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**Title:**

**Asynchronous speeds: disentangling the discourse of *high speed broadband* in relation to Australia's National Broadband Network**

**Abstract:**

This paper analyses the substantive problems related to the term *high speed broadband* in relation to the implementation of Australia's *National Broadband Network* (NBN). It argues that an understanding of speed in relation to broadband must take into account the complex assemblage of infrastructure networks, communication devices, software, location, user subjectivity and political input. It analyses how this assemblage operates at asynchronous speeds, which in turn impact on the perception, implementation and potential of the NBN.

Towards contextualising and problematising the understanding of speed in relation to the NBN, this paper explores four key points:

1. How the perception of speed is dependent not so much on technical performance but on the subjectivities of our Internet experience.
2. How the term *broadband* is politically shaped, especially in the context of the Coalition government's alternative multi-technology mix plan.
3. How the assemblage of actants that constitute *high speed broadband*

determines the perception of speed.

4. How asynchronous speeds impact on the perception, implementation and potential of the NBN.

### **Introduction:**

The idea for a national Australian broadband network emerged during the Howard Government era (1996-2007) through the work of the then Government's Broadband Advisory Group, however the National Broadband Network (NBN) project continuing today was initiated by the Australian Labour government in 2009, with the aim of providing high speed broadband to all Australian premises. Since its inception the NBN has polarised political and social debate predominantly around three main issues: the cost of providing fibre to the premises (FTTP), the speed at which the FTTP infrastructure was being rolled out, and the determination of an 'adequate' level of connection speed. The Labour government argued that universal access to standardised broadband speeds on a national network was crucial for Australia's future economy, and that in this context the provision of FTTP to 93per cent of households and businesses was both necessary and affordable. In addition this technology would ensure easy upgradeability to ever greater speeds, greater reliability of service, and cheaper maintenance costs.

In contrast the Coalition party critiqued Labour's plan as being far more costly than it needed to be, delivering far greater speeds than people needed or wanted, and being far too slow to build. Accordingly, since the Coalition took office in the election

of September 2013, the process of implementing an alternative plan for the NBN began. The Coalition's plan, led by Communications minister Malcolm Turnbull, involves a mix of technologies where FTTP will account for only 22 per cent of premises. Most of the remainder (71 per cent) will mainly be connected by fibre-to-the-node (FTTN), while 7 per cent of premises will be served by either fixed wireless or satellite connections (Coalition party, 2013). FTTN is a mixed approach where fibre optics link the main network to an exchange node located inside a cabinet serving many premises. The so called 'last mile' of the connection (from the cabinet to the premises) will be connected by VDSL (very high bit-rate digital subscriber line) using existing copper networks owned by Telstra and in variable condition (subject to new contractual agreements with the latter). Making use of existing network infrastructure, such as Hybrid Fibre Coaxial (HFC) cable, has also been suggested as part of the multi-technology mix scenario recommended as part of the Coalition's strategic review of the NBN (NBN Co., 2013a).

While the political debate continues and the transition process from Labour's original plan to Coalition's plan becomes increasingly complex, murky in both technical and commercial domains, and is consequently subject to frequent change, many questions remain unanswered. What is an 'adequate' speed of connection based on current and future broadband needs of the country? What is the best strategy to future-proof the network's performance? What services and applications might impact on the 'need for speed' in the near future? And importantly, what role does the end user play in the media assemblage envisioned by NBN Co.'s high speed broadband project?

High Speed Broadband is a phrase that is characteristically used in a way that assumes its meaning is unproblematic. This paper attempts to problematise the phrase by unpacking the wider implications of high speed and of broadband in relation to the NBN. By analysing the NBN's implementation of High Speed Broadband through its assemblage, we take into account technical considerations, political discourse, infrastructure implementation, household patterns of Internet usage and the role of the end user as an actor who must interpret the concept of high speed broadband through their own subjectivity. This paper argues that these actants are not necessarily synchronised, but rather interact with each other through asynchronous speeds.

