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Converging on an NBN future: Content, connectivity, and control ? a symposium overview

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Abstract

This paper provides an overview of presentations and discussion at the October 2012 'Converging on an NBN Future' symposium held at the University of Canberra. Key themes explored in the paper include recognition of the importance of Australia's National Broadband Network as an enabler of the digital economy (noting the importance of network ubiquity and reliability as well as speed) and its central role as platform for innovation and new service delivery. The paper outlines challenges in selling the NBN and notes the need for increased digital literacy across society, industry and governments. Policy issues arising in developing next generation communications infrastructure and services are discussed. The paper concludes with symposium participants' recommendations for advancing the NBN.

Background

In October 2012 the University of Canberra's Faculty of Arts and Design hosted a public symposium on the topic of 'Converging on an NBN Future: Content, Connectivity, and Control.' Featuring thirteen speakers¹ ^[7] from industry, government and academia, with input from an engaged audience, the symposium raised and discussed a variety of critical questions relating to the National Broadband Network (NBN) as it commences widespread operations in Australia. This paper provides an overview of symposium presentations, organised around common themes, and concludes with a summary of recommendations that emerged from the insights of presenters and the audience.

While the symposium participants recognise the potential for change in the scope and scale of the NBN^[8] once the next federal parliamentary election has been concluded, discussion at the symposium focused on the current vision for the network, as a wholesale-only, open-access network providing fibre-optic cable connectivity to 93% of Australian premises, with the remaining 7% to be served by fixed wireless or satellite connectivity (Wong and Conroy 2010). At the time of the symposium the reference document guiding the development of the NBN was the *2012-2015 Corporate Plan (NBN Co Limited 2012^[9])*. The government's vision for realising the benefits of the National Broadband Network is set out in the 2011 *National Digital Economy Strategy (Australian Government 2011^[10])*.

Connectivity will enable the digital economy

There was strong support for the NBN vision from symposium participants. If rolled out as planned, the NBN will deliver better connectivity to all Australians, enabling economic growth and social sustainability. Speakers confirmed the frequently cited benefits of the NBN as a platform for improving access to health, education and local government services but also emphasised its potential as the primary mechanism for delivery of television and other entertainment content, such as games and music, in future. Rather than viewing the NBN as simply a project to build a faster Internet network, speakers affirmed that the NBN was important for its ability to deliver innovative telecommunications services to users independent of the Internet. From this perspective, raw speeds and technical specifications are less important than the development of ubiquitous, reliable and affordable broadband infrastructure. Robin Eckermann (Robin Eckermann & Associates) and Rosemary Sinclair (University of NSW) reiterated the importance of reliability and cost when extending improved connectivity to regional Australians (Sinclair chaired the 2011-2012 Regional Telecommunications Independent Review Committee and Eckermann served as a committee member).

As fixed broadband infrastructure, the NBN offers enormous scope for new models of service delivery. While the NBN model has been criticised for eliminating facilities-based competition among fixed broadband network providers in Australia, Catherine Middleton (Ryerson University, Canada) noted that facilities-based competition between cable and incumbent telephone providers in the United States and Canadian markets has yet to result in competitive higher speed broadband offerings. Data from both countries³^[11] indicate that only about 15% of households have a choice of service provider for broadband speeds greater than 30 Mbps, allowing for the conclusion that facilities-based competition will not quickly deliver Americans and Canadians the same quality of broadband connectivity as being rolled out by the NBN. Participants emphasised the importance of this insight, as it demonstrates that competition between facilities-based broadband providers is not always sufficient in improving connectivity.

Service-based competition on the NBN will enable innovation and choice in service delivery. NBN Co's Sean Casey noted that households will be able to get a variety of services from multiple providers, enabling them to choose different suppliers for Internet, public services, home monitoring, and entertainment. Geoffrey Heydon (Australian Centre for Broadband Innovation) suggested that there are many models of service delivery yet to be developed, noting that to date the focus has been on building the delivery platform (the network) rather than exploring innovative business models for using it. Heydon and Middleton noted the opportunities that arise for developing services that do not use the commercial Internet, but instead make direct connections over the NBN. For instance, closed networks could be developed to control delivery of educational content to students, and local networks could deliver services within communities.

