White Paper: The National Broadband Network

New Business Opportunities and Industry-Specific Effects of its implementation

New Business Opportunities from the National Broadband Network

Universal high-speed broadband Internet access in Australia will dramatically change the way in which businesses operate.

The development of the Internet over the past 25 years has already revolutionised most aspects of daily life, particularly work, entertainment and communications. Yet history has proven that predictions of the technological, social and business developments of a breakthrough in telecommunications pale in comparison to the eventual reality. Every major historical telecommunications development has changed business practices in ways and at speeds that were unforeseen at the time; and each telecommunications revolution has been faster and broader than the previous one.

Progress in telecommunications has led the way for economic, social and even political developments throughout the world over the past 150 years. This has been true for telephone, radio, television, satellites, mobile technology and finally the Internet. By all accounts, the next step is the implementation of universal high-speed broadband access - a goal not yet fully achieved by any nation in the world, though pursued with ever increasing vigor. This goal is so actively sought after because history shows that the nations who achieve universal implementation of new telecommunications breakthroughs have a huge leg up in the global economy.

The past two decades of global Internet development have shown that despite booms and busts, growth continues steadily and exponentially. Within four years of the World Wide Web being launched in 1991, there were 16 million users. Three years later, there were almost 150 million. Today there are an estimated 2.75 billion users worldwide[1]. Speed of transmission has increased at a similar rate, from initially around 14 kilobytes per second to the over 1 gigabyte per second available through fibre connections, which are upgradeable to much faster speeds without significant infrastructure changes.

[1] ITU
http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2013.pdf

The Australian government has embarked on a plan to provide high speed broadband and telephone services throughout the nation. This white paper provides information on the opportunities and innovations that will stem from this immense infrastructure upgrade and define the next generation of Australian business telecommunications.

NBN Overview

Australia relies mainly on an ageing copper telecommunications network to connect to the Internet, with subsequent below standard broadband performance. The National Broadband Network (NBN) is a 10-year effort to dramatically upgrade Australia's broadband Internet capabilities through widespread installation of some of the most advanced telecommunications technology available. Simply, Australia is positioning itself to rank among the most technologically advanced nations in the world.

The development of Australia's NBN allows for new business opportunities in virtually every major industry. However, it also presents great challenges - customer expectations for high-speed Internet services and products will undoubtedly shift, and business processes will evolve rapidly. Those businesses that are prepared for the changes will be able to deliver to their customers the services they expect while simultaneously innovating with the new tools the NBN will provide.

Where We Start

Currently, despite a tech-savvy population, Australia statistically ranks below average amongst OECD countries for fixed broadband penetration, price of Internet plans and maximum advertised download speed[2]. Only 23.4% of the Australian population has fixed broadband access, and at speeds below average in comparison to other developed nations. Instead, to a large degree Australians rely on mobile broadband for their high speed Internet access, a technology which can limit bandwidth and connection speed, depending on use.

[2] OECD Broadband Portal
http://www.oecd.org/internet/broadband/oecdbroadbandportal.htm

Australian businesses, on the other hand, are world leaders in broadband use. The latest data shows that 96.6% of Australian businesses make use of high-speed Internet connections, ranking the nation in the top three worldwide[3]. Yet without the necessary volume of customers with which to interact over high-speed connections, businesses have been slow to develop and invest in services that rely on this infrastructure.

The implementation of the NBN will almost certainly change the situation on the ground dramatically for all involved. Prices for high speed broadband access are likely to become more competitive for both individuals and businesses. As with each telecommunications advancement in the past, this will lead to rapid and disparate innovations. Yet the prospect of the NBN is technological advancement at a rate never previously experienced in Australia's history.

For organisations with no plans to innovate and take advantage of the NBN, the anticipated changes have the potential to be devastating. Businesses are likely to find themselves quickly losing revenue to those who can deliver on customers' increased expectations.

Business Readiness

Increasingly, Australian business leaders understand that the NBN will change the way their companies operate. Studies show that 49% of businesses expect the NBN to change their operations, a number that has increased steadily each year [4]. Yet most businesses view the changes from the NBN in a very narrow sphere: increased telework, potential to reach more customers and better customer engagement. While every business should be prepared to take advantage of these specific opportunities, they are the tip of the iceberg when it comes to the changes that the NBN will bring about. Currently, however, only 29% of businesses are ready for even these simple developments[5].

