of other connections being a dial-up or satellite connection at or below 1.2 Mbps (download speed) the high subscription levels in Australia have not achieved average connection speeds comparable with other OECD countries or those with a high BQS.



FIGURE 1: BROADBAND LEADERSHIP TOP 20, 2010
 (BQS 2010: 10, with permission)

Improving the BQS is in Australia’s interest as countries with higher scores have not only been achieving greater socio-economic benefit, but have been innovating faster and using newer infrastructure to position themselves for tomorrow’s opportunities (Vicente et al. 2009: 1).

Not recognising the importance of quality, as well as speed, in the race to compete in the Digital Economy will have a serious impact on regional employment growth. In Australia over the last several decades employment growth has been in the service industry and in the mining industry. Where broadband applications lend advantage to rural and regional locations is where they can be leveraged to compete for low- and high-end service jobs, from call centres to emerging ICT services such as web and interactive media development, network and virtual service providers (SaaS and cloud computing). Broadband can have the additional benefit of enabling populations to stay in regional centres to support local business activities (e.g. Mining, agricultural, and transport and logistics operations) or where services, especially government services such as education and health, can be enhanced with access to digital networks.

Qualifying quality: Pull services and upload speed

Broadband quality is no longer just about downloading speed or the capacity to push products and services down a one-way channel to a consumer. It is about the capacity to make connections, to collaboratively create

¹ Sourced from OECD Broadband Portal 9 September 2010 at http://www.oecd.org/document/54/0,3343,en_2649_34225_38690102_1_1_1_1,00.html#Services_and_speeds.

content and ideas, to share applications, to synchronise real-time data transmission to businesses across a global supply chain, to diffuse innovations, and to stimulate two-way exchanges between multiple nodes in a network anytime.

While download speed has remained important, upload speed increased in importance. Web 3.0 empowers the consumer to personalise how the web delivers applications and services. Unlike earlier generations web content is richer; communication is more interactive and synchronous (two-way) rather than just asynchronous (one-way, one at a time); applications can process and understand (semantic web) (Ray 2010); content creation is increasingly vested with consumers (e.g. Facebook® updates, posting YouTube™ videos or blogs); and businesses can access virtual services and applications (Software-as-a-Service and cloud computing). Coupled with the drive to personalise the virtualisation of business, Web 3.0 marks the shift to ‘pull’ systems where upload is every bit as important as download speeds (BQS 2010). Capacity, instead of being centred on a location or a business or a person, is shared.

Qualifying quality: Latency and reliability

One of the key problems with satellite and wireless when compared with fibre connections is latency. Latency refers to the time it takes for data to be transmitted from one point to another (NBN Co. 2010a). It represents ‘a time delay between the moment something is initiated, and the moment when its effects begin or become detectable’ (O3b Networks 2008:4). Latency issues are critical to the quality and reliability of broadband connections. In practical terms, network latency affects the types of services and activities that can be carried out via a network (Berkman Center 2010: 54).

Therefore while satellite broadband may be appropriate for enhancing such activities as downloading videos on demand, latency issues will render it unsuitable for interactive activities requiring synchronous exchanges such as data synchronisations or massive multiplayer, online games (OECD 2004:46). Low latency bandwidth is also crucial for real-time applications. For instance levels of latency on broadband satellite and wireless connections will affect high-bandwidth activities such as Internet Protocol telephony, telepresence, work in 3D environments, video streaming and high definition IP TV (Pepper 2009: 16). Network latency can make impossible even low-bandwidth applications and services such as those commonly required by government services (i.e. data transfer, secure e-commerce activities, telemedicine).

Reliability is a secondary but closely related problem. The lack of reliability becomes an issue where services are unable to be supplied to the much promoted ‘always on’ advantage of fibre-optic cables. For fixed wireless users this is an issue as line-of-sight configurations operate much as cellular networks do. Black spots can emerge and no connection to or ‘drop outs’ in the signal will occur. For regional Australians who experience problems with the cellular phone network coverage or reception of analogue TV signals, wireless NBN is a far inferior option to a fibre or cable connection.

Qualifying quality: Affordability

Affordability is a major factor in adoption rates and volume of traffic. As many parents of children who exchange media files and download movies or music will attest the speed of connection is not the sole determinant for a broadband subscription cost. In Australia the cost of data has been the major factor influencing affordability and broadband penetration.

Australia’s overall average per person volume of data carried on digital networks is lagging well behind nations with established high-speed networks. While the average volume of data continues to grow in Australia the possible benefit derived from increased numbers of mobile Internet subscribers has had only marginal effect as over 91 per cent of data traffic still remains on fixed-line networks (ACMA 2010b: 33). Australians’ transmission of data over the Internet on a per-capita basis in 2008 has been estimated to be as much as 24 times lower than that of Korea and only a fifth of regional competitors such as Japan (OECD 2007: 12)².

