



Townsville Campus

Townsville Qld 4811 Australia

Telephone (07) 4781 4111

International +61 7 4781 4111

www.jcu.edu.au

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Andrew McGowan
Inquiry Secretary
House of Representatives Standing Committee
on Infrastructure and Communications

Email: ic.reps@aph.gov.au

Dear Andrew

Inquiry into the role and potential of the National Broadband Network**INTRODUCTION**

James Cook University (JCU) is the primary tertiary education provider for northern Queensland, a research institution of international renown, particularly with respect tropical science and innovation, and the University plays a significant role in the regional economy. We have a commitment to providing a diverse curriculum to our communities and to train graduates for employment in the region's businesses and professions. JCU is itself part of the region's infrastructure – it is a community facility of considerable value and importance – and it is vital to north Queensland's sustainable development.

Universities are providers and users of information. The emergence of ICT technologies and tools across the past two decades has transformed how universities collaborate and interact with students, collaborators and local communities. JCU regards the establishment of National Broadband Network (NBN)-like technologies as an essential enabler to support its missions of education and research in northern Australia. While JCU has access to high capacity data links via AARNet, this network is essentially limited to connecting major campuses of Australia's universities and research organisations. AARNet does not extend into the homes of students, research and teaching staff, nor many of the University's partners and collaborators.

One of the most compelling elements of the NBN for JCU is its planned coverage and accessibility. With the assurance that students will have access to high speed upload and download transfers, new IT-mediated teaching can be developed with the expectation that it will be accessible to students both on and off-campus in their homes or on work placements. While wireless/mobile services are an important component of the accessibility mix, they will not be able to offer cost-effective access to high speed data services. Without high-speed internet access required for High Definition video transmission and similar applications, development of next-generation teaching tools and environments cannot flourish.

TERMS OF REFERENCE

JCU offers the following responses to the terms of reference of the NBN inquiry.

a) Achieving health outcomes

The NBN will deliver improved outcomes related to health research, education, and delivery, and encourage innovation with respect to in-home patient monitoring, diagnosis and triage. We recognise, however, that the policy and cultural environments associated with the health sector may well constrain the benefits in the short term.

There are now many examples of in-home patient monitoring that the ubiquitous nature (i.e., almost all homes will have equivalent access) of the NBN will be well suited to deliver. Within Australia and internationally a vast array of tele-health services are operational and routine. Deployment of these services will become more viable in a NBN environment.

The health education programs JCU provides rely on professional placement programs. While large hospitals and health campuses have high-speed broadband, many remote communities and smaller organisations do not. High-speed NBN networks rolled out to these locations will enable high quality remote supervision and education of many health and allied health students in regional Queensland.

Once appropriate services are built and deployed, JCU expects the impact of the NBN on health delivery in remote and regional communities to be considerable.

b) Improving the educational resources and training available for teachers and students

An inexorable transformation of higher education is happening across the world. Universities are being asked to develop more practical, job ready skills in their graduates. Students themselves are now very IT literate the 'digital natives' and demand access to ICT services, including off-campus access, and there is a strong growth in flexible and remote learning. Work integrated learning is becoming increasingly important in university teaching. Better support to remotely located students will be possible with access to high speed communications and the development of new methods of teaching.

As well as providing for a more complete student experience, the capacity of students to remotely access university ICT services off-campus means there are gains to be made in teaching quality and efficiency. Currently at JCU, final year physics and mathematics students are sharing lectures remotely presented in HD video from several universities around the country. Deeper and wiser use of this and emerging technologies related to immersive video, hyper-realistic simulation environments and other advanced teaching technologies are inevitably coming to higher education (and VET space) in the next few years. The NBN provides a platform to enable deeper penetration of these tools into regions that would not otherwise have the capacity to access them. NBN technologies have the potential to optimise scarce educational resources across a disparate network of Higher Education providers. Leveraging discipline-specific expertise, in whatever location, and providing access for a diverse spectrum of learners increases the probability of improving participation and success.

c) The management of Australia's built and natural resources and environmental sustainability

JCU is working with local governments, business groups, utilities and industry partners to actively explore the application of 'Smart City' concepts into regional Australia. The Smart City concept with respect to IT relies on the application of pervasive communications infrastructure to 'instrument' urban spaces with a variety of sensors. These sensors can feed real time information about the status of a city environment (e.g., travel conditions, energy & water consumption) into systems that allow consumers and support agencies (e.g., police) to respond immediately to developing events. Smart Cities promises better utilisation of resources, greater resilience, safety and more liveable urban spaces. In a tropical environment, where extreme weather events are common, real time information and communications can ameliorate the potentially devastating effects of natural disasters.