Towards this aim, four key points will be analysed. First, how the perception of speed is dependent on the subjectivities of our Internet experience (rather than simply on a numerical value in Megabits per second, or MB/s). Second, how the term *broadband* is politically shaped, with a particular focus on the implementation of the Coalition's plan since its election. Third, what is the media assemblage that constitutes high speed broadband and how does the end user act upon it? And finally, how do the asynchronous speeds of the diverse actants in this assemblage impact on the perception, implementation and potential of the NBN.

### **1) The perception of speed in high speed broadband**

How do we perceive speed? If we are driving on a freeway, we know our speed by

simply looking at the speedometer. A policeman standing on the side of the road equipped with a radar detector also knows exactly what speed we are travelling at. A bystander without such equipment doesn't know that, but can make an estimated guess based on certain clues, such as the speed limit of the freeway, assuming that everyone is obeying the speed limit (because of the radar detector) and comparing our speed with that of other cars. However, the subjective experience of Internet speed does not benefit from such advantaged points of view, and the combination of factors is more complex. It also must take into account the speed of information travelling in both directions simultaneously.

While there are tools available to measure the speed of connection in MB/s (some of which use the metaphor of the car speedometer), the actual experience of Internet speed involves a combination of actants such as (but not limited to): computer processor speed, the distance to the location of the information being accessed, the reliability of the Internet connection, how many devices are using the same connection in a household, how far the device is from the wireless modem, how many users worldwide are accessing the same servers, the performance of those servers, and, most importantly, individual subjectivity. Lack of speed might be a temporary (and acceptable) nuisance if someone is watching a video for entertainment purposes. But for more serious matters, such as using a teleconferencing system for a business meeting or consulting a doctor online, such delays might simply be unacceptable.

The importance of user subjectivity is reflected in a study of household adoption in

Brunswick, one of the NBN's first-release sites (Nansen et al., 2013). This study showed that, while households had a good understanding of their Internet service Provider's data allowances and monthly download limits, they were 'much less knowledgeable about data speeds'. The speed of their Internet connection was 'often understood in intuitive or experiential ways rather than quantitatively' (Nansen et al., 2013: 2).

In one sense, this lack of awareness is attributable to the historical importance of reliability rather than speed. In a report on FTTP broadband implementation in an inner suburb of Hobart, Wilken et al. (2011: 5) remarked that speed wasn't the main attractor, but rather having constant access to it:

For many households, speed is not the difference that makes a difference; rather it is the fact that broadband is ever-present and ever-available, whereas dial-up must be switched on and off.

This reinforces findings made a decade earlier in relation to the transition from Dial-up to ADSL Broadband, that 'the always-available feature is more valued than sheer speed' (Hampton and Wellman 2001, Hampton 2001, quoted in Wellman, 2001). As the accessibility and reliability of connections have become increasingly certain through broadband technologies, Ewing and Thomas (2012: 8) point out that this is being replaced by a focus on the speed of Internet connections, with one in five Australian households expressing dissatisfaction with their speed. Increased bandwidth delivery and increased speed might in turn increase participation of

households in the digital economy. However, any benefits that might be perceived by households are *mediated through their own experience and subjectivity*, involving past routines of use, concerns about the future costs, as well as present frustrations in making their technologies work for them in their own particular domestic context (Ewing and Thomas, 2012: 11).

Therefore, the user experience of high speed broadband, rather than simply an experience of speed, is intrinsically related to a 'changing *media ecology*', where 'high-speed broadband [is] examined as part of the domestic technological environment as a whole, rather than focusing on discrete technologies or applications' (Nansen et al., 2013, 5). This involves acknowledging that any desire by users for a faster connection will be directly related to how such connection might fit into the current media ecology of the household, as we outline later in our analysis of the media assemblage of high speed broadband.