Recognising that connectivity is central to accessing services in a digital economy, many speakers highlighted the need for improved mobile services. The NBN is a fixed network, but demand for connectivity and services in a digital economy is not limited to fixed locations. While acknowledging that, at present for many Australians, mobile access offers a supplementary service rather than a primary form of access,⁴^[12] and noting the limits of wireless service delivery, participants made a strong case that the connectivity enabling a digital economy should not be location dependent. Ubiquitous, affordable and reliable access must be available to mobile users, not just at the fixed locations served by the NBN. In particular, the need for better mobile service in regional Australia was highlighted.⁵^[13] The implicit conclusion is that two related markets exist, and that since historically private-sector delivery of broadband has concentrated on mobile access leading to comparatively better services in that domain than in fixed-line provision, it is entirely appropriate for Australia to develop the NBN along with further mobile services. Neither will overmatch the other, and both will contribute materially to exploiting the social and economic opportunities of digital computing.

How is the NBN supporting innovation in the digital economy today?

The Department of Broadband, Communications and the Digital Economy's (DBCDE) *Digital Hubs* and *Digital Enterprise* programs are getting underway in communities where the NBN is operational or construction has begun.⁶^[14] These programs are helping local governments, small and mid-size enterprises (SMEs), and not-for-profit organisations learn to operate in and benefit from the digital economy. Importantly, participants believed that the NBN was helping to make these benefits more widely known and available even given the fact that there has been more than 15 years of Internet access in Australia for such ventures. Not only does the NBN offer the ubiquity, reliability and speed necessary for these benefits to be exploited (especially given the patchwork quilt of existing broadband connectivity), but the investment of funds in education programs enables people to shift their thinking to transform their activities for digital network engagement, rather than simply transferring existing approaches online.

DBCDE's Keith Besgrove noted early successes in using the NBN for government service delivery (e.g. City of Onkaparinga, SA) and provision of youth mental health support services (e.g. Kiama, NSW). He also noted the potential for implementing emerging assistive technologies that work on faster networks to improve opportunities for social and economic engagement for those with disabilities. The EduONE program (New England region, funded by the Digital Regions Initiative) is demonstrating ways that the TAFE sector can offer rich, interactive learning experiences to students across the country through NBN-enabled virtual classrooms.

Besgrove also emphasised the profound economic benefits to be realised through increased uptake of cloud computing, a service that will be easily accessible to SMEs across the country through the capacity of the NBN. Increased uptake of teleworking is another benefit of the NBN, allowing for flexible working arrangements and making a contribution to achieving the digital economy goal of improving environmental sustainability. As the NBN extends to regional and remote Australia, it will provide increased and improved employment opportunities through teleworking.

Innovation will be driven by broadband users and service providers as the NBN deploys more broadly across Australia. The NBN is already enabling service providers to enter new markets and deliver new services. For instance, NBN Co's Casey noted that the vast majority of Australia's Internet service providers are now qualified as retail service providers on the NBN, allowing them to offer faster, more reliable broadband connectivity to their customers. Additionally, companies that previously only offered services using one type of technology (e.g. satellite broadband providers) are now able to offer services across all three of the NBN's technical platforms, allowing them to expand their customer base and offer new products. Casey also noted that higher-speed plans are more popular than anticipated, confirming the founding premise of the NBN, that customers understand and want the better services that come from faster connections. He emphasised the role that educators and universities can play in developing new services. AARNet (Australia's academic and research network) is using the NBN to facilitate linkages among educational institutions and could provide educational services to homes using the NBN.

Challenges and opportunities

Participants agreed that the NBN has great potential, but there are also many challenges that must be addressed in order for Australians to realise the full benefits of an NBN-enabled digital economy. Digital literacy is a central concern, not only for consumers but also for SMEs and local governments, especially in regional and remote areas where there has been limited experience with high-quality broadband connectivity. As noted above, DBCDE is implementing programs to help SMEs and local governments learn about the digital economy and to develop and use digital services in ways that create economic benefits. Sinclair noted the Regional Telecommunications Review recommendation that the Digital Hubs program be extended to communities across regional Australia that are not current NBN release sites. She stressed that people need to learn that they should not wait for the NBN to come to their communities before thinking about the digital economy.