² The Australian Communication and Media Authority reported this rate had risen in 2008-2009 to 3.5 Gb data downloaded per month, per subscriber on average (ACMA, 2010a:176)

Currently Australia's cost of data per MBit/s is higher than the OECD average and all countries with comparably high broadband penetration rates. At USD\$11.82 Australia was ranked 15th in a comparative study of average price per advertised Mbit/s (OECD, Broadband Statistics³ as at October 2009), far higher than the lowest price of USD\$1.76 (Korea) and, with the exception of Sweden, way behind all the countries ranked in the top ten BQS nations that had averages below USD\$5.56 per Mbit/s (Vicente et al. 2009: 9; BQS 2010). Rather than directly addressing this issue there is currently evidence that suggests the initial cost of data per MBit/s for those offered subscriptions that connect to the NBN are not at all competitive with OECD price averages (Bowles, 2011). This is an important factor as countries enjoying lower costs and top ranking in terms of BQS have demonstrated that as access to quality connections improved so adoption and levels of broadband penetration increased across all regions and sectors of the community (Gyarmati et al. 2010: 48-52; BQS 2010:15).

Qualifying quality: Mobility and ubiquitous access

The NBN has been designed to be an open, 'ubiquitous' network. To achieve this 'universality', connections will not be solely dependent on FTTH. Instead the NBN will include fixed wireless and satellite options for the 7 to 10 per cent of Australians not provided with fibre. But is this truly a ubiquitous or universal solution?

For the last two years Australia's Internet subscriptions remained fairly stable with some 84 per cent of Australians being connected (ABS 2008a , 2008b, 2009; Nielsen 2010: 4). However, the shift towards mobile and satellite connectivity seems to be expanding in line with global trends where over 30 per cent of subscriptions to the Internet use connections other than terrestrial, fixed lines (OECD 2008: 249). In Australia while fixed, terrestrial broadband connections in the form of Digital Subscriber Line (DSL) dominate types of connections (51 per cent of non-dial-up connections), there has been a significant acceleration away from cable-type connections to mobile Internet connections (increasing to 2.8 million in December 2009) and satellite (40 per cent increase in subscriptions 2007-2009) (ABS 2010).

The trend in Australia towards mobile and satellite Internet connections is unlikely to slow. Without factoring in the effect of the NBN, one in three new connections to broadband in Australia is expected to be to a mobile service (Teltscher et al. 2009: 5; ACMA 2010a: 3, 8). This reflects the fact that while remote users opt for satellite in the absence of DSL or cellular coverage, subscriptions to the copper cable network in the city will plateau as consumers increasingly use mobile wireless Internet and Internet-connected phones (ABS 2010; Battersby 2010).

As of late 2010 the design of the proposed fixed wireless and satellite solutions within the NBN and how they would integrate with the fibre network remained unclear. Nevertheless, if the fixed wireless solution fails to match consumer quality preferences and speeds, subscriptions to 3G instead and other forms of mobile broadband or alternate satellite services will continue. This is an important consideration as the penetration of broadband through wireless and satellite is not just a lifestyle or business choices or a result of high mobile phone ownership (Gyarmati et al., 2010: 43). Satellite is often a last resort, failing all other options. Mobile broadband adoption rates suggest that ubiquitousness is not just a function of not being able to access a fixed connection; it is a choice made to ensure access to broadband on the move, using a range of devices that can connect to the Internet anytime, anywhere.

Conclusion

The NBN is Australia's investment in the attainment of national competitiveness in the Digital Economy while ensuring Australians can access an affordable, universally accessible high-speed broadband.

If the primary economic rationale driving the building of the NBN is based exclusively on the density of population and cost per connection (DBCDE 2010: 10) then the promise of the NBN is eroded. Such a decision may achieve short-term policy and economic imperatives to 'win' the race to compete. But this focus should not limit consideration of universal access reflecting speed is not the sole determinant of quality in the Digital Age. Put simply countries cannot rely on any type of 'high-speed' connection when seeking to secure advantage

³ Compiled from latest data from OECD Broadband Portal [oecd.org/sti/ict/broadband] 9 September 2010.

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in the race to be competitive in the Digital Economy. Evidence confirms a nation's competitiveness and consumer decisions to subscribe will be guided by interrelated considerations that include:

- **Download bandwidth speed** as it relates to consumption activities such as accessing websites, watching videos, listening to music, downloading files;
- **Upload bandwidth speed** as it relates to sharing and sending activities such as information and content production and advanced interactive service activities (e.g. telehealth, telecommuting, real-time collaboration, video-communication and services, Software as a Service and cloud computing);
- **Latency** as it affects consumer satisfaction with the Internet experience and the performance of specific interactive communication and data exchanges, or real-time consumption and production activities;
- **Reliability** as it relates to consumer satisfaction or the risk of error when low reliability prevents or adversely affects exchanges with others across different types of networks, connections or platforms;
- **Mobile access** as more than wireless Internet, but anywhere anytime connection that is not fixed and can follow the consumer in a range of work and life contexts; and
- **Data costs** as a critical consumer consideration when assessing cost against utility factors such as types of services and applications able to be used, and volumes of data able to be uploaded and downloaded.

The important relationship between quality and adoption was also evidenced through a study of non-metropolitan consumers unable to access the NBN's fibre network. Regional and rural subscribers adopting broadband can place a heavier emphasis on social factors such as the quality of the utility of services comparative with overall cost (Stenberg et al. 2009: 23, 29). Lack of a connection of comparable quality to optic-fibre will therefore affect adoption patterns.

In the race to be competitive in the Digital Economy the NBN not only needs to provide universal access to a high speed broadband network, it has to deliver high-quality connections. Failure to achieve this can seriously jeopardise the overall advantage Australia is seeking to gain through the investment.

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