## **2) Shaping *high speed broadband* through politics**

There is much to be said about the manifold issues surrounding the implementation of the NBN and its several political and financial issues. Yet the issue of adequate level of speed seems to capture the imagination of both politicians and the population in general as the main factor in the debate between what might be the best solution for the country.

Unfortunately, in this process speed is reduced to an abstract number or to a vague



verb (fast, high speed, slow etc.) each of which ignores the underlying complexity. This oversimplification of the concept of speed of connection takes us back to the 'Information Superhighway' metaphor where information is moving unimpeded at a very fast and constant speed, in cruise control mode.

The oversimplification of speed is a defining feature of the Coalition's alternative NBN proposal – the so-called 'Turnbull model' – a supposedly cheaper (and 'good enough') alternative to Labour's original NBN plan. The Coalition's plan directly correlates the high cost of FTTP with the concept of high speed, resonating with many Australian households sceptical or dissatisfied with Labour's original NBN plan and its implementation. In 2011, the Coalition leader Tony Abbott declared Labour's fibre optic network proposal as a waste of money 'at a time when Australia's road, railways and ports are completely clogged' (The Age, 2011).

In arguing that the NBN's cost directly interferes with the upgrading of 'more important infrastructure networks', that are concrete, tangible, generally unproblematic to build and to explain the benefits of, Abbott appeals to the immediacy of results sought by consumers (either households or businesses) that might *perceive* a lack of network speed, yet do not *foresee* the need for the higher speed connections offered by Labour's original plan. While the final details of their amended plan for the NBN are still under consideration (at the time of writing, see NBN Co., 2013a), the Coalition's pre-election document – *The Coalition's Plan for Fast Broadband and an Affordable Plan* (Coalition party, 2013) provides an overview of their intentions and strategies.

Their plan is based on a two-step approach: first, it dismisses the Labour's original plan as a massive waste of public money and resources, in so much as its speed is not necessary, is not desired, and will not be used, and in addition points to the slow implementation and adoption of the NBN so far. Second, as an alternative, it argues for a 'leaner' NBN that can be implemented quicker and at a lower cost (around two-thirds of the cost of Labour's plan as stated in their strategy) by using a mix of technologies rather than near universal FTTP. In arguing its case the Coalition is specifically questioning the social and economic value of *speed* and is questioning the previous government's commitment to the provision of universal high speed capacity:

What is the direct and indirect value in economic and social terms of increased broadband speeds, and to what extent should broadband be supported by the government? (Coalition party, 2013)

The Coalition's original NBN 'value for money' approach proposed an alternative to Labour's plan back in 2010 at the bargain cost of AU\$ 6 billion that involved 'upgrading existing copper networks and more wireless to support a 12 megabit per second peak speed'. This plan was quickly dismissed by field experts, who pointed out that it lacked a fundamental technical understanding of the subject – including the clear speed and download limitations of wireless Internet (Moses, 2010; Tucker, 2010). More recently, the Coalition has argued that 25 MB/s 'would be enough for home usage', adding that at this speed, 'a family of four could simultaneously

download four different sport or movie programs' (ZDNet, 2013). The Coalition's idealised vision of the performance of the household media ecology provides the guiding line to Coalition's alternative (and revamped) NBN plan, which supports a minimum connection of 25 MB/s; over twice the proposed speed of their 2010 proposal (Coalition party, 2013: 2):

Our goal is for every household and business to have access to broadband with a download data rate of between 25 and 100 megabits per second by late 2016.

