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AUSTRALIA

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Andrew McGowan
Inquiry Secretary
The House of Representatives Standing Committee on
Infrastructure and Communications
PO Box 6021, Parliament House,
Canberra ACT 2600

Dear Andrew

Please find attached the University of Newcastle's submission to the House of Representatives Standing Committee on Infrastructure and Communications to 'examine the capacity of a National Broadband Network.'

The University of Newcastle welcomes the opportunity to provide the perspective of a comprehensive, multi campus, regional University on this significant federal government initiative.

I look forward to hearing from you in due course if you require any further information.

Yours sincerely

Kevin McConkey
Deputy Vice-Chancellor
(Academic and Global Relations)

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UoN Submission to the Standing Committee on Infrastructure and Communications

University Overview and Direction

The University of Newcastle is a progressive, dynamic institution recognised for research achievement, teaching innovation, and access to higher education for disadvantaged groups.

The University has four major campuses located in Newcastle, Ourimbah, Port Macquarie and Singapore as well as locations in Sydney, Orange, Tamworth and Taree.

The University has 32,000 enrolled students and 2,500 staff. It is ranked in the top 10 of Australian Universities for Research Funding and Outcomes.

The University in 2020

In 2020 the University of Newcastle will be a sector leader in providing opportunities for students from diverse backgrounds. It will cater to over 40,000 students including onshore, offshore and distance education.

The University will expand into the Newcastle city centre on a campus accommodating business, law and creative arts students. Planning is underway to establish education, humanities and social sciences disciplines in the city.

The University will be home to the best engineering and health faculties in the country, relative to size, with even stronger health and medical research capabilities through the new state of the art Hunter Medical Research Institute building.

With increased reach across the region and overseas through expanded online program delivery, as well as established infrastructure and support systems, the University will provide one of the best student experiences in the country.

Given the geographically dispersed nature of its campuses, its focus on the provision of higher education for students from diverse backgrounds and the growth in stature of its research outcomes, the University of Newcastle will benefit enormously from the rollout of ubiquitous high speed communications.

Inquiry Specifics

Summary

The National Broadband Network (NBN) has the potential to take geography out of the equation. It represents a seismic shift in the way Australians live, work and conduct business. Innovative use of ubiquitous high speed communications will be critical to Australia's, and in particular regional Australia's, ability to participate and compete in the global economy.

Much of the debate surrounding the National Broadband Network (NBN) has focused on bandwidth and cost. Whilst the speed and affordability of the network service are key components of the Government's policy objective, it is also important to take ubiquity and bi-directionality into consideration.

The NBN will provide access to high speed broadband to 100% of the population. That is the most notable change in the Nation's telecommunications infrastructure and where real benefits of the NBN will be most profoundly experienced.

The ability to download as well as upload large amounts of data will transform real-time communications and create new products and services. Because of the increase in bandwidth those services will be richer in functionality and capability.

This combination of universal coverage and high speed throughput will make it possible for individuals and organisations to communicate collaborate and conduct their day to day business in ways that have simply not been possible to date.

Most notably this will be achieved via a concept known as Telepresence whereby end users experience a feeling of being present at a remote location as a result of stimuli such as life-sized images, eye contact, and spatial sound. Telepresence is an example of an immersive online experience and will have applications in healthcare, education, research, small to medium enterprises and communities.

The pervasive nature of the NBN will also make it possible to connect more and more objects to the network. These objects could be telemetry devices, sensors, smart

appliances or in fact any device that can be controlled by or create a digital output. The ability to measure and control the built environment will lead to efficiency gains, service improvements and innovation, especially within the utilities and health sectors.

The NBN is the next logical step in the evolution of communications in Australia. The NBN however is not an end in itself.

It is the services that run over the NBN that will have a transformative effect economically, educationally and socially.

Organisations will need to investigate how they intend to optimise the benefits of the NBN. Business models, processes and work practices will need to be re-assessed. Service delivery models will need to be enhanced. New and emerging opportunities will need to be assessed and where appropriate implemented. These are significant challenges.

The NBN will cut across all aspects of our daily lives and will have far reaching implications for the economic and social prosperity of the nation as a whole and regional and remote Australia in particular.

The National Broadband Network is a transformation technology. Ultimately the success of the NBN will be measured by how it enhances the prosperity of all Australians no matter where they live.

Delivery of government services and programs;

It has only been in relatively recent times that telecommunications infrastructure has been explicitly recognised as a base requirement for improved service delivery.

The NBN will streamline government service delivery across metropolitan, regional and rural communities via efficiency gains in the provision of current services as well as leading to new and innovative services.

The NBN will also lead to equitable service delivery for vital services such as health, and education for outer metropolitan, regional and rural centres.

