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Minister for Lands
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S20448

Mr Phillip Costa MP
Chair
Standing Committee on Broadband in
Rural and Regional Communities
Parliament House
Macquarie St
SYDNEY NSW 2000

Dear Mr Costa

I refer to the NSW Standing Committee on Broadband in Rural and Regional Communities' recent invitation for submissions to inform its *Inquiry into the Needs of Rural and Regional Communities in Relation to Telecommunications (including Broadband) and other Technology Services*.

A submission prepared by the NSW Department of State and Regional Development, is attached for your consideration.

The Department considers that the availability of broadband services is critical to support the ongoing economic and social development of rural and regional New South Wales. In the increasingly global environment, broadband access provides scope to significantly reduce the challenges that rural and regional businesses and communities face, due to their low population density and physical remoteness from cities.

The submission stresses the substantial regional and network benefits to businesses and communities in rural and regional NSW from having access to high speed affordable broadband infrastructure. These benefits largely arise due to the positive network and regional externalities that broadband access offers.

At the business level, access to high-speed affordable broadband services provides increased opportunities for businesses to generate significant productivity improvements, improve their access to global supply chains, explore and develop new business models, develop more efficient forms of service delivery, and improve opportunities for business innovation. At the community level, access to broadband enables rural and regional communities to communicate more effectively with people across the nation and abroad, engage more fully in social and community life, and pursue distance education as well as a range of other personal interests. Broadband also makes the delivery of essential government services to geographically dispersed regions easier and more cost-effective, and significantly enhances equity in the delivery of such services across regional and metropolitan New South Wales.

In light of these potential benefits, the submission also stresses the risks which regional businesses and communities currently face from having inadequate access to broadband services, as well as the limitations they are likely to face in the longer term, if this issue is not addressed, including the reduced ability for regions to attract businesses and individuals, resulting in the possibility of internal migration.

To ensure these risks are minimised, and that the extensive benefits of broadband access are realised, the submission argues that it is important for governments to support the acceleration of broadband deployment and the delivery of competitive, high speed broadband service in regional and rural areas, through a range of measures to encourage greater private sector investment in infrastructure. This will ensure that the "digital divide" between regional and metropolitan areas is minimised, with regional areas enjoying the fruits of "digital prosperity" in terms of employment, growth and innovation.

If your officers require further clarification in relation to this submission, they are welcome to contact Mr Alok Ralhan, Director, Industry Policy on (02) 9338 6666 or by email at alok.ralhan@business.nsw.gov.au.

Yours sincerely



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Minister for Regional Development

Encl.

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Department of State and Regional
Development

SUBMISSION

to

Legislative Assembly Standing
Committee

On

Broadband in Rural and Regional
Communities

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NSW DEPARTMENT OF STATE AND REGIONAL DEVELOPMENT **SUBMISSION**

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Overview

This submission primarily addresses the economic benefits that will accrue to regional and rural New South Wales from adequate telecommunications services infrastructure. These benefits flow to the community as a whole, with impacts ranging from enhanced business competitiveness; improvements in the delivery of health, education, social and cultural services; and an increased ability to interact with the rest of the World. By contrast, the impacts of an inadequate infrastructure are dire: areas with inadequate telecommunications infrastructure risk being left behind in all spheres. Although adequate telecommunications service availability may not be the determining factor in future ongoing regional development, inadequate services may well retard regional growth and lead to economic dislocation.

On account of the convergence in the transmission of voice and data, the submission refers to the telecommunications network delivering these services in a generic manner as a "broadband network", or a "broadband service". This approach is adopted as the network is akin to the pipes or wires over which information flows. The technology used to deliver network services, whether it be copper wire using digital subscriber line (DSL), cable, fixed wireless (including "Wi-Fi" and "Wi-Max"), microwave, satellite, fibre-to-the-home (FTTH) or powerline based, is immaterial; the final service level is what's important. This service needs to be ubiquitous, reliable, of adequate quality (primarily in relation to speed) and affordable, so that it is adopted quickly, which will in turn drive unit costs lower.

The submission does not investigate the technicalities of investment in broadband infrastructure. Rather, it focuses on the benefits to regional and rural New South Wales of such infrastructure; how these benefits can be realised earlier; and the risks that regional and rural economies face due to delayed investment in this area, particularly the impacts of falling behind national and international standards in the provision of telecommunication infrastructure and services into the future. The submission argues that broadband technology displays strong regional and network externalities, which can be harnessed to maximise benefits flowing to country New South Wales. In light of this, the submission also suggests some government actions to facilitate greater broadband infrastructure deployment and take-up of broadband services.

1. Introduction

The availability of adequate telecommunications infrastructure and services, including broadband and other technology services, is a key objective for governments around the world. Broadband connectivity is increasingly being recognised as a key enabler and accelerator of economic and social development. The OECD recently identified broadband access as a key requirement for economic sustainability and growth of economies in the 21st century¹.

Research in the Australian context² has identified the potential economic benefits of broadband access to be in the order of \$12 billion to \$30 billion per annum for Australia. The report notes that, if harnessed effectively, broadband will be a key driver of Australia's GDP, employment and wages growth and will generate the next wave of economic expansion – a situation already seen in countries such as South Korea and Taiwan, where there is very high broadband penetration.³

This paper outlines the key benefits arising from the availability of an adequate broadband infrastructure in rural and regional NSW, as well as the risks that these communities face on account of having inadequate access to such services. The NSW telecommunications market comprises a range of services, including a range of Internet services, fixed and mobile telephony and digital television.

This report focuses on the need for an adequate broadband service from a business perspective, given the potential benefits that broadband access has on businesses - in terms of improving the efficiency of existing business operations, spurring new business delivery models, boosting the creation of new and innovative goods and services, and improving business competitiveness in a globalising world.

A number of case studies are presented which demonstrate the opportunities, as well as highlight the risks to regional businesses of having inadequate telecommunications services coverage – in terms of accessibility, speed, reliability and affordability. The paper notes that a failure to provide adequate services will lead to lower than desirable broadband penetration rates in business practices. This is likely to significantly retard both business and regional growth. High penetration levels of affordable, high-speed broadband are considered to be important contributors of business and economic growth, as adoption of broadband technology leads to strong 'network benefits' – with the benefits to network members increasing cumulatively, as more businesses adopt broadband enabled business practices. A natural corollary is that a lack of adequate provision of broadband coverage will impact on, and restrict, regional business growth.

In addition, the report argues that innovative use of broadband connectivity by regional business will be critical to their ability to continue to participate and compete in the global economy. Access to affordable high-speed broadband is of national economic importance to ensure that regional Australia maintains parity with national and international broadband trends.

¹ OECD Communications Outlook 2007 – Information and Communications Technologies, July 2007

² Innovation Delivered – Broadband for Australia, An Economic Stimulus Package, Accenture, 2001, referenced in the Broadband Advisory Group's Report titled Australia's Broadband Connectivity (2003) and the Australian Government's Broadband Blueprint (2006).

³ Australia's Broadband Connectivity, a report of the Broadband Advisory Group (2003)

A number of recent reports have found that Australia currently lags behind other developed nations in the provision of broadband service. For example, a report by the Information Technology and Innovation Foundation⁴ ranked Australia 14 out of 30 based on an index which weighted penetration levels (subscribers per household), average speeds and the price of access. Of the three measures considered, Australia ranks 26 out of 30 countries on average speeds. These overall measures for Australia as a whole mask the fact that regional and rural areas typically have services that are well below the national average.

Failure or delays in rural and regional businesses obtaining access to adequate broadband services will adversely impact regional growth and social development. Businesses with inadequate access to broadband services and associated technologies will be placed at a serious competitive disadvantage. This has the potential to reduce the viability of businesses in regional and rural businesses areas and to further increase the metropolitan/regional divide.

1.1 Telecommunications (including broadband) and other technology services

Telecommunications systems involve the transmission of electromagnetic signals over a distance for the purpose of communication. These signals transmit information in the form of words, sound or images by telegraph, cable, telephone, radio or television. Technological developments, including the digitisation of information, has resulted in information being able to be conveyed over a range of transmission infrastructure, such as networks consisting of cable, telephone lines, satellite, fixed-wireless transmission, optic-fibre or a combination of these.

Voice, data and images are carried from the source to the final destination over a number of networks, which depend on the source and destination locations. For example, information, in the form of "bits" can be generated at a laboratory in Sydney, transferred from the computer in the laboratory to a high-speed fibre-optic network that connects to the Internet network backbone, which then carries the information to a "node" close to the destination from where it may be transmitted by wireless, satellite, mobile technologies or by a telephone line to the user in a farming property in rural New South Wales. The choice as to which network is used depends on locations of parties between whom the information exchange occurs. This technology development is also referred to as 'convergence of voice and data transmission over networks'.