Throughout its time in opposition and since coming to power, the Coalition has been careful to supplant the term 'high-speed' broadband with 'fast' broadband. This is a deliberate strategy, with the word 'fast' intended to serve two purposes: fast suggests the speeds possible under a mixed broadband plan; and, in a politically savvy move, fast also suggests a less expensive and protracted roll-out of infrastructure. And yet, the goal of providing in excess of 25 MB/s through a mix of technologies by 2016 has already been dismissed as unachievable in the *Strategic Review of the National Broadband Network*, announced by Malcolm Turnbull in December 2013 (Hutchinson and Heath, 2013; Australian Government, 2013). In the same report, the Coalition's oversimplification of speed is summarised in its claim that 'HFC networks are capable of delivering hundreds of megabits per second today, just like fibre' without any explanation of how this might be achievable. The politicised simplification of speed is also evident in the Coalition's 'Choice at a glance' chart in their alternative plan for the NBN (Coalition party, 2013: 15). Designed to easily compare alternative broadband models, the chart implies that speeds will be

virtually the same. Yet, this is achieved by making no mention of upload speeds, glossing over the unpredictable variations in speed delivered by FTTN (as previously outlined) and the unknown overall state of Telstra's copper cable network, which their FTTN strategy depends upon.

It is unclear if the Coalition regard their FTTN as transitional and anticipate an easy conversion from FTTN to FTTP. In their NBN strategy plan (Coalition party, 2013: 11), they state that 'all FTTN designs must be upgradeable'. As Rod Tucker (2013) points out, upgrading Coalition's FTTN to FTTP in the future would involve extensive civil works at an estimated cost of AU\$2000-5000 per premise, while upgrading FTTP's speed would not involve any civil works to the infrastructure and could cost as little as AU\$100-200. Rod Tucker (2010: 43.10) also points out that an all-fibre approach (FTTP) has two key advantages: virtually unlimited capacity and ease of upgrading:

The potential data capacity of fibre to the premises technology is virtually unlimited [...]. As the need arises for even greater data rates, it will be a straightforward matter to upgrade the user modem to a higher data rate by simply changing the user modem.

The Coalition's plan for the premises not connected via FTTP involves two solutions (FTTN and VDSL, or very high bit-rate DSL). Both of these plans are dependent on Telstra's copper cable network to cover what is known as 'the last mile' between the exchange unit and the premise. While technologies such as DSL can provide transmitting speeds of 100 Mb/s (or more), their actual speed, as Tucker (2010: 43.11) points out, drops significantly as the distance between the exchange and the

premise increases. Speed of the network across copper cables is affected by 'intermittent degradation due to water ingress [...] poor wiring [...] and old technology fixes' (Tucker, 2013).

In sum, the Coalition's alternative 'cost-effective' NBN plan makes several leaps of faith by disregarding the many issues that will impact on the speed capacity of their preferred FTTN approach.

### **3) Unpacking the media assemblage of high speed broadband and situating the user as actor**

The complex media assemblage that constitutes high speed broadband is dependent upon many actants: Internet service providers, communications modes, file servers, signal interferences, local network performance, Internet devices, software, international web traffic, content origin, the domestic media ecology, and so on. These must be unpacked prior to analysing how the end user interacts with this assemblage.

Broadband is a troublesome term with several definitions. Adding the 'high speed' quality to the word makes it even more subjective. Back in 2004, the Australian Bureau of Statistics (2004: 4) defined broadband as 'an "always on" Internet connection with an access speed equal to or greater than 256kbps' (one quarter of 1MB/s). The number of broadband subscribers at that time represented 16 per cent of all subscribers (Australian Bureau of Statistics 2004: 9). Their latest report

(Australian Bureau of Statistics, 2013) retains its definition of broadband; a definition that is *out of pace* with the speed of current technologies. According to this definition, broadband now accounts for 98 per cent of connections. The majority of these connections (just under half of the subscribers) have access to speeds between 8 and 24 MB/s, or below the Coalition's minimum envisaged speed (25 MB/s). The remainder are divided into three categories: 256 kbps to 1.5 MB/s (accounting for 3 per cent of broadband connections), 1.5 to 8 MB/s (33 per cent) and over 24 MB/s (15 per cent).