Business readiness is less apparent for small and medium sized enterprises (SME). Uptake of simple Internet-based services, like cloud computing, remain very low – at 16% in the most recent survey. Only 38% of SMEs reported even having a website [6]. Small businesses are also more likely to see the NBN as having a negative impact rather than a positive one for their operations. On the other hand, while large businesses remain more optimistic about the opportunities from the NBN, still only 44% see it as an opportunity for real benefits[7].

Business Opportunities

The business opportunities from the NBN are vast. Just through the implementation of already tested technologies, the NBN is set to revolutionise healthcare, education, energy, security, entertainment, retail and elder care. The possibilities increase every day as new Internet-dependent technologies are rolled out.

Within the healthcare and education fields, the NBN holds the prospect of connecting consumers from around the country with the people and resources they need to significantly improve outcomes. A whole host of technologies within the health industry hold the potential to improve patient outcomes while allowing for greater independence and efficiency across the system.

In education, collaborative teaching and learning are likely to raise standards across the board. Students will be able to access high quality education regardless of where they live. In addition, opportunities for education in the workplace hold the potential to upend traditional work and education patterns, while at the same time increasing workers' expertise, productivity and loyalty to employers.

Smart devices and the potential for a smart network make dramatic energy savings possible in a wide variety of activities and uses. Homes and businesses will have the tools and information to effectively decrease energy usage through constant energy monitoring.

[3] OECD Broadband Portal http://www.oecd.org/internet/broadband/oecdbroadbandportal.htm

[4] "NBN Business Readiness Survey in 2013" http://www.deloitte.com/view/en_AU/au/insights/browse-by-service/technology/05660fd56ab1e310VgnVCM1000003256f70aRCRD.htm

[5] ibid

[6] "NBN Blinker for Australian Businesses" http://www.businessspectator.com.au/article/2013/4/17/technology/nbn-blinkers-australian-businesses

[7] Big Business Expect to Benefit from NBN more than Small Business http://www.roymorgan.com/findings/big-businss-nbn-benefits-201307220337

Technological changes in the energy grid hold the prospect of efficiency levels never before seen.

In the area of security, the NBN will allow for constant monitoring of premises by individuals and security professionals. This monitoring will enable seamless integration with police, fire and other emergency services to increase response times, enable better ordering of priorities and reduce false alarms.

Developments within the entertainment industry from universal high-speed Internet will be rapid and likely destructive to those who do not evolve with the changes. Between smooth HD video streaming, opportunities in interactive web-based entertainment, higher quality mobile content and vast opportunities in gaming, the variety of changes will affect every aspect of media.

Australia's retail industries stand to benefit from marketing and customer relations opportunities never before possible. While online presence is already a must for most retailers, the NBN implementation is set to introduce a paradigm shift towards interactive online sales and targeted online marketing. Customers are likely to expect an Internet-based sales experience that is streamlined, efficient and effective, while simultaneously demanding access to information about products and services never before shared by most businesses.

Adoption of the NBN is likely to dramatically increase quality of life for parts of the aging Australian population. Through better monitoring, early intervention and video conferencing with medical professionals, seniors will be able to stay in their homes for longer and live healthier. E-health implementation holds the potential to significantly limit healthcare costs for the elderly, while simultaneously decreasing stress on both patients and healthcare practitioners.

Each of these changes to Australian life and business stem from previously tested and implemented technologies. They represent only a fraction of the developments that are likely to stem about from implementation of the NBN. Yet each of them holds the prospect of revolutionising the industry within which it will be implemented. For businesses to effectively navigate these changes and take advantage of their opportunities, they must be prepared – prepared with the knowledge of what to expect and prepared with the systems that allow them to innovate quickly and efficiently.

Worldwide National Broadband Rollout

Throughout the world, nations are developing plans for high-speed universal broadband access in order to increase standards of living, generate growth and gain a competitive advantage in the technologies that will define the 21st century. Studies have shown that a 10% increase in broadband penetration rapidly leads to a 1.2% increase in per capita GDP among the highest income nations, with an even greater benefit for developing countries. Countries with the highest broadband penetration indicate an approximate 2% higher annual GDP growth [8] . These developments have occurred over very short periods and produced countless calculated benefits.