Research by the Australian Communications and Media Authority (ACMA) is instructive in understanding the current state of digital literacy among Australians, offering insights on connectivity, capability and confidence in the online environment (Australian Communications and Media Authority 2012a^[15]). Consumers do not always fully understand the digital services they are using (Australian Communications and Media Authority 2012b^[16]), and many Australians lack confidence in using online tools and report concerns about security risks (Australian Communications and Media Authority 2011). Noting programs like Cybersmart (targeted at youth, parents and educators), ACMA's Lesley Osborne discussed how the Authority is actively responding to these concerns. She noted that the ACMA provides advice for consumers to protect themselves from spam and to stay safe online.

Gwang Jae Kim (Hanyang Cyber University) and Sora Park (University of Canberra) suggested that Australia can learn from extensive research into digital literacy in Korea, adapting to the Australian context practices that have proven successful in Korea. Strong government-driven policies enabled a widespread penetration of broadband. However the second level digital divide is still potentially an issue. Due to this gap in access and skills or usage, there has been considerable increase in reports of cybercrime and other negative activities. New policies are attempting to address such issues. For example, the Korean Communications Commission (KCC) states in their 2012 Annual Report that user welfare, effective competition and cyber security will be the core policy drive of the future BcN7^[17] policy. KCC is aggressively introducing cyber ethics program to schools and coming up with preventive measures to keep cyberspace safe and secure. The concern for some is that the current focus on technical development of the NBN, even given the programs run by DBCDE, risks leaving a skills and knowledge gap which might be hard to fill once the NBN is completed.

Symposium participants noted that there are serious non-technical barriers to overcome to enable Australians to understand the NBN and what it means, not as a technology but as a socio-technical change. Matthew Allen (Curtin University) reminded participants that the potential of using broadband networks to deliver improved educational, health and government services has been understood and promoted for decades. He noted that many services that have been promised for years and are now understood to be feasible because they will be deployed over the NBN can in fact be delivered today, using existing broadband networks. The problem is not inadequate broadband, it is that services have not been developed in ways that are compelling to users or that meet the needs of service providers. In other words, the NBN, while improving and extending reliability to all Australians, will not of itself miraculously make people change their perspectives and habits; at the same time, as evidenced by the rapid development of unexpected network innovations in the 1990s and 2000s (such as the use of SMS on mobile networks and the rise of Facebook, Twitter and other social media), the NBN will produce an enormous potential for unanticipated change, whose benefits cannot yet be predicted accurately.

Digital service delivery necessitates changes in business processes. Process change can be complex, often requiring engagement with multiple stakeholders. Digital service delivery may challenge existing business models by changing the relationships among service providers and service consumers. For instance, a TAFE college can develop virtual classrooms to deliver services anywhere in Australia, thus raising questions as to how state governments might continue to fund the TAFE sector. Likewise, investments in health care services by one level of government may realise benefits for another level, making existing funding models unsustainable. Such disruptive effects have already been felt in commercial sectors such as gambling, where the delivery of services online has decoupled the benefits realised from the locality in which costs are incurred.

The Regional Telecommunications Review committee recommended establishment of a National Digital Productivity Council of Experts in regional service delivery. This council would bring together representatives of Commonwealth and state/territory governments and industry to address systemic barriers to the adoption of national digital productivity initiatives? (2011?12 Regional Telecommunications Independent Review Committee 2012^[18], p. 79), including telehealth and e-learning.

Changing service delivery methods can also force change upon those using the services. Not only do Australians need sufficient digital literacy to access online services, they also need to be open to changing their mindsets as to how certain services are delivered. Casey gave an example of 'flipping' the classroom, meaning that students could access course content at home by watching videos and online lectures, and then do their 'homework' at school with the assistance of their teachers. The move to teleworking enabled by the NBN offers another example of significant change, employees and even clients facing new ways of managing interactions and providing or receiving services; see for example Bosua et al. (2013)^[19]. As an audience member observed, there is a real need to work out how to use new services. It was also suggested that there is a need for a debate about the practice of replacing offline services (i.e. local, in person services) with online services.

Several participants commented on the scale and complexity of changing large social systems, especially in the health and education sectors. Sinclair noted that large systems do not deal well with exceptions, meaning that applications that can serve critical masses of users across all types of connectivity must be built to the lowest technical common denominator. As the NBN is rolled out, however, it will provide a sufficiently robust connection to support a wide variety of services even for those accessing the network by satellite.