A recent report by CISCO (2013: 9) states that 'the global average broadband speed continues to grow and will nearly quadruple from 2012 to 2017, from 11.3 Mbps to 39 Mbps [or MB/s]'. Also according to the CISCO report, while upstream traffic (or upload traffic) remains stable, a move towards increased symmetry could occur through any combination of the following service actants: the use of peer-to-peer content distribution systems (to lower content delivery costs), PC-to-PC video calling, the shift from sharing streams to individual streams of content in Live TV over the Internet, the adoption of 3DTV, the rise of gaming-on-demand, and streaming gaming platforms. (CISCO, 2013: 15, 16). Once these new services and technologies are available and potential users are informed about them, they can be quickly adopted, creating a 'snowball effect of innovation' (Dias, 2012), where the use of new services leads to speed increases, and vice-versa.

In a recent consultation paper the Australian Competition and Consumer Commission (2013) outlines several technical actants that can affect broadband

speed. The report equates the concept of transfer rates (or amount of data transported during a fixed period) with speed. It subsequently identifies *both* downstream and upstream data transfer rates (or 'speeds') as 'the' key metric for any broadband performance monitoring and reporting program (Australian Competition and Consumer Commission, 2013: 20). The report highlights the difference between 'sustained' and 'burst' speeds. The former equates to the average speeds sustained over several seconds, while the latter refers to 'the effect of techniques used by cable-based ISPs to temporarily increase data transfer rates' (Australian Competition and Consumer Commission, 2013: 20).

The same report outlines several technical issues that can act upon the speed of connection. These include packet loss (loss of information during transmission); latency (the time it takes information to travel from two points in the network and back); jitter (the rate of change of latency); webpage browsing speed (the time a computer's browser takes to load all elements of a given webpage); domain name service resolution (the time it takes an Internet service provider (ISP) to translate a website address into a numerical IP address); and DNS failure (which occurs when the ISP cannot effect such translation) (Australian Competition and Consumer Commission, 2013: 21). We can also add to this list the technique of bandwidth throttling adopted by some Internet service providers to selectively slow down upload and download connection speeds. Such issues might be acceptable for leisure applications. However, they might not be acceptable for online medical consultations conducted remotely or business videoconference meetings.

In the light of the above, the issue of speed must be considered in the context of the many factors that define the media ecology of a household. Included in this context, and impacting on the performance of high speed broadband, are factors that at first glance appear to be entirely social. As Ewing and Thomas (2012: v) point out:

Households on lower incomes are not any more likely to be dissatisfied with the speed or reliability of their home connection, but they do appear to derive less benefit from their internet access. They are less likely to access government services or information online, less likely to see the internet as a fast and efficient means to access information, and more likely to see the Internet as a frustrating technology.

In their study, Nansen et al. (2013: 16) point out that speed was a dominant factor towards opting for a specific type of Internet connection in *both* NBN and non-NBN homes: while 44 per cent of NBN homes said that they wanted fast speed, 27 per cent of non-NBN homes stated that 'their current speed was fast enough and suited their needs'. They argue that the ADSL homes (those who opted not to switch over to the NBN) 'seem to be guided less by active decision-making and more by a passive sort of response to the communication marketplace' (Nansen et al., 2013: 18). They also note that 'households that take-up the NBN tend to earn more money than those who have ADSL broadband connections' (Nansen et al. 2013: 15); and as Ewing and Thomas pointed out above, they are more likely to actively seek benefits from the Internet.

This suggests that any benefits accrued by the NBN and its 'faster speed' perceived



value depend not only on an understanding of how such speeds might positively impact on the end user's experience (which is dependent on the household media ecology), but also on active participation, which itself is dependent on digital literacy.

As Apperley et al. (2011) argue, the previous government's plan for the NBN envisioned the household as an important node in the digital economy:

The digital home is imagined as an integral part of a network of digital living with seamless transitions between home, office, supermarket, school, and hospital.