This submission refers to the "telecommunications (including broadband) and other technology services" as "broadband". The independence of the information and the infrastructure that carries the information makes this approach possible. The characteristics of the information being exchanged between parties determines the equipment used, eg., computers, telephones, television or radios, mobile phones etc. At However, the choice of the network used between the sender and receiver is not dependent on the nature of this information.

By referring to the infrastructure in a generic manner, the submission makes the case for an adequate broadband infrastructure to be a necessity for regional and rural areas. The choice of technology for this infrastructure depends on the economies of implementation, geographical dispersion of subscribers and technology advancements. The most important features of an 'adequate' network are speed, reliability and ubiquity. Speed

⁴ ITIF: The Case for a National Broadband Policy, June 2007

refers to the rate at which information, in the form of “bits”, is carried from one location to the other. Reliability measures the proportion of time the network coverage is available at the specified performance level. Ubiquity refers to the extent of network coverage across all geographical areas, delivering “any time any where” access. Price or affordability will determine the degree to which these broadband services are adopted, or taken-up, by businesses and communities to achieve increases in business productivity and profits, and community welfare.

A critical aspect of broadband is what it allows users to do. The higher bandwidth capabilities of broadband enable users to access applications that are time consuming at the speed of a narrow-band or dial-up connection. Broadband connectivity enables users to transfer large files of text or graphics at high speeds and to instantly access web pages, including those with large amounts of graphics that are typically very slow to download on a dial-up connection.

What is Broadband⁵?

Broadband (also known as ‘broad-bandwidth’) refers to any kind of fast Internet access, which gives users:

- instant ‘always on’ Internet access 24 hours a day;
- high speed transmission, at speeds that are generally 10-20 times faster than narrow-bandwidth (otherwise referred to as ‘narrowband’ or dial-up modem connections);
- two way transmission, that is the ability to receive and transmit data – enabling interactivity among users; and
- capacity to simultaneously carry multiple content and/or applications, enabling telephone lines to be free.

There is some debate as to what minimum speeds actually constitute broadband bandwidth. These range from speeds greater than what can be achieved through a dialup connection (i.e., greater than 56kbps) to very high connection speeds (i.e., greater than 10 Mbps) to enable the utilisation of high quality multi-media technologies.

More importantly, however, from a business development and innovation perspective, broadband technologies make the use of communication applications that combine video, voice and data, such as videoconferencing, feasible. Broadband has made transmission of content rich data and services possible opening up new areas of business operations to productivity improvements, and making the delivery of new goods and services possible.

1.2 Transmission speed

Speed is one of the most important determinants of the short-term and long-term adequacy of a broadband network. However, speeds across a network are not constant over time and users can experience highly variable speeds depending on a number of factors. Further, it is speeds in both directions, that is upload and download speeds, which are important, as most current broadband services offer high download speeds but inadequate upload speeds. Such asynchronous transmission does not meet the needs of interactive applications which require real-time information sharing. In addition, asynchronous transmission speeds do not allow users to make use of a range of multi-media applications which may foster further business innovation.

⁵ Congressional Research Service Issue Brief for Congress: Broadband Internet Regulation and Access: Background and Issues (updated April 2006).

Digitisation has resulted in all forms of information, be it in the form of words, images, voice, or video, to be transmitted over a communications network in the form of "bits". A "bit" is a unit of information. At the bottom end of the range are words or electronic documents that result in the least amount of bits to be transmitted, while high-resolution video results in large amounts of bits to be transmitted. The transmission speed is measured in bits per second, kilobits per second (1,000 bits per second), megabits per second (1 million bits per second) or gigabits per second (1,000 million bits per second). Information to be transmitted is digitised, that is converted into "bits" (also referred to as binary information consisting of 0s and 1s). When the receiving equipment (for example, a computer) receives the information in bits, it converts them to regenerate the original information that was transmitted.

The speed at which transmission occurs determines the time it takes for the original information to be sent from the sender to the receiver. Table 1 shows time required for various amounts of information to be transmitted at a number of typical transmission rates.

Table 1

Time to Download Various Media Types for Different Access Speeds									
Media	Typical File Size (MB)	Access Speeds*							
		56 kbps	256 kbps	512 kbps	6 Mbps	12 Mbps	30 Mbps	100 Mbps	1 Gbps
Access Type		Dial-up	ADSL	ADSL/ BDSL*	WiMAX Wireless Version 1	WiMAX Wireless V2	Cable	Fibre to the Node	Fibre to the Home
Small Image	0.1	12.5 sec	3.1 sec	1.6 sec	0.13 sec	0.07 sec	0.03 sec	0.01 sec	0.001 sec
Quality Photo (3 Megapixel Camera)	0.55	68.8 sec	17.2 sec	8.6 sec	0.73 sec	0.37 sec	0.15 sec	0.04 sec	0.004 sec
MP3 Audio Single	7	15 min	3.6 min	1.8 min	9.3 sec	4.7 sec	1.9 sec	0.56 sec	0.056 sec
Audio CD single	43	1.5 hrs	22.4 min	11.2 min	57.3 sec	28.7 sec	11.5 sec	3.44 sec	0.34 sec
Audio CD	640	22 hrs	5.6 hrs	2.8 hrs	14.2 min	7.1 min	2.8 min	51.2 sec	5.12 sec
DVD	9,400	13.6 days	3.4 days	40.8 hours	3.5 hrs	1.7 hrs	41.7 min	12.5 min	1.3 min

Source: NSW Department of Commerce, Government Chief Information Office.

*BDSL refers to Business DSL, which is otherwise known as Symmetrical DSL, or SDSL.

* The table reflects typical speeds for different access types. Speeds relate to download speeds (known as 'downstream speeds'), rather than upload speeds.

The type of communication between two parties determines whether information is required to flow mainly in one direction, or more equally in both directions. Typical Internet browsing activity involves information being "served" to the browser in one direction, with little information required to flow in the opposite direction, mainly by way of requests for further information. On the other hand, applications requiring true interactivity, for example, health services delivered to a remote location in 'real' time, will

require large amounts of information to flow in both directions. Information flowing between the patient (or primary health centre in a remote area) and a hospital in town or regional centre may include diagnostic information/images, voice, diagnosis and/or treatment information. This information needs to be exchanged in both directions in real time, in order to improve health service provision in terms of service quality and costs.

Technical developments to speed up the flow of information have resulted in a number of technology solutions, many of which speed up flow of information in one direction (downstream) at the expense of speeds in the opposite direction (upstream). These solutions are generally referred to as asynchronous transmission solutions. An example of this type of broadband technology is Asynchronous Digital Subscriber Loop or ADSL.

Further, broadband services are typically delivered over a network that is shared by a number of customers. This is based on the belief that not all subscribers will use the service at the same time. As more subscribers use a broadband service simultaneously, however, transmission speeds drop. This practice of sharing the bandwidth of a network is called "contention". At any time, contention ratios may vary from a low of 1:1 to 80:1 or higher. At higher contention ratios, service speeds naturally drop during periods of peak demand.

The practical impact of these two factors, namely asynchronous transmission and contention, is that subscribers experience transmission speeds that are variable over time, and different in the two directions in which information is transmitted⁶. For example, a business seeking to upload a certain quantity of information to its website at peak time over an asynchronous and a moderately contended broadband service will experience substantially longer times than when a similar amount of information is downloaded during off-peak periods.

1.3 Business needs in relation to transmission speeds

Businesses increasingly require greater amounts of information to be transmitted to improve business operations, and to deliver a range of innovative products and services including education, health and cultural services. Table 2 shows typical bandwidth required for a range of services.

⁶ A number of other technology related factors also impact on transmission speeds. These include distance from signal source, topography, presence of interfering signals, the condition of the hardware, software etc. Broadband service providers should take these factors into account when considering the delivery of quality broadband services in regional and rural New South Wales.

Table 2
Bandwidth requirements for Broadband Services

Service	Bandwidth (downstream)
Broadcast TV (SDTV) (MPEG-2)	2 to 6 Mbps
HDTV (MPEG-4)	6 to 12 Mbps
Pay per View (PPV or NVoD)	2 to 6 Mbps
Video on Demand (VoD)	2 to 6 Mbps
Picture in Picture (MPEG-2)	Up to 12Mbps
Personal Video Recorder (PVR)	2 to 6 Mbps
Interactive TV	Up to 3 Mbps
High-speed Internet	3 Mbps to 10Mbps
Video conferencing	300 to 750 Kbps
Voice/video telephony	64 to 750 Kbps

Source: TR-094, broadbandtrends.com

As businesses increasingly adopt practices that require interactive two-way communication (voice and video) and the exchange of information (electronic documents and images), networks will need to be able to deliver high transmission speeds in both directions.