Heydon compared the NBN to a road, noting that to date much of the effort has gone into designing and building this road rather than thinking about what to do with it. As the construction of the road continues, the focus must shift to thinking about what can be done on this road. Heydon suggests new business models will develop, resulting in transformation across all sectors of the economy and fragmenting the ways that revenues flow between consumers and suppliers. The focus will soon need to shift away from the technology of the network towards the development of easily used devices and applications, as has occurred with tablet computers.

Provocatively, Heydon argues that the 'digital literacy of the future will be complete ignorance,' but the challenge is that 'we're not there yet.' From this perspective, digital literacy must be addressed from two directions – by increasing skills and knowledge, while *also* decreasing complexity. In this scenario, innovations in how digital network experiences are created, packaged, sold and sustained could prove the most profitable use of the NBN. As Allen noted, 'selling' broadband has always been a tricky business for both governments and commercial entities – perhaps the selling of experiences might prove more effective.

Kim and Park described Korea's plans for building an 'ultra-broadband convergence network (uBcN).' It is projected that by 2015 about 20% of the broadband homes will be connected with speeds greater than 1 Gbps. This network will offer 10 Gbps service by 2016, with the goal of widespread use of these speeds by 2020; this approach suggests Australia should also expect some lag between the deployment of the NBN and the commencement of its transformative uses. Driven by ICT policies that have successfully fostered e-government, e-learning and e-commerce, broadband in Korea has, however, demonstrably enabled social connectedness. There are opportunities for Australia to learn from Korea how to develop integrated ICT policies to foster use of broadband networks, and to understand how ever increasing network speeds can be harnessed to provide value to citizens, not through speed itself but through the richer social engagement between people mediated by networks capable of near-instantaneous interactivity for social, commercial and political events

Putting television on the NBN will offer many Australians their first experience of an NBN-enabled service that is not the Internet. Gerard Goggin (University of Sydney) observed that the multiplicity of devices now being used to access television content is creating new ecologies of television driven by users and changing the ways that Australian stories are consumed. Television is available on a whole range of platforms (including mobile, internet, and digital over the air), and consumers are much more able to watch what they want, when they want it. Television and sharing of audio-visual content is no longer just a broadcast activity – people are able to contribute content to be shared with others and can join common conversations while watching TV, raising questions as to the roles of trusted intermediaries and brands. Broadcasting has been not at the forefront of policy discussions around building a digital economy, so there are many issues to consider as content creation and delivery is established in this new technological environment.

Selling the NBN

Symposium participants are keenly aware that the vision for, and the potential impacts of, the NBN are not well understood by many Australians. Participants suggested that there has until now been too much focus on the technical details of the network rollout of the NBN. Middleton noted that the central message of government policy is that the NBN is critical infrastructure, a point often overlooked in marketing which largely centres on faster internet connections. There has been insufficient focus on the value of improved connectivity in extending coverage to underserved regions, increasing reliability, and allowing for services not possible with today's business models of service provision. However, as Allen discussed, selling the NBN is a complex matter, in part because of tensions and contradictions inherent in messages that try to reassure users that the NBN is just an upgrade to technologies people are already familiar with, while simultaneously setting out a vision of the NBN as something offering an exciting new future.

Allen explained that selling the NBN involves more than the political sale of the current vision of the NBN. Selling is also about commercially selling the high-speed connections now on offer by retail service providers, and it is about systematically selling the idea of change. Ultimately however, it is about creating a long-term understanding of the NBN across a diversity of stakeholders, an understanding that will emerge and evolve as the network is experienced and ultimately taken for granted. The selling of what the future of the NBN ought to be will give way to what it becomes, as its possibilities (many unanticipated) are discovered, demonstrated and entrenched. History suggests that users will define the ways that broadband connectivity offers them value, regardless of corporate or government visions of a broadband-enabled future.

Australia's broadband future may change as a result of the 2013 federal election. It can be assumed that a Labor victory would result in the NBN rollout continuing according to the existing plans. However, Shadow Minister for Communications and Broadband Malcolm Turnbull has indicated that a coalition government would favour fibre to the node infrastructure rather than the NBN's current fibre to the premises approach, and would also reprioritise plans to upgrade services in areas it has identified as being in most urgent need of improved broadband connectivity (Turnbull 2012^[20]).

Turnbull recently stated that 'we in the Coalition believe the NBN will again be an important election issue in 2013' (Turnbull 2012^[20]). As the election campaign is yet to unfold, assessments of whether or how broadband will influence the outcome are speculative. What is clearer however, as discussed by Tony Eyers (Tektel), is that most Australians have very little information on which to develop an informed opinion about the network and its benefits. Despite this lack of information, Australians will be making a choice about Australia's broadband future when they vote in the September 2013 election.