Nansen et al. (2013: 11) point out that the integration of the NBN with the digital home depends not only on the infrastructure network (the main subject of the political debates), but also importantly on integrating the household media ecology:

[N]ot only does the successful integration of the NBN with the digital home rely upon take-up of technical infrastructures and networks, but to fully realise ambitions for digital inclusion and the digital economy it also depends upon the aggregation and interaction of the household media ecology, including its technologies, costs, uses and literacies.

Nansen et al. (2013: 10, 35) remind us that the media ecology of the digital home is already media-rich and saturated with information devices. Their study of the adoption of the NBN in the Brunswick area, an early release test site, showed that the number of mobile phones (average of 2.59 per house) and laptops/netbooks

(1.96) were significantly higher than landlines (1.06) and desktop computers (0.82) (Nansen et al. 2013: 35). As they point out, this increasingly complex and more mobile media ecology presents challenges of integration in the light of several needs: installing and integrating new devices, connecting to different service providers and 'engaging the household ecology with external networks'.

It is also worth noting that this pattern of media-rich and information-saturated households is not exclusive to inner suburbs in Australia's biggest cities, but is also found in isolated areas in regional Australia. This is described by Bell (2009: 17) in her comprehensive study of the state of connectivity of South Australia. Regardless of location and context (densely populated inner suburbs or small isolated towns) the picture emerging from the media assemblage of high speed broadband in Australia involves *asynchronous speeds* of implementation, perception and connection.

#### **4) Asynchronous speeds and the NBN**

The asynchronous speeds of the media assemblage of high speed broadband in local areas is part of the bigger picture of the NBN as a holistic, nationwide project; this begins with speed of connection.

In July 2013, the NBN Co. released a report that '163,500 existing homes and businesses had been passed with fibre [FTTP] along with 44,000 premises in new developments' (Ramli and Hutchinson, 2013). However, Ramli and Hutchinson

(2013) point out that this includes premises that cannot access the NBN:

55,000 of the existing premises counted as 'passed' are in fact unable to order an NBN service because they are classified as 'service class zero'. These are mostly apartments, shopping complexes and other multi-dwelling units.

The NBN's weekly report on the state of implementation of the infrastructure network (NBN Co., 2013b), retains the term 'passed', but also includes the categories of 'serviceable' (premises that are passed and able to connect to the NBN) and 'active' (premises that have activated their service). The report indicates that by January 2014, the total number of premises passed for fibre connections (including brownfield and greenfield) was 360,755 (an increase of over 100 per cent since July 2013), while only 83,119 of those activated their service; around 23 per cent of the total of premises passed. The number of 'passed' NBN fibre connections amounts to approximately 3 per cent of the total number of Internet subscribers in Australia (12 million in June 2013), while the number of those connections that have been 'activated' amounts to less than 1 per cent of the total (Australian Bureau of Statistics, 2013).

The take-up rate of NBN fibre 'passed' premises (23 per cent) at a national level is much lower than the percentage of take-up rates of the NBN in the first-release sites: in Armidale, NSW, and Willunga, SA, the take-up rate was between 80 and 90 per cent, while in Brunswick, VIC, and Midway Point, TA, it was closer to 50 per cent (Nansen et al., 2013: 6). All these numbers reveal several discrepancies between

speed of availability and speed of appropriation of the NBN's fibre rollout. As outlined in the previous section, appropriation is dependent on the speed of change in socio-economic and cultural practices that in turn are affected by the political reshaping of high speed broadband and that need to be contextualised at both local and national level.

## **Conclusion**

This paper has sought to investigate the asynchronous speeds associated with the NBN as a media assemblage. We argue that the technical, social and political intricacies of Australia's high speed broadband project cannot be easily separated or oversimplified. While the NBN has been consistently framed through its speed of connection, we must analyse it in conjunction with its speed of perception, implementation and adoption. This is especially important in light of the governmental change of approach to NBN's infrastructure network implementation. Unveiling the asynchronous assemblage of these social and material speeds allows us to better understand how it affects any perceived benefits for the end user as an actor in this assemblage.

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