Networks delivering high-speed transmission are not widespread in Australia at present. As these become available in metropolitan Australia, it is important that comparable services are also available in country New South Wales. Service availability in country New South Wales needs to be comparable in terms of speed, geographical reach (and not only in regional centres or towns) and reliability, as measured in terms of quality of service and the proportion of time the service is operational and available for use.

Additionally, increases in the uptake of broadband services in regional and rural NSW, in response to the increasing business and community reliance on bandwidth intensive applications, will require continual improvements in service provision and investment in equipment and networks by service providers to meet these growing needs. Deployment of such infrastructure and services will be critical to ensure that regional communities are able to take advantage of bandwidth intensive applications not just for entertainment but to realise productivity improvements and to enable the delivery of new products and services. More importantly, the availability of adequate broadband services will enable regional and rural communities to transition from being just consumers to becoming "prosumers", that is producers and consumers. This will support their continuing contribution to national welfare, as well as raise regional living standards.

2. Benefits from broadband

Broadband is an 'enabling technology' in that it is able to facilitate and accelerate economic and social development, by enabling businesses, communities and governments to take full advantage of new communications tools and next generation applications. Broadband is often referred to as the 'electronic roads' for the knowledge economy.⁷ Given the increasing role that advanced communications capability is playing in advanced economies, broadband is fast becoming an increasingly important determinant of business competitiveness, innovation and prosperity.

In addition, access to broad bandwidth at globally competitive prices is becoming an increasingly important determinant of competitiveness in the global knowledge economy. Expansion in the availability and adoption of broadband services can help drive innovation and the development of new services and business opportunities, which will reinforce New South Wales position as the driver of innovation in Australia.⁸

At the business level, broadband can play a critical role in reducing costs and improving productivity and business efficiency in regional and rural areas, which is likely to lead to jobs growth in all industry sectors, particularly in the knowledge intensive sectors, such as the manufacturing, agriculture, mining and services sectors.⁹

Such benefits of broadband technologies are being recognised in countries across the industrialised world, making the development of broadband and wider national information infrastructure a central policy objective for many governments today. As a result, access to high speed and affordable broadband services will play a vital role in future sustainable growth and the economic and social development of regional and rural New South Wales.

The availability of broadband is able to impact all facets of economic, social and cultural activities. Direct impacts of broadband include: reduced costs of distributing digital content, reduced transaction costs, ability to deliver e-health services, which can improve regional health care outcomes and lower health care costs; greater access to distance learning opportunities, and improved operation of markets by making markets more competitive and open by allowing access to more information by all market participants. Other direct impacts include the ability for businesses to dramatically improve the efficiency of their internal operations; restructure their supply chains; reduce costs, by providing consumers with self-service options; improve service delivery, by enabling the delivery of services for longer periods of the day; and improve energy efficiency. For governments, broadband allows streamlining of routine transactions, sharing of information across its various agencies, delivery of services to geographically dispersed populations and the implementation of constant productivity improvements.

Broadband also provides a number of second- and higher-order impacts to the community. These include providing businesses with access to larger markets, enabling better decision-making based on better data being able to be delivered more quickly; and enabling market efficiencies which will lead to economies of scale and the ability to operate at higher capacities. This will promote jobs growth, and more efficient allocation of goods and services which expand consumer information and choice. Other second-

⁷ Hon. Mal Bryce, *Innovation, Broadband and The Smart Community: Keynote Address to the Innovation Festival*, 2003.

⁸ The upgrade of knowledge and information infrastructure is one of the key goals of the NSW Innovation Policy, as outlined in the *NSW Government Statement on Innovation*.

⁹ The Allen Consulting Group, *A Broadband Network for New South Wales: An assessment of the Economic Impacts*, Report to the NSW Office of Information and Communications Technology, November 2004, pp.22-23.

order benefits include improved quality monitoring, mass customisation¹⁰ of products and increased innovation from the involvement of more customers in the improvement of business operations, products and services.

Broadband networks can also reduce the challenges of low population density and physical remoteness from cities faced by businesses in rural and regional areas, as well as increase business productivity and boosts new forms of business and service delivery.

2.1 Conducting business

Broadband services enable businesses to access information immediately which leads to better and more efficient decision-making. Improved information infrastructure has increased the ability of business to store, retrieve, sort, filter and distribute information. This greatly enhances the value of information that business holds. For example, retail stores have always checked their inventories. However, with computer and information technology, stores are able to track their inventories. With effective broadband, they can also collate this information accurately across a network of stores and re-order items from suppliers electronically. They can also analyse stock movements, enabling them to run special targeted promotions or dynamically discount slow-moving items. Businesses can also conduct banking and financial transactions in real time. The result is that the businesses can effectively manage their inventory, responds to customer demand patterns, not lose customers on account of an item not being in stock, and manage their cash flow effectively by paying suppliers on time or ahead of time and negotiating discounts.

Broadband enables businesses to streamline their production and supply processes, by linking their production and inventory systems to major clients and suppliers on-line. As a result, their participation in global supply chains is facilitated or they can reorganise their distribution channels. This enables stocks to be immediately ordered when they reach a critical level, without the need for stock levels to be monitored. By improving interactions with supply chains, regional businesses are able to reduce the time they spend in purchasing and sourcing inputs. Regional businesses are also able to access a larger range of suppliers through the internet and can source products and inputs more cheaply than by simply relying on obtaining the products and inputs from the local market.

These benefits can be replicated across a range of business activities – including the manufacturing of component parts, and the implementation of just-in-time inventory management practices. Technologies enabled by broadband services will enable businesses to avoid duplicative activities, remove activities redundant, and respond quickly to changes in consumer preferences etc. The ability to design customised products and services to meet customer requirements, obtain customer approvals, exchange design information electronically and feed this information directly into manufacturing facilities all becomes possible with broadband technologies.

Employees can also gain access to better training opportunities using broadband by logging onto corporate intranets and the Internet to train for new product offerings or to refresh their knowledge on current products and services.

All these benefits flow from an effective and efficient use of business information that is shared by staff and management in real time. Access to such information facilitates better business decision-making. With regional and rural businesses being more geographically dispersed, with larger distances between them and their suppliers and

¹⁰ Chris Anderson calls this the “long tail” – see article of the same title in the Wired Magazine (2004)

customers, access to broadband offers significant benefits as it enables collaboration which may not be possible otherwise, or only at substantially greater costs.

On the marketing and selling side, broadband enables businesses to approach potential customers directly on-line and to rationalise their distribution channels. Applications enabled by broadband technology enable businesses to market themselves on-line, as well as to seek clients on-line. They can also approach customers outside their traditional market bounds which may be limited on account of marketing effort, customer awareness, or their ability to deliver. This aspect of marketing and the ability to present to potential markets is important given limited demand in regional areas due to low population. This can ensure longer-term viability of many regional businesses and enable some of them to achieve economies of scale.

As an example, the Phoenix Foundry, which is one of Uralla's largest employers, has an online design and proofing facility for customers ordering bronze plaques. This has enabled them to access international markets for their products. Similarly, a company based in Canowindra operates an in-bound Japanese tourism business. Through its Japanese website, the business is able to manage bookings and payments from its base in regional New South Wales.

Broadband also provides increased opportunities for regional businesses to successfully tender for national and international projects. High-speed internet capacity means that searching and researching tender databases is easy and much less time consuming. For example, an engineering services company in Orange was recently successful in winning a contract to design a shopping centre in Singapore. The company noted that ninety percent of its work currently comes from interstate and international markets. Their regional location affords them an effective low cost base for doing business internationally. Similarly, a number of businesses in the Hunter region have boosted their competitiveness by now sourcing motors and other component parts from national suppliers on-line.

Videoconferencing enables businesses in regional and rural areas to communicate with other national and international businesses, without the need for frequent travel. This lowers the cost of doing business.

Accessing strategic market information and market intelligence is made easier with fast broadband speeds. For example, farmers based in Cowra are increasingly turning to the Internet to source alternative cost-efficient suppliers from outside their region and to reduce distribution costs by selling products on-line. With up-to-date market information, farmers are now able to take decisions on which markets to supply to in order to maximise revenues for their products.