Eyers argued that the language of the NBN Co and Federal government websites (<http://nbnco.com.au> ^[21] and <http://nbn.gov.au> ^[22]) makes both sites inaccessible to the general public. For instance, NBN Co's description of the NBN begins by stating 'The NBN is Australia's first national wholesale-only, open access communications network that is being built to bring high speed broadband and telephone services within the reach of all Australian premises.' (NBN Co 2012 ^[23]) The government's site explains that 'The National Broadband Network is a next-generation broadband network designed for Australia's future needs. The network comprises of three technologies - optic fibre, fixed wireless and next-generation satellite' and will provide more reliable, high-speed broadband access to all Australians.' (Department of Broadband Communications and the Digital Economy 2012 ^[24]) As Allen observed, 'Messages that resonate with everyday consumers aren't the ones being used.'

While both NBN Co and DBCDE websites offer videos and fact sheets explaining ways that the NBN will benefit Australians, Eyers argued that current information is insufficient and is not creating engagement with the general public. He noted the government's NBN Facebook page has fewer than 2000 'likes' (by the time this article went to press, it had about 2050 'likes', in comparison, Qantas had close to 315,000 and Telstra customer service almost 270,000). NBN Co's most popular video on YouTube has been viewed about 40,000 times, but most of its videos have been viewed fewer than 2000 times. Further, there are not yet enough customers connected to the NBN to share their experiences in a way that will have an impact on general public opinion about the network. Additionally, he suggested the media could be more effective in explaining the differences between the government and opposition views on broadband. Eyers has developed his own site, at <http://broadbandexplained.com> ^[25], to offer a 'simple explanation' of the NBN and provide links to consumer information and NBN technical documents, but notes that like the other sites, without word of mouth or advertising to drive traffic to this site, it remains difficult to reach those who might be interested in learning more about the NBN and alternatives.

Policy issues

What about mobile? The NBN is designed to deliver fixed broadband services to Australians. Evidence from the Regional Telecommunications Review and data collected by the Australian Bureau of Statistics demonstrate enormous demand for mobile communication services, but it was noted there is no equivalent approach to the NBN to address market failure in the delivery of mobile services in regional and remote Australia. Several symposium participants stressed the need for policy to address the provision of mobile communication services across the country. If, as the government states, broadband is essential 'to improve Australia's productivity and economic prosperity, assist the nation's fight against climate change, improve service delivery in the critical areas of education and health and ensure the connectedness of our regions,' (Government of Australia 2009 ^[26], p. 6) then surely such benefits should not be realisable only when and where fixed broadband connections are available. Likewise, the objectives of developing broadband as 'a significant piece of Australian critical infrastructure that will underpin the provision of a range of essential services to the Australian community' and ensuring 'access to affordable, high speed broadband' (Wong and Conroy 2010 ^[27]) should not be location dependent.

What about television? Goggin called for debate and discussion on a policy framework to guide the development of television services on the NBN. He identified a real disconnect between the current policy environment and the emergent user driven dynamics that are creating new varieties of television. Television must be considered as a central component of a unified policy framework, a framework that also covers the development and delivery of fixed and mobile networks and services.

Heydon observed that as the quality of television and video content continues to improve and increases the number of bits presented on the screen, it will no longer be possible to deliver television content by means of over the air broadcasts. High-capacity fibre networks will be needed to deliver the next generations of television. Furthermore, even if continuing to broadcast television over the air were technically feasible, Heydon argues that the spectrum used today for television broadcasting will become too valuable for television, and will need to be reallocated, helping to solve the need for fast mobile network connections. These observations reinforce the need for a unified policy framework that can ensure the telecommunications and broadcasting infrastructure meets the needs of Australians as services converge onto a single digital platform, accessible through wired and wireless networks.

What about policy evaluation? Franco Papandrea (University of Canberra) offered some thoughts on the application of policy evaluation tools to assess the NBN. Questioning why the government has ignored standard evaluation policy tools, he noted that enormous social welfare losses can be generated by policies that lack proper analysis. He noted the need to clearly define the problem for which the NBN is a solution, and called for the development of measures to assess the benefits of the NBN as compared to the status quo (e.g. what are the incremental benefits in increasing network speeds from 12 Mbps to 100 Mbps? what demand is there for higher speed connectivity?). He also called for assessment of the decisions to implement equal pricing across the country, and to structure NBN Co as a monopoly network operator and noted the importance of tailoring connection strategies to the needs of consumers.