Higher Education is a service supported by government in the interests of the nation. As is the case with any organisation the pressure to deliver more with less is an ongoing challenge. Universities also have an obligation to provide equity in its service delivery.

Given the comprehensive nature and its vast multi-campus regional footprint, the University of Newcastle will be able to meet these challenges as a direct result of the immersive nature of NBN enabled communications combined with ability to move more services online.

Achieving health outcomes

The University of Newcastle offers a comprehensive range of degree programs, both at undergraduate and postgraduate levels across Biomedical Sciences, Health Sciences, Medicine and Public Health and Nursing and Midwifery.

The Faculty of Health ranks eighth in the country in terms of research funding from the peak body in Australia, the National Health and Medical Research Council (NH&MRC). In addition to training undergraduates in research methods, the University

trains a large group of research higher degree Masters and PhD students across the Faculty's four Schools (over 250 annually). The University of Newcastle is a leader in the fields of neuroscience, cancer research, heart and digestive diseases, reproduction, public health, asthma and respiratory disease, and our Faculty has internationally competitive facilities for biotechnological research.Health care in the region is covered by two state area health networks.

The Hunter region is part of Hunter New England Local Health Network (HNELHN) and the Central Coast is managed by the Central Coast Local Health Network (CCLHN). The University works in close partnership with both Local Health Networks.

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Whilst there has been a concerted effort to improve inter-site communications via a rolling upgrade to both HNELHN and CCLHN wide area networks (WAN), many of the localities serviced by both health networks have relatively poor access to broadband. This places a constraint on the ability of the relative health networks to provide next generation tele-health and e-health solutions to the entire community.

The NBN will deliver a communications infrastructure that has the potential to enhance the delivery of health services. Obviously such an infrastructure can never fully replace the need for face to face consultation, however if utilised in a targeted and appropriate way, it can greatly reduce the amount of in-person consultation and provide individuals in under serviced areas access to a greater array of specialised services.

It is the immersive nature of the real time communications and the ability to move large data sets that will have the greatest application in health services in particular in the delivery of:

- aged care
- mental health services
- medical imaging
- health monitoring services
- initial consultation and diagnosis
- follow up care
- creation of communities of interest

Local health networks are poised to enter a period of vastly increased demand for services. The provision of immersive and engaging services via online delivery mechanisms has the potential to increase hospital productivity, keep down health costs for the public and ensure health care is accessible 24 hours a day to all Australians regardless of location.

Given the vast geographical area and sheer volume of patients, a fast broadband network that connected 100% of the population would greatly improve health outcomes in the Hunter and Central Coast and Mid North Coast areas, where the University of Newcastle has campuses and works closely with health services.

Improving the educational resources and training available for teachers and students

Part of a university education is gaining the competencies for a future career. The other and arguably more important aspect is one of individual transformation. Higher education provides the student with the skills to assess problems and issues in a fair and honest way. This process is both iterative and collaborative.

At present, online delivery of University programs can deliver a competency to a student. Over the last 10 years more and more content has been delivered online ranging from course notes, quizzes and forums through to the recording of lectures, basic online collaboration and, at the more advanced end, real time collaboration via technologies such as the Access Grid.

Online program delivery is still in its infancy. This is primarily due to insufficient capability within our communications networks. As a result the transformational aspirations of higher education cannot be fully achieved in the online world.

The NBN has the potential to change this. Access to such a network will provide real time, immersive collaboration between academics and students as well as between students. Students will have access to an expansive set of online resources. These resources will be more engaging and interactive and will be seamlessly woven in to the teaching and learning experience.

This will be particularly evident in the way students in regional and remote areas engage with the University sector. A ubiquitous broadband network will provide distance learning and e-learning opportunities to student cohorts no matter where they live.

Given the University of Newcastle's commitment to equity in education, improved communications will go some way to improving education outcomes by providing new opportunities by closing the digital divide.

It has to be noted however that improved communications is not an end in itself. The education sector may have to change as fundamentally as, say, the music and film businesses have. They have had to re-evaluate their business models and enhance their service delivery in order to remain competitive.

A further move to online delivery has the potential to open up markets but it will also increase competition. As has been evident in the music and film industries, it will be the Universities that are able to adapt and innovate that will prosper in this new environment.

Management of Australia's built and natural resources and environmental sustainability

The University is at the forefront of Newcastle's emerging national role as a hub for energy research. With Australian Government support of $30 million, the University will soon open the Newcastle Institute for Energy and Resources (NIER), an energy research facility on a scale unmatched by any university in the country.