2.2 Regional development

It is evident that availability of a broadband service by itself does not make a regional location appealing in terms of attracting investment or for business expansion decisions. However, lack of this service can be a determining factor for business location decisions – businesses are unlikely to locate in an area with inadequate broadband service.

Every additional investment in a regional area enhances its economic viability and releases positive regional externalities. Broadband, in that sense makes it possible, not only to attract a favourable investment decision to a region but also to attract suitably skilled residents. It is also likely to be a critical factor in the retention of local students and

residents, which is a key skills concern for many regional businesses. The case study on attracting a new manufacturing business to the Central West region of the State illustrates how the availability of broadband is crucial for leveraging other advantages that a regional location offers.

Case studies show that an improvement in broadband services in regional locations has attracted new businesses that have contributed to the amenity of the local economy. For example, Parkes has had a well-developed logistics industry and has been able to build on its location-based comparative strength, in recent years, on account of the availability of good broadband coverage. Similarly, availability of broadband infrastructure in Uralla has been important for the town to maintain its competitive position in the information technology field – the broadband service has helped in fostering critical mass of such businesses that in turn has enabled the sector to attract the necessary skills and professional development services for their continued development and enhancing competitiveness.

From a regional development perspective, the availability of broadband also allows existing locally established businesses to adopt higher value-adding business propositions and re-organise themselves to expand and grow by serving larger markets. Eastmon Group, based in Glen Innes, has expanded its business beyond local markets with the availability of broadband service (See case study at the end of this submission).

Broadband also makes other forms of work possible. Telecommuting is becoming more common in regional areas, although poor broadband speeds and high prices for broadband services still remain an issue, limiting the widespread adoption of telecommuting and teleworking. Telecommuting has particular advantages in regional areas where the labour pool is limited and distances travelled are greater. Telecommuting allows individuals to work from home while remaining connected to the office. This saves commuting time and expense, and reduces traffic congestion and air pollution. In addition to benefits to the businesses and individuals, the community also gains through energy saving and lower pollution and improved quality of life outcomes from increased telecommuting. Access to affordable broadband is likely to make telecommuting and teleworking feasible for an increasing number of people and businesses in regional and rural New South Wales with significant social regional benefits.

2.3 Government service delivery

Broadband makes the delivery of essential services to geographically dispersed regions more efficient and more cost-effective, and significantly enhances equity in the delivery of such services across regional and metropolitan New South Wales. These essential services include the delivery of education services, e-health, to community access to essential government information. For its part, broadband also enables governments to access suppliers from a wider pool, enhancing competition in the supply of goods and services to government, which leads to the delivery of better services at lower costs.

E-Health

NSW regional and rural communities face expanding demand for health care, fuelled by the ageing of the population and growing availability of new treatments. Broadband services and attendant technologies provide scope for hospitals and registered medical practices in regional areas to achieve a range of administrative efficiencies, such as enabling personnel information to be held centrally, and accessed more readily, in the delivery of health services.

In addition to administrative efficiencies, the use of broadband in medicine provides scope for a major change in the way health care is provided in regional and rural communities, with the significant benefits to local residents as well as reduced costs to government. Specifically, broadband can provide regional and rural based hospitals and clinics with opportunities to offer improved health care to their residents, by bringing specialist health services closer to where people live, as well as providing a wider range of services¹¹.

Access to broadband technology and applications will enable smaller regional clinics, hospitals and medical practitioner/medical centres to:

- Have access to specialists and other resources at larger hospitals. This will reduce the impact on regional and rural communities of skills shortages in the health services;
- Obtain remote access to clinical information from smaller clinics, and relay this information back to the base hospital;
- Employ digital X-ray production technology, so that images can be sent online for expert analysis outside of the region;
- Use video cameras to refer patients for remote medical diagnosis;
- Engage in case conferencing by video with patient, local health provider and an expert (individual or team) in a major metropolitan teaching hospital; and
- Provide for the enhanced professional development of medical staff by enabling them to stay in contact with colleagues and keep abreast of developments in their chosen professional fields. For examples, video conferencing can allow medical procedures being conducted in one location being viewed by medical staff in another/remote location. This also alleviates skill shortage issues, which are particularly acute in rural and regional areas.

Cultural and social services

At a regional community level, broadband also has significant social and quality of life implications. In particular, it provides a basis for the integration of rural and regional communities into the NSW economic, cultural and social life. People in regional and rural communities are able to communicate effectively with people across the nation and abroad, engage more fully in social and community life, as well as pursue personal interests and access a greater range of information on-line, including books, songs, music, plays, movies, videos, and live performances delivered over the Internet.

Social impacts may take the form of increased capabilities for individuals and communities, improvements in the "soft" infrastructure of community facilities and greater opportunities for, and diversity in, social interaction.¹²

In summary, the extension of broadband services into regional and rural New South Wales is likely to have significant social impacts on regional and rural communities. These impacts include:

- Heading off a potential 'digital divide'¹³ between regional and metropolitan New South Wales, whereby emergence of a digital underclass solely on the basis of geographic location is prevented;

¹¹ *Highway to health: better access for rural, regional and remote patients*, Commonwealth Senate Community Affairs Committee, 20 September 2007, p.29

¹² *Networking the National, Evaluation of outcomes and impacts*, Department of Communications, Information Technology and the Arts, Communications Research Unit, June 2005, p.56

¹³ The 'divide' refers to factors that separate individuals and groups on the basis of their ability to participate fully in the economic, social and political life of a community which is increasingly reliant on communications technologies for the dissemination of information and ideas.

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- Improved opportunities for social interaction and community-building, as well as improved ability for people in regional communities to contact families and friends outside the region; and
 - Improved opportunities for personal capacity building.

Education services

High-speed broadband services are likely to fuel important changes to educational practice by increasing the extent of student involvement in the education process, and away from an entirely teacher focused approach. This change is facilitated through easier and faster access to information; and increased opportunities for communication and the sharing of ideas and knowledge. Broadband also can have a tremendous impact on learning for students in regionally disadvantaged communities, by providing for specialised learning to cater for individual needs (eg., those with mental or physical impairments, or single parents wishing to improve their skills) as well as provide a platform to showcase creativity and problems solving capabilities. Access to media rich content can provide additional motivation to learners of all ages.

Similarly, access to broadband provides opportunities for teachers to take advantage of many online resources, especially resources with intensive visual, audio or interactive content, which can be integrated into everyday classroom activities.

At a business level, broadband provides regional and rural businesses with the opportunity to retrain staff through distance learning, especially in locations that may not have access to training courses nearby. Employees can also access training opportunities by logging on to corporate intranets and the Internet to train for new product offerings or to refresh their knowledge on current products and services. From a regional business development perspective, broadband access ensures that young people in rural and regional areas will not feel compelled to leave their communities in order to further their education elsewhere.

Broadband is also transforming educational opportunities for tertiary students in regional areas. Broadband access provides opportunity for prospective students to complete tertiary and vocational education studies through distance learning, without the need for them to move to metropolitan areas. It also enables tertiary students to access cutting edge course material from campuses around the world.

Many Australian universities, TAFE colleges, are progressively putting their curriculum online. For example, a Certificate IV in Agriculture is offered online by the North Coast TAFE from its Wollongbar campus and the North Coast TAFE at Taree offers Certificates 1-III and a Diploma in Equine Studies online. Online courses can cater to students from a larger service area, as the face-to-face component can be delivered to meet the preferences and circumstances of students. Providing opportunities for students to access such training and educational courses is particularly relevant for regional areas where local demand often does not warrant specific courses being delivered.

Broadband also has the potential to greatly improve the education standards of regional and rural Australians by facilitating greater lifelong learning among students, employees and the broader population in regional and rural areas. Due to the cost of providing higher education services in rural and regional areas, NSW TAFE is increasingly offering courses on-line. Broadband connectivity increases the opportunities and incentives for people in regional and rural areas to retrain or obtain qualifications in a field of interest by distance education, as students are able to research material, download lectures and upload large data file assignments, in a fraction of the time taken to perform these functions with narrow bandwidth technology.

3. Maximising regional and rural benefits

As previously discussed, broadband access offers significant benefits to rural and regional businesses and communities. Firstly, broadband is a “prosumer” technology, in that it enables consumers to act as both consumers and producers. Broadband enables consumers to become more efficient, enabling them to drive high rates of productivity and economic growth and business innovation.

Secondly, broadband also delivers positive network externalities, where the benefits from broadband adoption flow to other broadband users and the community as a whole. In a regional context, these regional externalities encourage businesses to consider both locating and expanding their business operations in regional areas.