In discussion, Casey reminded the audience that the NBN is an investment in national infrastructure. Participants noted that the long time frame for the NBN roll out make cost-benefit analysis difficult. They argued that a credible methodology for conducting cost-benefit analysis for the NBN has not been offered by anyone, and countered with examples of successful large scale public infrastructure projects that did not undergo cost benefit analysis. There are challenges in assessing demand based on current broadband uptake patterns, but it was noted that more could be done to promote the positive impacts of NBN applications and services already in use in locations where the NBN is now operational. The development of the Internet to this date also shows a trend by consumers to always seek to exploit the benefits of new and faster connectivity.

Conclusions and recommendations

Symposium participants offered a variety of perspectives on the development of the NBN. There was fairly broad consensus as to the benefits the NBN can bring, coupled with informed discussion about the complex challenges that must be addressed in order to fully realise the network's potential as an enabler of the digital economy and a means to enhance social connectedness in Australia and beyond. This section summarises the main themes discussed at the symposium, and offers recommendations for advancing the NBN.

The NBN is not just about speed. The NBN is often described as a project to bring faster broadband services to Australians. Symposium participants agreed that the real value in the NBN is in the connectivity it will offer, connectivity that is affordable, ubiquitous and reliable, and enables service delivery. The NBN will provide faster broadband (especially important in regional and remote areas that have limited availability at present), but must be understood as a national communications infrastructure that enables service delivery rather than just a fast network. Structuring the NBN as an open-access wholesale network ensures competition among service providers, allowing the focus of innovation and investment to be on service delivery rather than on building competing fixed broadband infrastructures.

Speed is significant for what it can do for new services dependent on faster datastreams; however in many cases it is the ubiquity of the network that makes it most valuable, allowing businesses and governments to assume connectivity will exist. Broadband should not be merely regarded as a type of a network infrastructure but rather as an ecosystem that includes both the supply and demand components, including networks, services, applications and user demand.

The NBN will be an enabler of Australia's digital economy, but action is needed to ensure this outcome Participants discussed a variety of programs that are in place to foster digital literacy, among individuals, SMEs and local governments. These programs require ongoing support to ensure that Australians have the capacity to benefit from digital service delivery and the skills to innovate and discover ways to use a national broadband infrastructure that improve quality of life and increase economic opportunities. Businesses (especially SMEs) and governments have an opportunity to develop new digital goods and services that meet citizens' needs, and will benefit greatly from initiatives to help them share their successes, understand the challenges of process and business model change and learn how to overcome barriers that constrain widespread participation in the digital economy. Emphasis should be placed on moving away from trials of services in favour of rolling out services available to all. Lessons can be learned from countries like Korea that have been successful in developing policies to foster e-government, e-learning and e-commerce.

Better information is needed to explain the benefits and costs of the NBN to the public Australians will face a choice of two broadband futures in the 2013 federal election. Some participants suggested that neither the NBN Co nor the DBCDE efforts to inform Australians about the purpose and value of the NBN have been very successful in capturing the general public's interest. It is difficult to foster a national conversation about the benefits of the NBN or the experiences of connectivity it enables when there are currently so few Australians actually using the network. In an environment where many Australians are supportive of efforts to improve broadband services across the country, it is important to help people understand the differences between the Labor and Coalition plans for Australia's broadband future. The media and independent observers have an important role to play in offering objective assessments of the two approaches.

Mobile connectivity is key. There was strong consensus at the symposium that participation in a digital economy should not be constrained by location. Mobile connectivity is essential in realising the benefits of a digital economy, and is a critical component of a national digital infrastructure. Efforts must be made to address lack of reliable, affordable mobile connectivity in regional and remote Australia. There are two elements of broadband networks that are not necessarily consistent with each other. One is the connectivity that high capacity networks can provide and the other is the ubiquitous access - the 'always on' feature. Mobile technologies complement fixed broadband by enabling true ubiquity.