The University is part of the winning consortium for the Australian Government's $100 million Smart Grid, Smart City demonstration project for Newcastle. Led by EnergyAustralia, the project includes the NSW Government, CSIRO, Newcastle City Council, IBM Australia, AGL and GE Energy. Together with EnergyAustralia, the University will also create a Centre of Excellence in intelligent electricity networks.

When news of the consortium was announced, Federal Climate Change Minister Penny Wong stated that the 'trial would help people save energy and connect renewable energy to the grid and that such technology has enormous potential to drive efficiency in the electricity sector'.

In this instance it is not the speed of the NBN that is important rather it's penetration into the market place. Any device that is network enabled will be able to connect to the network.

This will lead to innovations in utility management and will:

- improve fault rectification,
- increase efficiency,

- reduce costs,
- enable the management of renewable energy generation and;
- potentially forestall the requirement for additional utility capacity.

The Smart Grid, Smart City project is an example of how ubiquitous communications could be used to manage all manner of built and natural resources including electricity, water and gas.

Impacting regional economic growth and employment opportunities

Whilst the build phase of the NBN will generate significant economic stimulus, the large and lasting impact will arise from the networks use.

Infrastructure enables the creation of products and services. These products and services drive the economy. This is evident in the economic benefit derived from the investment in road, rail and utility infrastructure. Communication infrastructure should be seen in the same way.

Access to high speed communications will be the key driver for economic growth in the nation as a whole and economic diversification in regional Australia in particular.

As stated previously the NBN has the potential to take geography out of the equation. The promise of telecommuting, distance education, tele-health and access to the online services that have not been available to communities in regional and remote Australia means that populations will no longer need to live where they work. Instead they will be able to choose where they live and use the network to participate in the digital economy.

Regional and remote Australia is a very attractive option for such a population.

As a direct result of this population migration to regional Australia the breadth and depth of the existing skill base in these areas will be dramatically improved.

This will be the key enabler for innovation and further economic diversification that will allow the region to move more seamlessly to an economy that is less reliant on natural resources and agriculture to ensure continued prosperity.

This shift has the additional benefit of taking pressure off metropolitan areas by attracting people to regional and remote Australia rather than to the seemingly endless urban sprawl of metropolitan centres.

Impacting business efficiencies and revenues

The Faculty of Business and Law at the University of Newcastle strives to make a difference by creating new knowledge, preparing our students for global citizenship, and contributing to social, political and economic progress of Australia and the Asia-Pacific region.

The Faculty of Business and Law conducts research and contributes knowledge in a wide range of fields, with a focus on how business and society can work together to create sustainable enterprises and communities.

The NBN will be a key enabler for the Australian economy. Access to high speed communications will transform service delivery, lead to innovation and open up new markets.

However, much of the current debate has focused on the transformational impact the NBN will have on health, education and government including tele-health, distance education and government interaction.

Whilst these sectors will receive significant benefits from the NBN, the impacts of the NBN on Small to Medium Enterprises (SMEs) has not been clearly stated and as a result, the majority of SMEs does not understand the many benefits associated with low cost, ubiquitous, fast broadband.

These benefits include:

- increased ability to focus on core business
- decreased costs
- increased efficiency
- broader market reach
- collaboration
- innovation
- tele–communication
- utility Computing also known as cloud computing
- Device convergence leading to greater integration between devices and appliances

It is also important to note that ubiquitous high speed communications also come with a number of challenges and risks including:

- other markets having a greater reach into the local economy
- competitors expanding market share because of early take-up
- compliance
- security

At the forefront of the NBN is the notion that access to ubiquitous high speed communications will lead to innovations that cannot even be imagined today. Whilst this statement is true, as demonstrated by the introduction of centralised electricity generation in the 1890s, it has taken a level of precedence over the benefits that are possible today for SMEs.

There is a pressing need to demystify the NBN and break it down in to the tangible day-to-day benefits that are possible today. In doing so, the prosperity promised by the NBN will become a reality.

Interaction with research and development and related innovation investments

The growing use of communications technology is fundamentally changing the way research is conducted in the higher education sector. Researchers rely heavily on the Internet to access research information and online journals and to communicate and collaborate with colleagues in Australia and overseas.

Many if not all research intensive institutions have access to high speed communications, both on their internal networks and via high capacity network providers such as AARNet. The impact of the NBN on these links will be incremental at best.

The NBN will provide high speed communications links in to over 11 million domestic and business locations across the nation. This will make it possible to take the research collaboration that is currently being conducted 'on net' (on networks such as AARNet) out to the 'off net' world.

This dramatic increase in the amount of potential locations to connect and collaborate with will bring an increase in the amount of potential research partners, collaborators and potential funding partners.