Broadband networks show strong network effects - that is, the ‘value’ of the network increases to both existing and prospective users of the network, as more people join the network. This arises from the ability of network members to be able to interact with other users of the service.

These features are important as they offer the potential for broadband services to deliver significant benefits to regional and rural economies.

3.1 Harnessing network benefits

In order for network effects to be maximised, it is important, from the perspective of the government, to have a broadband service that is of adequate standard – reliably delivering required speeds of transmission and being available across the State. These factors, along with a service that is priced affordably, will determine the extent of broadband take-up and thus the benefits that are able to be realised by the community.

As a significant proportion of the value of a network is a positive externality¹⁴, service providers are likely to under-provide the service or, in the case of a monopoly, attempt to internalise this value through their pricing strategy. This means that initially, prices offered will limit adoption rates, until a critical tipping point is reached at which point prices drop and service adoption rates soar.

It is well recognised that business (and individual) decisions in relation to location have significant externalities for the regions within which they locate as well as for the State as a whole. For example, a decision to locate in a regional location reduces congestion and costs of doing business in metropolitan areas while contributing to business activity and community wealth in the regional location.

In the context of a given set of economic factors, adequate broadband coverage alone may not deliver a competitive advantage in the contemporary business environment, however an inadequate or sub-par service will definitely retard growth prospects. Studies in the United States have shown that, in communities with broadband services,

¹⁴ An externality is an economic side-effect. Externalities are costs or benefits arising from an economic activity that affect somebody other than the people engaged in the economic activity and are not reflected fully in prices. If the externality is beneficial (positive externality), the market will provide too little; if it is a cost (negative externality), the market will supply too much. From Economic A-Z – economist.com

employment grew annually at a rate of one percentage point higher than communities without the service over a four-year period¹⁵.

These factors together mean that it is important to have adequate levels of broadband service in regional and rural New South Wales. Adequacy of service measures must be maintained over time, as technology develops and higher levels of service become possible. It is important to appreciate articulation of a minimum standard of service is not possible and that the standard must be relative to services available in competitive jurisdictions. This will ensure the continued viability of communities, in terms of their ability to participate fully in the Information Economy and to attract people to live in these communities. Access to adequate broadband will ensure that potential residents do not feel disenfranchised on account of their geography nor feel they face a narrower range of consumer choice options, on account of moving to a regional location.

From a government perspective, both broadband service levels and pricing are important determinants of delivering ongoing benefits to regional and rural economies and, indeed, to ensure their on-going viability. Broadband services offer the prospect of stopping, or even reversing, the decline in some regional and rural economies around New South Wales.

3.2 Broadband service levels – a regional/rural perspective

The Department of State and Regional Development (DSRD) recently surveyed its NSW regional boards, with a view to obtaining the views of businesses and residents as to the availability of telecommunications services and other technology services in rural and regional NSW.

The survey found that businesses and individuals in rural and regional NSW consider that they have inadequate broadband coverage – in terms of accessibility, speed, reliability and affordability.

The survey supported recent results by the Australian Bureau of Statistics that placed the take-up of existing broadband services in rural and regional areas at about 29 percent of households, significantly lower than the take-up in metropolitan areas which is about 48 percent.¹⁶ A number of reasons for this low take-up were advanced by regional businesses and residents, including the lack of cost-efficient broadband services, due to a lack on investment by telecommunications services providers in broadband backbone infrastructure, as well as a lack of sufficient retail competition in the market, thereby making the cost of broadband services relatively higher than the cost of similar services provided in metropolitan areas.

The survey results revealed that a large proportion of rural and regional NSW do not have a well-developed awareness and understanding of broadband or the capabilities and shortcomings of available access technologies. In regions where there were a number of telecommunications services providers, offering a range of broadband access technologies, regional businesses and residents reported that it was difficult to obtain independent information regarding the particular type of access technology which would best meet their actual broadband needs, or the best broadband 'package' to purchase to address their needs.

¹⁵ The Case for a National Broadband Policy, The Information Technology and Innovation Foundation (June 2007).

¹⁶ Source: ABS data, 2006 Census Data - Cat. No. 2068.0 - 2006 Census Tables, Type of Internet Connection (a) by number of persons usually resident and (b) by household composition.

In a number of regions where there was more than one telecommunications services provider available, and a range of access technologies, providers were often quoting the 'maximum' access speed capable of being achieved through a given access technology. In the case of ADSL technology delivered broadband services, for example, this maximum access speed may differ significantly from the 'actual' access speed for users, at times that the network is in heavy use. Speeds also reduce as the distance from the enabled exchange increases.

The Commonwealth Government's Australian Broadband Guarantee¹⁷ attempts to address some of the issues of inadequate service delivery, in areas which are not serviced by major telecommunications companies for commercial reasons. Under the Australian Broadband Guarantee, the Commonwealth Government recently announced that Telstra had agreed to switch broadband to 211 Australian regional and rural exchanges for the first time from October 2007, with 21 of these exchanges to be located in rural and regional NSW¹⁸. While DSRD supports the Commonwealth's initiative, it notes that a number of regional and rural areas in NSW still have inadequate coverage/service delivery.

Broadband services in regional and rural New South Wales are delivered through a range of transmission technologies. The principal technology is Digital Subscriber Line¹⁹ (DSL) which uses the existing telephone copper network to transmit data. Other technologies include cable as well as a range of fixed and mobile wireless technologies and satellite. However, a significant disadvantage of ADSL technology is that transmission speeds drop as the distance increase from a DSL enabled telephone exchange increases. (The service is considered not to be viable at distances of 3 to 4 kilometres from the enabled exchange). This is a serious shortcoming of this technology, as distances in regional and rural New South Wales easily exceed the technology threshold distance.

Some rural and regional areas are being delivered by wireless broadband, which has often been provided as a 'last mile' solution, as it has the potential to reach distances outside the services areas of ADSL and cable broadband²⁰. However, businesses have reported that service reliability of wireless broadband is not of the required standard.

As a consequence, a number of regional economic development boards have reported that, while services have improved in their regions in recent years, access to broadband services still remains an issue for residents and businesses in regional areas and rural towns, with the availability and capacity of broadband services varying significantly across these communities.

¹⁷ The Australian Broadband Guarantee provides a safety net for all Australians who cannot receive an affordable metro-comparable broadband service.

¹⁸ The 21 exchanges in NSW which are to be ADSL enabled include exchanges in Cargo, Cullen Bullen, Currawarna, Downside, Elands, Forest Reefs, Gooloogong, Old Grevillia, Jiggi, Koorawatha, Mullamuddy, Mooneba, Wallendbeen, Nymboida, Quandialla, Rockley, Springhill, Taylors Arm, Tullibigeal, Tottenham and Tullamore.

¹⁹ ADSL technology uses existing copper telephone infrastructure to deliver both voice communications and high-speed data simultaneously.

²⁰ However, except where distance is an issue and the local exchange is not ADSL enabled, there has generally been low take-up of wireless as a broadband access technology in rural and regional NSW. Wireless technology is generally not preferred by end users, as speeds on wireless cannot be guaranteed, since for some types of wireless technologies users must share the bandwidth. In addition, wireless has less potential to provide multi-megabit speeds than wired technologies and is generally more costly than wired technology.

Many residents and businesses in rural and regional NSW currently still do not have access to broadband services. Such businesses and residents are typically located:

- in areas where the local exchange is not equipped with Digital Subscriber Line (DSL) services (which use existing copper phone lines to deliver both voice communications and high speed data simultaneously), or
- in areas that are too far from the enabled exchange for the DSL services to operate (more than more than a 3.5-4 km from the exchange); or
- in areas where there is still no access to an 'affordable' high capacity wireless service.

Source: NSW Department of Commerce.

It has been reported to DSRD that, even where regional and rural residents and businesses are located within the 4km radius of an ADSL enabled exchange, they are often unable to get broadband coverage, other than by means of satellite broadband. For example, some local residents in the Central West region reported that they were unable to get access to ADSL services, although their neighbours on either side of the property were able to obtain access to the services. Only when the exchange was eventually enhanced, and the property owner's line was improved, were those residents able to get access to broadband services.

More importantly, a number of regions noted that the information provided by telecommunications services providers regarding access to broadband infrastructure and services in a region is often misleading, or does not accord with their experience of the service. For instance, while network coverage for wireless (Next G) services is claimed to be extensive (covering 98% of Australians), there is significant anecdotal evidence that the reality does not reflect this claim. In addition, it has been reported that information on broadband coverage is often provided by telecommunications services providers on an aggregated regional basis, which masks the real problems present in the regions, in terms of accessibility to broadband services. A particular case in point is that of the Hunter Region.