There are a variety of reasons for broadband's significant impacts on economic growth. Broadband usage among businesses allows for much more efficient processes and systems. Greater penetration among the population has been consistently shown to spur faster innovation, leading to new products, services and entire markets. Broadband also allows for businesses of all sizes to work with, sell to, and reach customers and pools of labour that would otherwise be inaccessible.

Every OECD country, therefore, has some version of a national broadband plan and many developing countries have it as the backbone of their economic development policy. The first country to implement a comprehensive broadband plan was South Korea, which used its broadband and overall IT plan as the foundation of its recovery from its 1997 economic collapse and rapid economic growth ever since.

Korea's *Cyber Korea 21* plan was first implemented in 1999, with the goal of building a knowledge-based economy throughout the country. As a result of this and other complementary plans, Korea has shot to the top 10 in the world for broadband access and speed with over 95% of the Korean population now having access to high-speed Internet. Known as a standard setter in information technology over the

[8] "Why Broadband?" http://broadbandtoolkit.org/1.3

last two decades, Korea's GDP per capita has more than doubled[9].

Korean businesses have also been able to utilise both their broadband connections and the almost universal access throughout the nation to build one of the most technologically advanced economies in the world – one that is able to seamlessly innovate to stay ahead of competitors. All of these rapid developments, often described as the "South Korean miracle", were to a large degree driven by a national high-speed Internet plan. They certainly required it.

Broadband plans in Europe and the United States have had similar benefits, though implementation is still well behind Korean levels. Germany has put in place a plan to bring 50MB/s broadband to 75% of residents by 2014, with even faster speeds to 50% of residents by 2020. Studies have shown that value added directly from the broadband installation, as well as network externalities, will see the country increase its economic growth by 137.5 billion Euros and add close to a million jobs[10].

The United States of America's National Broadband Plan was developed in 2009 with the goal of achieving universal broadband and, among other objectives, to lead the world in mobile technology. Currently, the USA already has broadband access for 200 million people, up from only 8 million in 2000[11]. Through increased business activity and the creation of new markets, broadband penetration has been credited with generating almost 400,000 new jobs (outside of employment gains from construction and implementation) between 2009 and 2012[12]. All of these gains came before any major benefits of government action could be realised. Estimates of the economic effects of expanded broadband access in the USA run as high as US$500 billion a year[13].

As almost no country has been able to fully implement a national broadband plan to date, the total economic benefits are impossible to predict. In addition, technological developments within telecommunications have been so rapid that attempting to look further than a few years into the future can be counterproductive. Yet there is no doubt that countries around the world see universal high-speed broadband as a precondition for success in the global economy of the 21st century, and by implementing a fibre-based broadband plan, Australia puts itself in a position to provide the fastest speeds available worldwide.

Telework

One of the most prominent and expected changes from the NBN to business practices is a rapid increase in telework among virtually all industries. Benefits from increased telework include cost savings from less travel, lower office expenses, better staff recruitment and retention, increased participation from all sectors of the workforce, and overall savings in money and time through decreased pressure on the infrastructure[14]. While studies of telework have varied widely in their view of its effectiveness, meta-analysis of the data shows that telework provides real benefits for businesses that implement it effectively and with enthusiasm[15].

Certainly telework is not appropriate with all jobs or industries, and most often it will involve a hybrid of traditional working models with teleworking for a number of days per week. Yet, today almost a quarter of Australians work at least some hours from home, though only 6% have contractual telework arrangements. New hardware and software capabilities have made connecting home offices with businesses a simple proposition. Additionally, business leaders expect the amount of workers who telecommute to balloon as a result of the NBN implementation. Overall, 49% of businesses say they expect to have increased telework as a result of universal broadband access, a number that has also grown