Ubiquitous high speed communications will make it possible to establish work centres and pilot sites in remote locations. The NBN will make it possible to deploy an endless array of sensors and other communication devices which have the potential to provide greater understanding of natural and man-made processes.

The immersive nature of the collaboration will bring a new depth and diversity of research to a wider audience and could lead to greater re-use of existing research and also fuel innovation into the future.

Researchers will now be able to engage with their own research and the research of others from just about anywhere in Australia. It will be possible to overcome the time lag difficulties associated with international locations by being able to collaborate in an immersive way from home.

Facilitating community and social benefits

The University of Newcastle promotes direct and mutually beneficial links with the broader community. The University aims to build strategic alliances that contribute to the development, prosperity and social wellbeing of the community.

Communications infrastructure is as important to a nation's social well-being as transport or energy. Community benefits will be intrinsically linked to the impact of high speed communications on the:

- revival of regional and remote communities
- economic diversification as and the resulting impact on a community's skills base
- reversal of population drain as more people stay in a region and more people and organisations are attracted to a region
- ability of communities to access services whether they be health, education or government services on a more equitable basis
- ability of communities to access markets as part of the digital economy
- way toward stronger and sustainable regional communities

It is also very important to note that communities no longer need to be bound by geographical boundaries. Online communication, even today, has resulted in the creation of communities of interest. Individuals and organisations with common interests are able to communicate and collaborate with one another in a meaningful way regardless of physical location. This in turn has a flow on effect whereby by these virtual communities of interest use online communications as a way of establishing traditional community groups.

The community benefits that arise for the NBN need be available to all. The NBN has the potential to exacerbate rather than remediate the digital divide. A concerted effort from all levels of government will be required to ensure improved access levels for:

- individuals from low socio economic backgrounds
- the older members of society
- the disabled
- the disadvantaged.

Without such an effort these groups will continue to be digitally excluded.

Optimal capacity and technological requirements of a network to deliver these outcomes

Six equally important factors need to be taken into account when considering the capacity and technological requirement of the NBN.

1. Speed
2. Bi-directionality
3. Ubiquity
4. Transit and core network capacity
5. Reliability and security
6. Future requirements

Speed

As network speeds grow, more applications become possible. Greater speeds result in applications that are richer in content and more interactive. The world of social media and user generated content exploded as speed increased.

Speed is not about one person performing one task at time. The end user expects to be able to multitask. Home and office networks needs to support multiple users and multiple concurrent services over one connection. End users will expect to be able to simultaneously surf the web, engage in a video conference, upload large files to the

cloud, conduct a voice call and perform an array of other tasks. The NBN needs to be built with multitasking as one of its core requirements.

This will only be possible if the NBN is built to deliver the speeds that will make this possible. By tracking the exponential growth in data speed requirements over the last 10 years, from an average of 256 kbps to in 2000 to 10 Mbps in 2011 it is plausible to extrapolate out to 2020 and come to the conclusion that 100 Mbps will be a fundamental end user requirement.

Bi-directionality

Whilst consideration needs to be given to downstream speed (downloading data), too much focus in the debate has been given to this requirement and not enough on the upstream speed (uploading data).

Without fast upload speeds, real-time collaboration using high definition video is simply not possible. The end user will be able to receive high definition signals but they will not be able to send them.

Any high speed communications network needs to provide sufficient upload speeds.

Ubiquity

The Digital Divide is more a function of access than it is of speed.

The NBN needs to be built so that all Australians regardless of where they live, have access to high speed broadband. While it is not economically feasible to provide all Australians with a 'Fibre to the Home' (FttH) solution, it is critically important that FttH reach the maximum amount of people within the financial constraints of the project.

It is vitally important that all users that will not be provided with an FttH solution be provided with the fastest possible speeds via other delivery mechanisms such as wireless and satellite services.

If the alternative solutions do not allow for a true broadband experience, then speed rather than ubiquity will be the issue that creates a new Digital Divide.

Transit and Core Networks

An end user will not experience the benefits of fast broadband in their premises or business if the networks that carry the data between network hubs (commonly known as Backhaul) do not have sufficient capacity. This includes inter-region, national and international links

Similarly the core networks will need to cope with the exponential increase in traffic that will arise from millions of end users interacting with bandwidth hungry applications.

Reliability and Security

The NBN will transform the nation in terms of service delivery and improved communications. As a result, the entire economy will become absolutely reliant on the products and services that the NBN makes possible.

The NBN should be thought of in the same way as electricity and water. The network needs to be built to ensure that the services it supplies are robust, reliable and secure.

Future Requirements

The data throughput requirements of the home and business user are increasing at an increasing rate. It is critical to ensure that the technology used in the National Broadband Network is able to keep up with this growth.