Broadband Coverage in the Hunter Region

Telecommunications infrastructure has significantly improved in the Lower Hunter region in the last few years, with the introduction of ADSL enabled exchanges by Telstra and the establishment of local carrier services by other companies.

In addition, all the major rural towns in the Hunter now have ADSL enabled exchanges which cover a radius of approximately 4km from these exchanges. Under the Universal Service Obligations that Telstra area required to meet, small regional towns with 500 telephone customers have also had their Exchanges enabled with ISDN even though the up-take of this technology has been cost prohibitive for small business and the general community. Nonetheless, access to broadband in rural areas of the Upper Hunter still remains a major issue.²¹

Based on data sourced from local councils, the ABS and the Hunter Valley Research foundation, the Hunter Regional Board has estimated that, on average, across the rural areas in the Upper Hunter, only 68 percent of the population has broadband coverage. The Hunter Regional Board considers that the lack of coverage in the Upper Hunter is largely attributable to the sparseness of these farming communities, which has made it

²¹ The Upper Hunter consists of six Local Government Areas which constitute approximately 16 percent of the region's total population.

uncommercial for telecommunications services providers to invest in broadband infrastructure.

The table below shows the total LGA population of the Upper Hunter region and the proportion of the population without ADSL coverage. The percentage potential demand in each LGA's is also detailed in the table.

Table 3

LGA	Total population	Potential demand (no ADSL)	Approximate % without broadband coverage
Gloucester	4,917	2,050	41.60%
Great Lakes	34,695	8,834	25.46%
Singleton	22,270	5,930	26.62%
Muswellbrook	15,149	3,649	24.08%
Dungog	7,994	4,363	54.60%
Upper Hunter Shire	13,424	5,574	41.52%

Table prepared by the Hunter Economic Development Corporation using data sourced from local councils, ABS and the Hunter Valley Research Foundation (2006)

The Hunter Regional Board noted that this situation is likely to remain unchanged unless there is some change in the Commonwealth Government's position in relation to providing incentives for telecommunications services providers to provide increased access to wired technologies in rural areas of the Hunter region.

3.2.1 Speed

Evidence suggests that average broadband speeds in rural and regional NSW are generally significantly lower than the average broadband speeds available in metropolitan NSW areas. A number of factors contribute to reduced speeds in rural and regional NSW.

ADSL is a relative cheaper form of broadband delivery, as it uses the existing copper telephone infrastructure to facilitate high-speed data connections. However, ADSL has the disadvantage that it is a distance-sensitive technology²². The asynchronous nature of broadband service and subscriber distance from an exchange are major issues for users of broadband services in rural and regional areas.

Although ADSL is designed to cover a 3.5 – 4 km radius from the exchange, the further a property is from an exchange, the slower the speed at which the information is able to be sent down the pair of twisted copper cables. A number of regional businesses, including a regional tourism business in the Far Western Region reported that they had experienced access speeds that were less than 30 percent of the advertised maximum speeds available.

Ongoing issues related to speed

The need for high-speed broadband continues to be an issue in ensuring that regional and rural areas of NSW are able to have access to necessary data to conduct their businesses at an efficient level.

²² Broadband Technology Overview White Paper – Optical Fiber , Corning Optical Fiber Information Center, June 2005.

For example, agricultural businesses in regional and rural NSW reported that they are increasingly becoming dependent on broadband technologies to remain efficient. If breakdowns occur in agricultural equipment, broadband technology can speed up the repair of such equipment, by enabling a digital image of the damaged equipment to be sent to the supplier directly, either over the internet or via mobile phone. The supplier can then promptly determine the actual component part that is needed to fix the equipment, or make the component part, and have it freighted promptly to the agricultural business. In addition, to remain competitive, agricultural businesses increasingly require access to certain technologies that require broadband services to operate, such as remote control irrigation systems, paddock mapping, fertiliser analysis etc.

3.2.2 Price

The affordability of broadband is important to the take-up of broadband services. Businesses and individuals in rural and regional NSW continue to express concerns regarding the availability of cost-effective higher bandwidth internet services. A significant reason offered for the perceived higher prices in rural and regional areas is the absence of alternative wholesale and retail telecommunications service providers in their area.

Many regional businesses report that, where broadband services are provided, the cost of these broadband services are still prohibitive due to a lack of effective competition in the wholesale and retail telecommunications services market as well as, in some cases, insufficient technological options for broadband service delivery.

Examination of a recent Telstra pricing schedule shows that most broadband services delivered in regional New South Wales are priced at the same level as those available in Sydney. The difference is essentially in terms of coverage – a significant proportion of the community in regional and rural parts of the state cannot access less expensive services (that is, ADSL and cable) simply on account of their geographical location, while wireless fast and superfast services have not lived up to the service levels promised by network providers. Satellite services can potentially meet needs of people in sparsely populated areas, but these services are expensive.

Table 4: Selected Telstra Bigpond plans – Sydney, Dubbo and Moree

Broadband service	Speed Kbps	Data limit MB	Set up cost \$	Sydney \$/month	Dubbo \$/month	Moree \$/month
ADSL	256/64	200	0	29.95	29.95	29.95
ADSL	1500/256	400	0	49.95	49.95	49.95
Wireless fast	256/128	200	249	39.95	39.95	39.95
Wireless superfast	1500/384	400	249	49.95	49.95	49.95
Satellite	256/64	500	1,198	104.95	104.95	104.95
Satellite	800/128	4,000	1,198	479.95	479.95	479.95

Source: Compiled from data on Telstra website. Data limit (MB) refers to download limit per month before users incur additional charges.

4. Risk factors

Access to broadband at competitive prices is a critical factor in the uptake of broadband services in rural and regional New South Wales. It is also likely to be a critical factor in any decision by a telecommunications service provider to further extend infrastructure into regional and rural areas.

At the community level, access to broadband at competitive prices is likely to have a significant impact on the social development of regional and rural communities, and the ability of such communities to maximise the network benefits which arise from a large proportion of the community being interconnected.

At the business level, access to broadband at globally competitive prices is an increasingly important determinant of competitiveness in the global knowledge economy. Policies that encourage the provision of affordable broadband to rural and regional NSW can place its businesses on par with, or ahead of, global competitors. By contrast, the failure of businesses and communities to have access to affordable broadband services is likely to have significant negative economic and social development impacts, as well as network impacts, as well as reduce the efficiency, competitiveness and innovation of regional businesses.

Global business is increasingly being conducted by electronic communications means. Without access to affordable broadband, NSW regions and rural areas are likely to fall further behind metropolitan NSW in terms of their ability to encourage national businesses to move to regional areas, gain access to global value supply chains, develop and retain a highly skilled workforce, and establish successful networks with other businesses and customers in the region.

Technology that delivers broadband is fast evolving. New generation technologies, such as ADSL2 and ADSL2+ are making higher broadband speeds possible over existing infrastructure. However, ubiquitous network coverage is still far from being realised.

Overall, regional and rural New South Wales faces two significant risks. First is the lack of adequate broadband coverage today. Even if government intervention, or the introduction of competition, or the development of revolutionary technology makes adequate coverage possible in the near-term, regional areas need to have network infrastructure that is similar in its coverage, quality, reliability and pricing to that available in the rest of the country.

Inadequate broadband infrastructure in country New South Wales in the short-term will retard economic growth as new investment and business expansion decisions will consider the availability of this infrastructure closely. This, in itself, poses a serious risk to rural areas where coverage is already inadequate today. Inadequate broadband also retards the ability for regional businesses to generate growth through productivity improvements, as newer more efficient practices cannot be implemented. This further compromises ability of regional businesses to compete.. Inadequate broadband also imposes social costs that arise from internal migration which reduces the size of communities, and in turn erodes their ability to attract service providers to invest in the provision of broadband services. These second-order impacts are more difficult to reverse, as they are driven by sentiment which can be difficult to change.

In the event that adequate broadband infrastructure becomes available in the near-term, business and communities will be able to invest in new technology, adopt new business

ideas, acquire new skills and develop new and innovative products and services to take advantage of opportunities that such an infrastructure will afford.

However, in the longer term, if a competitive infrastructure is not available, that is, relative to the infrastructure that is available in metropolitan areas, in terms of quality (speed), or pricing competitiveness, these new investments in business may be stranded as business' ability to compete is compromised. This represents a significant risk for regional businesses. More importantly, a perceived risk that regional broadband services may not be adequate, in the future, will impinge on investment decisions taken by businesses today, which can have long-term impacts. For example, a business currently considering whether or not to invest in a manufacturing facility in a regional location will need to assess the risk to its operations of not having access to a competitive broadband network, in the longer term.

As noted above, deployment of broadband infrastructure in regional and rural New South Wales is uneven. Given the significant positive regional externalities that broadband access offers, it is important for governments to support the acceleration of broadband deployment and the delivery of competitive, high speed broadband service in regional and rural areas through measures to encourage greater private sector investment in infrastructure. This will ensure that the "digital divide" between regional and metropolitan areas is minimised, with regional areas enjoying the fruits of "digital prosperity" in terms of employment, growth and innovation going forward.

5. Role of government

It is a legitimate role for governments to act to reduce the threats to inequality of access and to ensure the fruits of digital prosperity are shared by all in New South Wales. Government intervention should be considered at a number of levels. These are:

- availability of network coverage,
- development of skills especially in the area of digital literacy and skills development, and
- investment in government services that will complement efforts of the community to generate a return from investments in their well-being.

These investments may be in the area of community assets, such as schools, training institutes, healthcare facilities etc. Such investments are necessary as communities will need them to attract further investment to their localities. The good news is that broadband networks will make the delivery of these services less expensive through service provision via new distributed business models at relatively lower costs.

While there is always a risk of government intervention distorting markets, broadband coverage is an important threshold issue that cannot be left to market forces alone. Strong regional externalities from investment in broadband and ensuing incremental economic growth through innovation will more than compensate for any costs likely arise from government intervention.

Despite the upward trends in broadband penetration, penetration rates in rural and regional Australia are still low compared to national and international standards. There is strong evidence to suggest that, despite this upward trend, regional and rural areas are unserved or under-served and are likely to remain so for some time, in the absence of sufficient demand to motivate private sector investment. Active policies that governments can follow should both address service provision in regional and rural areas, and support industry development. This should include:

Encouraging service provision

- Provide targeted funding for establishing networks in high-cost and/or sparsely populated rural areas;
- Support local government to play a facilitative role in the roll out of broadband network infrastructure by telecommunications companies;
- Ensure that policies do not compromise adoption of on-going developments in technology, business models, products and services; and
- Act as an “anchor consumer” for broadband service in remote areas by providing e-services and/or centres where local communities can access services, such as the provision of Community Training Centres, and various community services offered by government including social security, community, and health services. In addition, governments can explore the feasibility of aggregating public sector and regional demand for broadband services to create a market large enough to provide an incentive for private sector investment in broadband infrastructure;

Industry development

- Requiring its agencies to adopt technologies and business practices that exploit productivity enhancement opportunities, deliver services to remote areas and make new service delivery models possible;
- By participating actively in the market by becoming a 'leading' user of broadband services in regional and rural areas the government can contribute to network effects or externalities, whereby the available "value" from joining the e-community will accelerate adoption rates and lower unit costs over the longer term;
- Support regional economic viability through skills development. This will require provision of up-to-date training to communities. Broadband infrastructure can make this possible by making a distributed model of service delivery viable, as opposed to a centralised model;
- Encouraging ancillary industries to develop that enable business to take full advantage of broadband. These industries would develop applications that would allow a high-order of data and information exchange leading to substantial productivity improvements through better decision-making, automation of routine tasks, removing redundant operations, streamlining business processes, and better market information and market intelligence;
- Promoting teleworking and working from remote locations, which is likely to result in increased demand and uptake of broadband services so that people are able to improve their work-life balance, make greater contributions to economic activity while reducing energy use; which is likely to spur telecommunications service providers to deploy broadband infrastructure and services;
- Assisting local government to take a leading role in the deployment of applications in their dealings with the community using broadband infrastructure;
- Encourage proper disclosure by service providers so that competitive forces in the market play their part in encouraging them to deliver promised service levels. An example, could be a requirement to disclose contention ratios²³ to subscribers of services allowing them to judge a service before committing to a long term service contract; and
- Support businesses in assessing service level standards and provide a mechanism for reporting service levels delivered by telecommunications companies.

The case studies (following) include some examples of current NSW Government action in support of technology take-up by rural and regional businesses.

²³ In computer networking, the contention ratio is the ratio of the potential maximum demand to the actual bandwidth. The higher the contention ratio, the greater the number of users that may be trying to use the actual bandwidth at any one time and, therefore, the lower the effective bandwidth offered, especially at peak times. Disclosing contention ratios or similar measures using standardised methods across all competitors so that subscribers can assess service levels will assist in improving services and in closing the gap between the specification in the contract and that experienced by subscribers. This practice is used in the UK where the Office of Communications (OfCOM) encourages such disclosures. Source: OfCOM website (www.ofcom.org.uk).

6. Case studies

Regional development

Uralla: After ADSL-based broadband service became available in 2004, Uralla has been successful in encouraging independent IT-related businesses to relocate to Uralla. These IT businesses have formed into a successful IT Cluster which has resulted in improvements in the skill level and services to the region. As a large proportion of the business secured by these IT firms comes from outside the region, the growth of these IT businesses in Uralla has increased the net income of the region.

In addition, other local businesses have also benefited from access to the expertise offered by these IT firms who provide advice and information to regional businesses on the use of broadband technology as a 'business driver', rather than just simply a tool for email communications.

The faster speeds available through ADSL compared to dial-up modem technology, as well as the lower access costs of ADSL compared to satellite services, have resulted not only increased take-up of broadband services among Uralla businesses, but also a greater adoption of bandwidth intensive applications and other technology which is supported by broadband. The New England Regional Economic Development Board believes that the introduction of ADSL was a strong factor in attracting IT businesses to Uralla.

The Parkes Logistics Hub has significant infrastructure advantages in the areas of transport (road and rail), available land, natural gas and electricity. As a result of these advantages, Parkes offered significant competitive advantage to the establishment of logistics sector businesses. These advantages have been magnified into a sustainable economic advantage through the availability of a broadband service. Broadband is required for all aspects of logistics management, including the management of goods packaging, tracking, vehicle load consolidation, etc., to ensure an efficient logistics business operation.

Parkes has fibre optic telecommunications infrastructure with a high level of redundancy, providing the perfect platform for the development of a "Communications HUB for National Freight Logistics".

The Parkes HUB already has multi-modal logistics companies such as Linfox and SCT with a third "state significant" development being approved recently. Other industries who are suppliers to the logistics industry sector have also established in Parkes which has further enhanced the viability of this regional centre.

Attracting new investment

The availability of fast speed broadband services is increasingly becoming a significant factor in local and international business's decision to locate in regional and rural New South Wales.

The Department of State and Regional Development has been working with an industry leader in the medical devices manufacture sector to establish a high tech low-cost manufacturing facility in regional New South Wales. The company will use world leading manufacturing technologies to develop a low-cost manufacturing facility that will service

Australian and Asian markets. The company's decision to locate in a regional area was firmly predicated on the availability of adequate broadband infrastructure as the management of the company believed that they could not take advantage of other locational factors such low property prices without adequate broadband infrastructure.

The company proposed to manufacture custom-made products to suit each end-users need. Products will be designed to suit each individual application and manufactured in a high-technology facility, with the finished products being airfreighted to the client. The pattern for each unit will be obtained through electronic scanning that takes place in the location the client lives and will then be transferred electronically for manufacture regional New South Wales.

The company has indicated that it intends to employ over 160 people and would need to provide ongoing training to its staff. Bandwidth intensive telecommunications will also be used to deliver some of that training remotely to its Cowra-based staff.

As a consequence of the availability of fibre optic broadband connectivity, the company is now negotiating to purchase a site on which to build its manufacturing facility in the area. The company advised the Department that its next choice would have been to look for opportunities to establish in Asia. This would have meant a loss of potential benefit in terms of employment and income to the Central Western region.

Broadband infrastructure holding back regional firms

The Data Mill, located in Uralla, provides customised and professional IT services as an MS Word developer and independent IT trainer. Specialising in VBA programming to customise Word and enable streamlined document production, Data Mill services small and large businesses in Australia and overseas. Its clients include legal firms and accounting/management consultancies, such as Ernst & Young, Henry Davis York, Australian Business Lawyers, Tenon (UK).

ADSL enablement of the Uralla exchange attracted Data Mill to Uralla. However, many IT firms choosing Uralla as a base found that the ADSL enabled exchange was out of ports. As a result, for a six-month period they were forced to operate from the Community Technology Centre and had to travel to Sydney to service customers while the Exchange was upgraded.