[9] "Formal Broadband Plans Spur Economic and Social Development" http://blogs.cisco.com/news/formal-broadband-plans-spur-economic-and-social-development/
[10] "Impact of Broadband on the Economy" http://www.itu.int/ITU-D/treg/broadband/ITU-BB-Reports_Impact-of-Broadband-on-the-Economy.pdf
[11] "National Broadband Plan - Executive Summary" http://www.broadband.gov/plan/executive-summary/
[12] "Impact of Broadband on the Economy" http://www.itu.int/ITU-D/treg/broadband/ITU-BB-Reports_Impact-of-Broadband-on-the-Economy.pdf
[13] "Economic Impact of Broadband" http://commsalliance.com.au/__data/assets/pdf_file/0016/8413/Economic-Impact-of-Broadband-final.pdf

[14] "Impacts of Teleworking under the NBN" http://www.nbn.gov.au/files/2012/02/ImpactsofteleworkingundertheNBN.pdf
[15] "Is telework effective for organizations? A meta-analysis of empirical research on perceptions of telework and organizational outcomes" http://www.emeraldinsight.com/journals.htm?articleid=17038598

rapidly as the NBN implementation has moved forward[16].

The potential for telecommuting to revolutionise work practices in Australia is great and should not be underestimated. Still too many businesses see it, along with greater customer communication, as the primary change to business practices as a result of the NBN implementation. By taking this view, business leaders may miss out on the many other game-changing developments across virtually all Australian industries, causing them to fall behind their competition as well as lose out on opportunities for investment and profit.

Industry-Specific Effects of NBN Implementation

Healthcare

E-health – or the combined use of information technology and electronic communications within the health sector – represents a paradigm shift within Australian healthcare. Business opportunities from universal broadband access will primarily be derived from two sources: selling of technology to facilitate e-health strategies and, secondly, dramatic cost savings from its implementation. Cost savings from these strategies have been estimated at 20% or higher overall[17]. Still, the potential business opportunities from technological innovations within the medical industry, though certainly vast, are impossible to predict.

Currently there are a host of medical innovations ready to be brought to the public at large that are set back by a lack of infrastructure. E-health services – such as real-time remote monitoring of patients, immediate analysis by experts of time-sensitive health data and e-prescribing – hold the potential to save billions of dollars within the industry, as well as countless lives. Yet all are dependent on high-speed Internet access. In fact, because of the need for high quality streaming video and data transfer, e-health services demand some of the fastest Internet speeds of any industry.

E-Health technologies will also by no means be limited to computers and video conferencing equipment. Innovation within a universal broadband paradigm will develop monitoring and data collection technologies that were never thought possible just a few years ago. For example, the prospects in patient monitoring include technologies such as simple sensors in floors that determine weight distribution and predict falls, Bluetooth connection with vital signs monitors, and monitors in phones that measure changes in the voice and can predict strokes[18], among countless others. Effective monitoring of patients who are at the highest risk for heart attacks, strokes, and other serious and acute medical emergencies will lead to more effective

[16] "NBN Business Readiness Survey in 2013" http://www.macquarietelecom.com/Portals/4/Downloads/NBN%20Business%20Readiness%20Survey%20in%202013%20DAE.PDF

[17] "Telehealth and e-care: The next generation of healthcare technologies" http://www.executivehm.com/article/Telehealth-and-e-care-The-next-generation-of-healthcare-technologies-/

[18] Ibid

prevention, better outcomes in emergency services and significantly lower rehabilitation times.

Another area where the NBN has the potential to change health services is through more effective patient education. With the aid of interactive online tools to help better explain conditions and prescriptions, as well as easier communication with doctors, patients will have the opportunity to understand more fully how to manage their own health, decreasing stress on the healthcare system and limiting costs. Additionally, combined with effective monitoring, doctors and other healthcare practitioners will have the ability to educate patients in real time on changes they need to make to better manage their conditions. As with many developments, these services will be even more important in rural areas where medical facilities are less available, and where broadband connections in the past have not been accessible.

Universal broadband also has the potential to alter the way emergency services are delivered, as access to time sensitive data during emergencies, combined with new ways to quickly administer tests, will create opportunities for more effective and prepared responses. Through immediate integration between patients and responders, as well as numerous technologies that are being developed to provide immediate test results for vital health information, emergency medical response procedures and outcomes are set to be revolutionised.

Significant preparation is necessary within the healthcare industry to ensure that the many cost savings from universal broadband are gained and that the opportunities in technological development are fully exploited. Entire service procedures will need to be rewritten, technologies must be researched and providers have to be educated on their uses. Health professionals, hospitals and other medical facilities that are able to implement these new standards effectively can expect to see dramatic increases in efficiency and patient outcomes.

Education

Universal broadband holds the potential to reform the way education is practiced from the youngest age groups through to working adults. Business opportunities within education are likely to be centered around building and selling the equipment necessary to implement various Internet-based education reforms, developing the educational software that can support these changes, saving resources through increasingly efficient educational tools and increasing worker productivity by utilising more targeted adult education.

Schools that take advantage of universal broadband will need to embark on a series of steps to upgrade their hardware, software and computer skills. This need provides numerous opportunities across the Australian economy. Hardware changes will include a dramatic increase in tablet computers as an alternative to paper-based textbooks, large mainframes to run school-wide networks and computers developed specifically for young children's use. Each of these will require the development of vast amounts of educational software to engage students, parents and teachers, particularly the types of software that can hold students' attention, interact in real time and focus on the areas where they need work.

Perhaps most important of all the primary school developments from universal broadband will be the need for teacher education in advanced computer skills. Past studies have shown that teachers actually lag behind their students on a number of important computer skills, including building a website, writing a program and making a presentation [19]. The market for training in computer skills and technology is likely to be among the fastest growing over the course of the NBN implementation.

The NBN will also dramatically change education outside of school. Already, the Australian online education market generates over $5 billion in revenue and is growing at 18.6% per year [20]. Increased Internet access and greater speeds are likely to, at a minimum, maintain this rapid pace, while simultaneously opening up e-learning opportunities for young students and those from rural areas.

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[19] Australian Bureau of Statistics, "Real Time - Computers, change and schooling, 2000" http://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/1301.0Feature%20Article182000?opendocument&tabname=Summary&prodno=1301.0&issue=2000&num=&view=

[20] IBISWorld, "Online Education in Australia Market Research" http://www.ibisworld.com.au/industry/default.aspx?indid=1907

Education within the Australian workforce represents growth opportunities both within the online education market and for all industries that take advantage of the opportunity. Businesses that continue to develop their workers' skills throughout their careers hold the potential to increase productivity, create the environment for innovation, build loyalty among their workforce and attract higher skilled labour. The market for targeted and in-depth adult education is largely untapped in many areas and holds potential for every business that is willing to make the investment. With the NBN implementation, these services can be provided within a work setting or from home, limiting the disruption to regular business practices.

Energy

The overall energy and cost savings from smart grid technology is unknown, with case studies and research coming to vastly differing conclusions. Yet there is little question that businesses making the effort to limit energy use by taking advantage of these technologies have the potential to significantly reduce costs across the board. This commitment to cost savings will come from more efficient procedures that result from energy monitoring, as well as cost-benefit analysis of energy use from increasingly detailed statistics on energy consumption.

Another area for large-scale business growth is in the software for energy monitoring and systems controls. Between utilities bill management, HVAC control, energy bill analysis and other emerging fields, the worldwide market for enterprise smart grid technologies already tops $6 billion, with as high as 30% annual growth[21]. Current energy policy aims to have smart monitoring technology in all Australian homes and businesses by 2020, further increasing the opportunities within the software and enterprise smart grid sector. Working within potentially the first country in the world to have both universal broadband and widespread smart grid implementation, Australian businesses are unique in their entrepreneurial and growth opportunities in the energy sector.

Businesses that do not innovate and plan for a new energy paradigm face the potential of competitors undercutting prices through dramatic reduction in energy costs. Energy costs vary dramatically between industries, with differences ranging from 10% to greater than 50%[22]. Industries such as petroleum refining, steel and aluminum manufacturing, paper and cement production, and chemical development represent the highest overall energy consumers, as well as factors in the production of virtually every physical product on the market. Even small-scale changes in the energy profile of these industries would hold real potential for profits and cost cutting throughout the economy.

Security

Changes in security practices as a result of universal broadband are likely to usher an age of never before seen business security, particularly through increased monitoring capabilities and integration with emergency services. For businesses, these capabilities will offer the benefits of dramatic increases in levels of overall security, faster response times to emergencies, and the potential for decreased insurance costs. Many of these technologies are already available on the market.

Mobile monitoring technologies include cameras, motion detectors, door and window sensors, smoke detectors and even water detectors. All of these will be offered through either remote monitoring by third parties or constant mobile monitoring. With new security technologies steadily being developed, safekeeping of high value or sensitive goods will become less expensive and simpler for businesses regardless of location.

The prospect of integrated emergency services represents another dramatic change from the National Broadband Network. Through sharing of video surveillance and monitoring data, police, fire and first responders will be able to respond quicker and with more information than ever before. Due to the increasingly accurate information that emergency services will receive, costly false alarms and unnecessary responses will be minimised.

[21] Groom Energy, "Enterprise Smart Grid Report Summary", http://www.groomenergy.com/ESG_report_summary.html

[22] "Energy as a percentage of total production costs by industry", http://www.zanran.com/q/Energy_as_a_percentage_of_total_production_costs_by_industry

From a business perspective, financial gains derived from better security and simpler security procedures will probably need to be reallocated to network security. Already most large businesses have significant investments in securing their data and networks. This is likely to soon be the reality for businesses of all sizes, thereby becoming an increasingly important strategic business investment. Costs of IT security breaches are seen in loss of work time, loss of business, money spent directly to fix any issues, and loss of intellectual property, among others. Many small and large businesses alike have already been forced to prepare for or respond to these costly intrusions.

Businesses offering IT security products and services are likely to continue to see dramatic increases in investment and returns as a result of universal broadband. These services, which are already seen as essential, will become even more important in a reality where physical infrastructure security is controlled through mobile devices. Increases in the use and variety of mobile devices within businesses will only add to the complexity of the security protocols necessary. Currently, the IT security industry within Australia is projected to generate $1.7 billion of revenue in 2013, with continuous double-digit growth [23] . Australian businesses are ahead of worldwide trends in security investments, providing an opportunity to increase international investment in local businesses, as foreign service providers who lack in IT security will represent a real risk to investors.

Additionally, investments in IT education and training are likely to dramatically increase as businesses continue to discover their vulnerabilities. At all levels of a corporation, IT training will be necessary, as virtually any device connected with a network can be a security threat.

Entertainment

The entertainment industry is likely to see some of the most dramatic changes as a result of the National Broadband Network. Many of the current business models within the entertainment industry lack a universal broadband perspective. The NBN therefore holds the potential to be a highly disruptive change to numerous businesses. Simultaneously, it represents an area for rapid growth and returns on investment. The recent economic gains in home entertainment have been led by strong increases in subscriptions for digital movies and television shows [24] . Increasingly, consumers will demand access to their full spectrum of movies, shows and other media in a streaming version.

Universal broadband holds the potential to provide easy streaming of HD video as well. This is likely to affect the already slumping DVD industry, while creating further opportunities within the online sphere. Already 5% of Australians are paying for subscriptions for online television content, with over 10% going online to catch television they missed offline [25] . While these numbers remain low, they are hampered by the inability to access popular online streaming services such as Netflix and Hulu, as well as bandwidth limitations that many people have with existing Internet connections.

Implementation of the NBN will significantly reduce the number of Australians who access the Internet under bandwidth restrictions, increasing business options within high bandwidth HD video streaming and download. Additionally, with an increasingly large segment of the population online at faster speeds, entering the Australian market will become more cost effective for streaming services. Today, a full 49% of Australians say they are willing to pay for online video content, a number which is likely to increase as options expand[26].

Furthermore, as online content is simple to distribute internationally, the profit making potential from producing quality video entertainment and streaming online is increasing rapidly. With technological advances in media devices and programming formats, the potential for interactive, 3D and other types of online video content are vast. Already, amongst the youngest generations of Australians, upwards of 75% go online for their media entertainment[27]. As ease of

[23] "Australian security market tipped to grow 12 per cent - advanced targeted attacks, BYOD, Gartner, security, big data" http://www.computerworld.com.au/article/464430/australian_security_market_tipped_grow_12_per_cent_gartner/

[24] "Streaming Lifts Home Entertainment Industry" http://mediadecoder.blogs.nytimes.com/2013/01/08/streaming-lifts-home-entertainment-spending/

[25] "Online Video Content in Australia" http://www.acma.gov.au/webwr/_assets/main/lib310665/report%201_online_video_content_in_australia.pdf

[26] ibid

[27] "The Internet Service Market in Australia" http://www.acma.gov.au/webwr/_assets/main/lib310665/the_internet_service_market_in_australia.pdf

use, number of options and opportunities for education increase, that number is likely to rise among the rest of the population. As movies and television are increasingly released only in online forms, uptake of these services will also be pushed upwards through demand.

Another area of entertainment with high profit potential from universal broadband access is the video gaming industry. Spending on online gaming subscriptions, virtual goods and mobile games in Australia in 2013 is estimated at $730 million, representing an 18% growth from the year before. This spending is already cutting deeply into profits of traditional gaming sales, which showed a 23% reduction in the past year[28].

As a whole, the gaming industry has been among the quickest to take up new technologies. The prospect of 3D gaming, increasing online sharing amongst players, and new consoles and interfaces being developed that require high-speed Internet hold the potential to surpass the expected 7.4% growth over the next four years[29]. As Australia's game development sector continues to grow, aided in part by government investment, the prospect of universal high-speed broadband allows for Australian business to make significant gains in video game technology and development.

Retail

The Australian retail industry has lagged behind other nations in its investment in online sales and marketing. Currently, the online sphere makes up only about 5% of the $249 billion sector. Yet, as with virtually every other Internet-based market, growth is in double digits, at 23%. Sales through mobile devices have increased by an order of magnitude in just the last year[30]. This indicates that Australian retailers need to be ready for dramatic changes in the landscape of the industry.

Changes in the retail industry will work in two directions: increased ways of providing consumers with information, and changes to make the sales process easier and faster. The first will involve technological development around web-based services, the mobile experience and in store sales technology, while the latter will involve developing smooth and easy to use platforms to provide information and quickly make sales. Large retailers around the world have been making significant investments in technologies to build online content and upgrade their online experience in order to prepare for this massive paradigm shift[31]. Australian retailers will need to follow suit.

Having websites, both mobile and standard, that are prepared for the future retail landscape will involve significant investments ahead of time. Already consumers are demanding a different sales experience from the recent past. Even when purchasing relatively inexpensive items, online consumers seek out a great deal of information. Smart businesses will need to provide this knowledge themselves in order to keep their customers within their sales space. And the ways that consumers acquire this information, whether through pictures, videos, infographics or simply articles, will only expand.

Additionally, pricing online is dramatically different from brick and mortar stores, and will require many Australian businesses to rethink their business model. With the NBN development and increased comfort in making online purchases, competition online will only increase. Within a space where a simple click takes a consumer to a competitor's site, businesses will now need to find innovative ways to add unique value to purchases or risk educating their consumers on what to buy and then losing them to a lower priced alternative from a competitor. Building consumer loyalty outside of just the price factor will be a significant area of innovation as the NBN brings in a new shopping paradigm.

Industries, which have been the most resistant to online sales, such as food and high priced goods, will also need to prepare for changes in consumer behavior. While consumers may still need to enter physical stores to make these purchases or compare goods, they will expect an online experience that adds value before going to the store.

While all of these changes to the Australian retail sector have the potential to cause large

[28] "Australian video games industry records $1.161 billion sales in 2012" http://www.igea.net/2013/02/australian-video-games-industry-records-1-161-billion-sales-in-2012/
[29] ibid
[30] "Australian retail industry must adapt to online shopping" http://www.heraldsun.com.au/news/australian-retail-industry-must-adapt-to-online-shopping/story-e6frf7jo-1226604027263
[31] ibid

disruptions to sales systems that have worked for generations, they also provide great opportunities for those businesses that are prepared. Universal broadband allows for online processes, such as highly interactive websites built with HTML5 or 3D web design, which seemed only a dream a few years ago. On the marketing side, businesses will need to be agile enough to react immediately to changes in customer engagement, particularly through social media. Yet those businesses that are able to provide the full experience that consumers are coming to demand – including quality content, a great web browsing experience, interaction between online and in store experiences, and quick reacting social media marketing – will find customer loyalty and retail profits are not left behind with rapid technological change.

Elder Care

Universal high-speed broadband access is expected to completely change the dynamics of elder care in Australia in the long run. These changes are among the most discussed benefits of the NBN, as well as being viewed as one of the areas of significant cost savings. The biggest changes are likely to develop from the ability to remotely connect elderly and disabled Australians with their healthcare providers, saving costs in hospital and doctor visits. With better and more consistent monitoring capabilities, the elderly will be able to live in their homes longer, diminishing the need for care facilities.

The vast opportunities for business investment and cost savings in the area of elder care are largely due to high spending and inefficiencies currently in the system, as well as the potential revolutionary changes from an e-health paradigm. Australia's population is ageing at a rate where by 2050 the number of people over 65 will double, requiring services that are simply not available at the scale necessary[32]. With healthcare costs already driven primarily by services for those over 65, the budget and social welfare implications of this change are dramatic. Businesses in the healthcare industry that serve the elderly and are able to build scalable e-health services will find opportunities throughout the system.

Opportunities in elder care from e-health services will include remote monitoring of seniors in their homes, e-consultations with doctors, greater sharing and access to medical records, and faster and more efficient responses to emergencies. Each of these developments show great potential for investment returns, as well as significant barriers to development, largely because of the relatively low technological proficiency among the elderly population. Yet with returns on investment of between 67% and well over 200% in small-scale studies, these barriers are not likely to hold back development[33]. Case studies in the United States have shown that allowing a patient to live at home through e-health monitoring versus staying in a nursing home saves up to US$64,000 a year. Implemented on a large scale, this could be the single change that finally arrests the steady and constant overall increase in Australian healthcare spending[34].

Outside of simple e-monitoring and video conferencing, there are many other business opportunities that the NBN implementation will allow in the elderly care sector. In order to live healthily for longer periods, elderly Australians will require many new products and services that are either available only recently or still in development. These will include everything from advanced automation of temperature systems, security devices and appliances, to advanced sensors that monitor blood sugar, blood pressure, heart rate and many other signs of health[35].

For hospitals, nursing homes and other aged care providers, preparing for the NBN implementation should be a top priority in order to take advantage of the opportunities it provides. Primarily this will include upgrading technology and records systems, developing e-health procedures and, most importantly, educating current and future patients and staff on how to take advantage of e-health services. Effective deployment and exploitation of the potential of the NBN implementation in elderly care services provides

[32] "The NBN is vital for economic, social and healthcare development, says health leader", http://blogs.crikey.com.au/croakey/2013/04/26/the-nbn-is-vital-for-economic-social-and-healthcare-development-says-health-leader/

[33] ibid

[34] "The rise and rise of health spending", http://www.businessspectator.com.au/article/2013/4/23/health-and-pharmaceuticals/rise-and-rise-health-spending

[35] "Smart technologies for older people", http://broadband.unimelb.edu.au/resources/Smart-technologies-for-older-people.pdf

perhaps the greatest opportunity of any sector to radically alter current dynamics.

Conclusion

All of the technologies that have been discussed are either already on the market or in late stages of development. Their availability to businesses and the public is being held back by the lack of sufficient high-speed broadband infrastructure in order to utilise their services. Furthermore, most businesses do not have the systems in place to take advantage of these dramatic technological developments. The education necessary to exploit them is highly limited and the knowledge of them is still, for the most part, confined to a small circle of experts.

Implementation of the National Broadband Network will provide the necessary infrastructure throughout Australia. Development of similar plans across the world will only heighten competition to be the first to provide the online tools and services. Businesses that are prepared for this development with the education, training and processes necessary to fully exploit the potential of the NBN will quickly find themselves leaders in their field and surpassing their competition. Businesses that are not ready take the chance of not being able to live up to their customers' expectations and rapidly losing market share.

To a large degree, Australian business leaders admit that they are not prepared for the NBN, and that their view of the changes it will entail are narrow[36]. Without a doubt, this will change quickly as competition and consumer demand force businesses to take seriously the implications of an entire nation connected by the highest speed broadband available today. It is still to be determined which businesses and industries will be the first to react and lead.

[36] "NBN Business Readiness Survey in 2013", http://www.deloitte.com/view/en_AU/au/insights/browse-by-service/technology/05660fd56ab1e310VgnVCM1000003256f70aRCRD.htm