New business models require new policy discussions. The NBN will offer many opportunities for disruption of existing business models, changing the relationships among stakeholders and in cases like television, shifting more control to the users. Television was highlighted as an area that requires reconsideration of existing policies, as patterns of use and modes of access change in the digital environment. Increased demand for spectrum for use in providing telecommunication services and limits to the quality of television service that can be delivered over the air will lead to calls for shifting television away from over the air transmission and onto fixed broadband networks. Policies governing broadcasting and telecommunications must be reassessed as the provision of content shifts to a digital form, accessible on demand over fixed or mobile networks.

Next steps. The symposium organisers (Sora Park, Matthew Allen, Catherine Middleton and Chun Liu of Southwest Jiaotong University, China) thank all the participants for their insightful contributions to this discussion on the future of the NBN. This article acts as a record of the forum, and provides the basis for further debate and discussion around the general themes addressed by participants. We hope that local champions, industry leaders, and governments will help in advancing the issues raised, and take steps to implement recommendations suggested here. We encourage academics to continue to offer critical analysis of the NBN and the development of Australia's digital economy. We will be following up ourselves with new initiatives that continue to explore the development of digital literacy among Australians and the evolution of the policy environment that is guiding the development of Australia's digital economy.

Converging on an NBN Future: Content, Connectivity, and Control

Public Symposium at the University of Canberra, October 9th, 2012

List of Speakers (in order of presentations)

Speaker	Affiliation	Presentation Title
Robin Eckermann	Robin Eckermann & Associates	Don't get hung up on the plumbing!
Keith Besgrove	Department of Broadband, Communications and the Digital Economy	Using the NBN to improve government service delivery
Gerard Goggin	University of Sydney	The NBN will (not) be televised: Internet, mobile media, and the future of the audiovisual
Matthew Allen	Curtin University	Selling the NBN: The politics of broadband in Australia
Lesley Osborne	Australian Communications and Media Authority	Communications literacy and the broadband society
Rosemary Sinclair	UNSW Australian School of Business	Opportunities ? Regional communities and the NBN
Geoffrey Heydon	Australian Centre for Broadband Innovation	Ubiquitous broadband is enabling the digital economy
	Hanyang Cyber University / University of Canberra	Reflection of broadband policies in South Korea

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Endnotes

1. The list of speakers, noting their affiliations and topics, is provided at the end of this paper.
2. This paper does not outline the details of the National Broadband Network as they have been discussed extensively elsewhere, including in this journal (e.g. Horsley and Gerrand 2011 [34]). The Department of Broadband, Communications and the Digital Economy maintains a webpage with current information on the NBN at http://www.dbcde.gov.au/broadband/national_broadband_network [35] and the NBN Co website is at <http://www.nbnco.com.au> [36].
3. See Canadian Radio-television and Telecommunications Commission (2012 [37]) and Crawford (2012 [38]).
4. For instance it was noted that 94% of data downloads are done on fixed rather than wireless networks (Australian Bureau of Statistics 2012 [39]).
5. Sinclair provided an overview of the recommendations of the Regional Telecommunications Independent Review Committee (see 2011?12 Regional Telecommunications Independent Review Committee 2012 [18], for details), with Eckermann reiterating the need for anytime anywhere access to information.
6. Program websites are at http://www.dbcde.gov.au/digital_economy/programs_and_initiatives/digital_hubs_program [40] and http://www.dbcde.gov.au/digital_economy/programs_and_initiatives/digital_enterprise_program [41].
7. Broadband Convergence Network (BcN) is the name of Korea?s next generation network, delivering at least 100 Megabits per second.

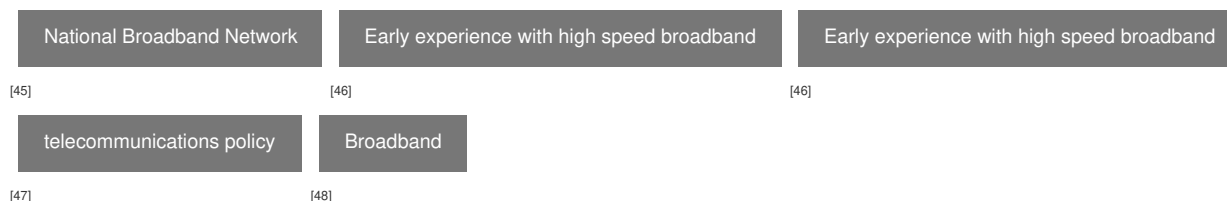
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