However, even after the upgrade broadband speed on offer was limited often making it necessary to travel to Sydney to work on larger jobs. In addition, it has encountered restrictions in mobile coverage in Rocky River (on the outskirts of Uralla). The company considers that higher broadband speeds to enable video conferencing and the timely transfer of larger data files would be imperative to the continued viability of their business operations.

Regional firms servicing the nation

The Eastmon Group is based in Glen Innes from where it operates a network of nine retail stores in eight country towns and manages 69 Rabbit Photo Stores. In 2002, the Eastmon Group introduced new information technology systems that have allowed them to expand into other countries and product areas and positioned them as leader in the photographic industry. Supported by a strategic relationship with Fujifilm Australia Pty Ltd, Eastmon services a large proportion of mass-market retail chains in Australia and New Zealand involving nearly 5,000 digital printing centres.

Using technology as a competitive advantage, Eastmon has developed state of the art photographic processing systems, remote retail management systems, IT support services and a sophisticated point of sale system. The strength of the Group is their ability to develop and administer online systems for managing photographic businesses and photo kiosks found in retail shops throughout Australia and New Zealand.

This business expansion has been possible because of Eastmon's ability to access high-end broadband communications network. Access to this communications infrastructure will continue to be an important factor in the company's success in future as it seeks businesses growth through further expansion into international markets.

Broadband impacting farming businesses

Hermes Poll Dorset Sheep Stud: Farming practices are becoming increasingly reliant on broadband and information technologies to achieve substantial improvements in business efficiency and productivity. For example, the Hermes Poll Dorset Sheep Stud in Cowra is employing ICT applications to improve the management of its farm operations and to deal with its suppliers and customers.

In particular, the stud uses ICT applications to access up-to-date weather information and other satellite images to assist in the management of the farm; source potential customers of sheep by providing photographs and other related information electronically; and to market its stock to potential breeders by providing them with detailed genetic information and pictures of individual animals to enable them to select stock suits their needs in relation to animal production efficiency. These applications require large amounts of information and images to be transmitted in a two-way direction. The farm currently relies on dial-up internet access to provide data to customers and breeders. This results in significant inefficiencies, with certain files taking between 2 to 3 hours to download, with occasional files taking up to 12 hours to download.

The business has considered moving to satellite broadband services. However, the set-up and download cost of satellite services is prohibitive relative to all other broadband technology platforms. While ADSL technology is available in Woodstock, the stud is well outside the effective 4km radius of the ADSL enabled exchange.

The lack of access to cost effective broadband technology impacts on the operational efficiency, business performance and business development opportunities of the stud farm and constrains its business growth prospects. For example, the stud is unable to readily access information on new technologies and sustainable farming systems, as this information is only available on internet sites designed for high bandwidth. A lack of affordable broadband options also inhibits the stud's use of existing and emerging technologies. For example, the stud is unable to operate remote control irrigation systems and gates, or obtain information on 'paddock mapping fertiliser needs' based on data collected from headers at harvest time.

In addition, the area where the farm is located does not have any mobile phone coverage, which means that repairs of agricultural equipment cannot be done without significant interruptions to farming practices. Mobile coverage and/or affordable broadband coverage would enable pictures of broken equipment to be sent immediately to suppliers which would speed up the repair process. The lack of mobile phone coverage also raises work safety issues, if an accident occurs on the property some distance from the house.

Outback Beds Inc: is a network of successful farm stays and accommodation businesses throughout Outback Western New South Wales and Queensland, which markets their

services to corporate and interstate travellers, retirees and semi-retirees, as well as international tourists, mainly from European and North American. The organisation's business success has been recognised in its winning the Business Enterprise Award category of the NSW Regional Achievement & Community Awards in 2005 and the Destination and Product Marketing Category of the Inland NSW Tourism Awards in 2006.

Many of the network members access broadband services using satellite connections, although some have dated satellite technology, resulting in one member reporting that the service was operating at speeds of 30% to 40% (48kbps) of the advertised speed for the service, making use of Voice over the Internet Protocol (VoIP) and video conferencing infeasible. The telecommunications service provider advised that this was a result of the age of the satellite technology being used by the business. However, assistance to upgrade this technology was not available, as the business had accessed such assistance previously. Given the vast distances that separate members, the ability to communicate at cost-effective rates remotely, via VoIP and videoconferencing, would offer significant cost savings and business development opportunities, which are currently not available with existing broadband services.

In addition, many members of the network have no mobile phone coverage. A lack of mobile coverage means members are not always available to take phone bookings as they are often away from the house undertaking normal farming/grazing activities. This results in lost bookings and reduced financial returns. The businesses in the network are concerned that coverage and service levels will reduce when the CDMA network is closed and replaced by Telstra's Next G network, which may impact on the use of home phones, EFTPOS and fax systems, as well as remote switching of equipment, such as water pumps, which are currently being delivered by CDMA technology.²⁴ Additionally, network members argue that Next G service are not expected to be covered by the Universal Service Obligation (USO) which have applied to CDMA technology, resulting in indeterminate timeframes for fixing of service faults.²⁵

There is also concern regarding the very limited stand-by and talk time of the Next G Wireless Link for home phones, in the event of a power failure. Telstra representatives at a meeting in Louth stated that at present the new phone would have a stand-by time of around 2-3 hours and a talk-time of approximately 20-30 minutes. Over the summer, when most power outages occur due to storms, members can often be without power for 24 hours and this poses a serious risk to their business continuity.

Education services by Riverina Institute of TAFE

The Riverina Institute of TAFE delivers over 30 courses through distance education. The In addition to traditional print-based delivery methods, Riverina Institute also offers online delivery of education service to suit student needs. However, slow internet speeds have retarded widespread adoption of this delivery method as students with inadequate network service are disadvantaged in their ability complete coursework and access educational resources for research.

The Institute has reported instances where students failed subjects because they could not email assignments on account of poor telecommunication network service. Further,

²⁴ Due to the remoteness of the location of a number of the businesses in the network, fixed line phone services are not available, with home phone services being currently delivered by wireless CDMA technology.

²⁵ Businesses reported that, if they choose not to take-up the Next G option, they can get access to a satellite phone, whose service is covered by USO obligations, but that information of this option is not being made available to the businesses, as satellite phones cost the service provider approximately \$80,000 per installation.

broadband access is also important to facilitate video conferencing to support the delivery of courses in locations with insufficient numbers to justify face-to-face classes.

Many smaller communities are experiencing digital disadvantage, with ABS data indicating that only 30% of people in regional and rural communities have access to the internet (see footnote 12).

E-health: examples of health service delivery²⁶

1. Centre for Networking Technologies for the Information Economy (CeNTIE) has developed the Virtual Critical Care Unit (ViCCU™), a broadband system allowing a specialist located at a major metropolitan hospital (Nepean Hospital in the initial implementation) to use a dedicated workstation to access all necessary information sources while maintaining real-time, "telepresence" communication with staff at a regional hospital (Katoomba Hospital). The information being generated in the emergency or obstetrics department takes the form of several views of video information, high quality audio, vital signs data, written notes and medical images. The specialist is an involved member of the emergency team able to request and access information, suggest courses of action and see the results immediately.

2. m.Net has developed HealthSpring, an e-health application, using wireless technology operating on a portable handheld PC communicating with a pathology database. The application allows improved access to medical test results by rural medical practitioners when working outside general practice surgeries, for example when providing after-hours and emergency services to the local hospital, managing hospital inpatients, visiting clients in residential care facilities (which may be in neighbouring towns) and conducting home visits for patients unable to attend a surgery.

Applications being deployed include voice over IP telephony, video-conferencing for telehealth, digital image storage and retrieval and shared network services for health agencies. One project, in Queensland, includes indigenous communities in the coverage of health services.

Examples of specific benefits identified to date include:

- efficiencies in healthcare delivery, including savings in travel and telecommunications costs, enabling reinvestment of operational savings into service expansion;
- health service staff productivity and job satisfaction increased;
- reduced real costs for the client and government through increased local access, including pre-admission consultations, orthopaedic reviews, remote digital radiology, specialist ultrasound services, online ophthalmology, dietetics services and renal dialysis support via video conferencing and e-health systems;
- economies of scale through sharing of ICT infrastructure and applications such as online health and medical records, integrated clinical information systems, financial/payroll and human resources systems;
- patient management and patient records maintenance on a regional basis;
- decreased Patient Transport Scheme costs;
- decreased radiology film transport costs; and
- improved ability to recruit and retain professional and medical staff in regional and rural location

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²⁶ Source: Department of Communications, Information Technology and the Arts submission to the National Health and Medical Research Centre (2005)