The installation of NBN infrastructure is considered an important element in the initiation of Smart City environments. Having access to ubiquitous fibre feeds allows transmission of large volumes of High Definition streaming video data that will be a core requirement for Smart City services. Environmental, infrastructure, health and public safety data can now be extracted from video data and the range of applications is constantly expanding. Firms such as the Queensland based CoastalComs are using streamed video data to provide essential data about coastal environments, weather and tidal information, as well as public safety, for example. Better access to fibre infrastructure would make services such as this both more accessible and less expensive.

d) Impacting regional economic growth and employment opportunities

JCU is enthusiastic about the positive impacts of the NBN on regional economies. The introduction of the NBN is regarded as a catalytic investment that is creating significant local interest in future deployments and evolution of internet-enabled services and commerce. The presence of an NBN pilot in the Townsville region is creating new opportunities for communities in northern Australia. The ubiquity and bi-directional aspects of the NBN are important characteristics that change the nature of existing communications services and create the environment for new services to be generated on top of the NBN infrastructure layer. While each region will have its own characteristic response and adoption of the NBN, we anticipate that its presence will result in economic diversification, especially as new business models and entities emerge. In particular, as the emergence of hosted cloud services and Software as a Service (SaaS) tools become more prominent in general business (one of the rising IT trends), regional communities will be able to both benefit and profit from these developments on equal terms to metropolitan centres.

Further details on economic impacts of the NBN in the north Queensland region will be contained in related submissions from various regional development agencies.

e) Interaction with research and development and related innovation investments

The application of advanced ICT to science and research has transformed the landscape for universities. Researchers are now requiring access to remote services such as data sets and visualisation systems, high performance computing and instruments as well as tools to participate in geographically dispersed collaborative networks. This form of research, termed eResearch, is now widely accepted, but further development demands access to highly enabled broadband networks.

For the last 15 years, JCU has worked with other regional universities in Queensland in the provisioning of affordable high bandwidth advanced networks to connect the University into the internet at competitive speeds. This connectivity has been essential in ensuring regional universities can maintain their capacity both to collaborate and compete with metropolitan institutions. At the same time, having high-quality internet access has provided the ability to tap into new ICT-related initiatives such as High Performance Computing.

The development of the NBN will be a significant improvement in the nation's science infrastructure in that it will dramatically extend the range and capacity of fibre networks into regional Australia. This wider availability will in turn enable a vast growth in the quality and extent of environmental monitoring networks. The fixed point satellite services proposed by the NBN will have a huge impact on the capacity to collect high quality data from remote locations and create new understanding of the state and complexity of the Australian environment. In part, it has been through the effective use of ICT that JCU has demonstrated it can support better than world-class tropical research.

f) The optimal capacity and technological requirements of a network to deliver these outcomes

The majority of the applications discussed in the preceding sections are dependent on a technical network that has specific characteristics associated with fibre optic networks. In particular, many of these applications require significant bi-directional capacity (high upload and download capacity), low-latency networks that can stream at constant, predictable bit-rates in order to offer high levels of interactivity. These characteristics are of critical importance in order to support the types of high-definition, multi-point video conferencing that will be core to many of the new IT services that are emerging.

While fibre optic provisioning is the most technically capable distribution conduit for the NBN, the high speed fixed line network needs to be complemented with mobile (wireless 3G and 4G) technologies. The case for wireless broadband is well understood but it remains impractical for wireless internet to technically meet the diverse applications that are synonymous with the NBN, especially in the longer term.

Another important technical characteristic required for an effective NBN includes access to sufficient backhaul capacity that can support the volume of traffic generated in regional areas without artificial bandwidth restrictions being applied. While many regions have access to adequate fibre backhaul connections, significant numbers do not. Thus, the momentum generated in the Regional Backhaul Blackspot Program (RBBP) will need to be maintained as the NBN develops.

While not directly a technical requirement, JCU views it as essential that the final retail pricing structure of NBN services be affordable to the general student body, in order to ensure that students from all socio-economic backgrounds can access University services remotely. A requirement therefore exists for the regulatory environment surrounding the NBN and associated telecommunications to remain dynamic and structured to foster innovation.

Whichever network technology is employed, it must be capable of evolution and growth in capacity over the medium to long term to cater for the predictable increase in demand. JCU has grown its desktop internet connection speeds from 10Mbps to 1000Mbps in the last decade, as have most universities in Australia. Similarly, backhaul connection speeds have increased by a factor of over 1000 in the past 15 years. There is no diminution in the rise of internet demand by students, staff and researchers and the NBN needs to be developed to provide this kind of long-term future proofing.

JCU welcomes the opportunity to discuss this submission with the Committee members.

For contact and further information:

Professor Ian Atkinson
Director, eResearch Centre
Ph:
Mob:
E:

Professor Chris Cocklin
Deputy Vice Chancellor (Research & Innovation)
Ph:
Mob:
E: