

ADDRESSING THE DISRUPTION OF OUR NEW DIGITAL WORLD

A CSC POINT OF VIEW



CSC



A FUTURE VISION WITHIN OUR GRASP...

OUR WORLD CLASS, HIGH-SPEED BROADBAND NETWORK WILL PAVE THE WAY TO A NEW VISION FOR AUSTRALIA:

ADDRESSING THE DISRUPTION OF OUR NEW DIGITAL WORLD

The National Broadband Network (NBN) signifies an ambitious goal to better position Australia in the new global digital economy. The neglect of our broadband network over the years has created a deep divide between our current broadband performance and prices verses that available globally. Although the \$5.375 billion investment per year over eight year makes the ordinary Australian jump, the intangible value it can deliver to our education and healthcare systems alone makes it just as valuable as the \$4.45 billion per year over six years we have invested in our road and rail infrastructure through the Nation Building Program¹. Over the last decade the global Internet Revolution has created an unprecedented amount of economic growth and disruption that even the hardest nose NBN critic would not disagree with. As stated in Digital Disruptions, a CSC Leading Edge Forum (LEF) report, "these disruptions, on par with the telephone and automobile, transform the marketplace and society so completely that it can take decades for their full effects to be realised."

The NBN provides the foundation for us as a nation to adapt to the new rules contained with the digital age. It will deliver a range of benefits to Australians, some which have already been identified like our visions for health care and education and new opportunities that haven't been considered through our increased confidence and trust in the digital eco-system. It is important to remember that the NBN is not all about technology; a component of the NBN's success will come from the policy that goes with it. One example can be seen around the policy of RF bands and that could be used to support the NBN's challenges with last mile issues, performance issues and costs in remote areas.

OUR FUTURE EDUCATION SYSTEM WILL PROVIDE A TECHNOLOGY ENABLED LEARNING ENVIRONMENT THAT RAISES OUR EDUCATION STANDARDS AND PROVIDES ACCESS TO ALL CITIZENS, IN A SAFE AND AFFORDABLE MANNER.

Enhanced standard of education: The NBN will provide students with the experience of learning from and collaborating with their peers across the country and the globe, a trend which is increasing in almost all industries. Furthermore, by leveraging real time modelling and visualisation techniques the NBN can provide alternative teaching aids. For example, in medicine it was found that the use of interactive virtual reality and 3D teaching applications can better articulate surgical anatomy and principles of surgical techniques in a way that is superior to traditional teaching approaches².

Access to education for all: The widespread reach of the network will allow children in rural communities or children unable to physically attend schools access to the same level education as their counterparts. For example, in a tertiary context, the NBN will enable the real-time transmission of lectures in high definition, allowing students to ask questions directly to the lecturer via text or using their own high definition video conferencing devices at home or in regional university hubs.

Affordable technology environment: By taking advantage of cloud based services, schools will simply manage computer terminals reducing the need for teachers to

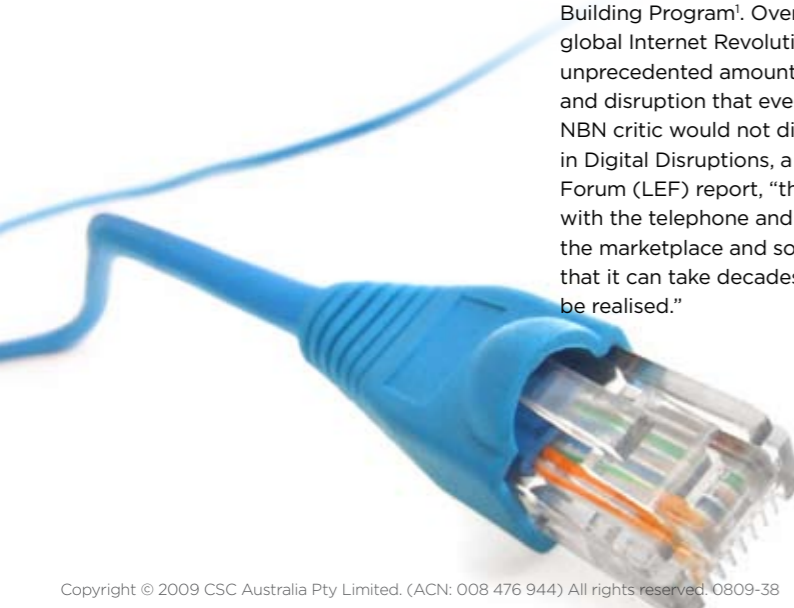
be IT technicians. Infrastructure improvements from the NBN will allow the management of software, operating systems, data storage and networks to all be conducted centrally providing a consistently high quality system at a reduced cost.

OUR FUTURE BUSINESSES WILL HAVE THE OPPORTUNITY FOR IMPROVED COLLABORATION AND THE ABILITY TO RAPIDLY RE-SKILL AND RE-DEPLOY WORKERS THROUGH THE USE OF ADVANCED COLLABORATION TECHNIQUES, IMPROVING OUR ABILITY TO COUNTER GLOBAL CHALLENGES.

Improved global collaboration to compete in a digital economy: The NBN will provide businesses, especially our small and medium sized businesses, the ability to better collaborate with local and overseas partners for a fraction of the cost. For example the Oil and Gas industry is starting to establish tightly integrated online and real-time collaborative partnerships with service contractors, support and supply organisations, as well as expert services³. CSC worked on a pilot project with NASA's Jet Propulsion Laboratory (JPL) to deploy telepresence technology, an immersive life sized meeting experience, which provided 90 percent of the telepresence experience of high-end systems at a fraction of the

cost, promoting more meaningful dialogue and participation. Furthermore an increased confidence in remote working will allow Australia's experienced workers who are close to retirement the opportunity to continue their role and pass on their knowledge from the convenience of their home or a remote operations facility.

Affordable re-deployment of workers: Adequate re-skilling activities and programs often require hands-on and face to face elements which sky rocket costs when large scale re-skilling is required. With the impact of the global financial crisis hitting industries like manufacturing heavily, re-skilling has become a crucial need for many workers. The NBN will elevate re-skilling cost pressures through a greater use of online collaboration technologies such as video conferencing (which can be via traditional webcam or delivered with life size telepresence) and virtual worlds allowing trainers to supervise multiple parties in various regions. The NBN will also enable the ability for re-skilling programs to offer low cost follow-up, refresher or one-on-one training to be delivered further improving success.





A VISION WE DO NOT YET KNOW...

OUR FUTURE HEALTH CARE SYSTEM WILL PROVIDE ACCESS FOR ALL, AN IMPROVED LEVEL OF INTEGRATION BETWEEN MEDICAL SERVICES AND THE ABILITY TO LEVERAGE MEDICAL TECHNOLOGY ADVANCEMENTS.

Health for all: Through the NBN, specialists could be brought into remote areas to conduct, supervise or manage procedures and consultations. Patients who have home treatment and care needs can get frequent checkups by a remote physician guiding on-site nurses or patients directly. Rather than establishing costly infrastructure for single operations or consults, the NBN would enable services for all.

Improved integration of systems and data: Supported by the NBN will be the use of Electronic Medical Records to access past medical treatments and plan on the fly. Rather than piece information together, integrated services encouraged by more accessible and affordable broadband services will improve outcomes. Patients will have the simple ability to access their complete medical history, while medical practitioners will be able to diagnose with a complete history, further encouraging regular checkups. As our data usage increases, analytics could be built into systems that identify disease or illness prior to symptoms becoming visible. Furthermore Government could leverage this data to gain better insight for quantifiable fund allocation.

Adoption of medical technology advancements: The NBN will provide the backbone infrastructure required for Australia to take advantage of technology breakthroughs in the medical field without the need for each facility to invest individually. With the ability to transmit high volumes of data to local or global facilities a number of advancements will be available through pay as you go services models. For

example, hospitals could order the printing of artificial bones⁴, use centralised diagnosis tools such as the Virochip to diagnose patients with respiratory tract infections⁵, or even allow patients to subscribe to a real time remote monitoring solution which is targeted at early detection and prevention. For instance allowing patients to better identify and treat muscle related anomalies⁶.

OUR FUTURE JUSTICE SYSTEM WILL HAVE ENHANCED FACILITIES IN ALL REGIONS AND GREATER INTEGRATION ACROSS JUSTICE SERVICES.

Enhanced facilities: The NBN will support improvements needed within the Australian Judicial system (particularly in remote areas) addressing growing case loads, issues related to distance and the need to reduce stress on victims by exploiting technology. The ability for high-speed data transmission will help alleviate the increasing costs associated with data storage requirements from AV technology allowing funds to be better spent on further facility improvements. In addition, by leveraging trusted cloud services, all justice facilities can have access to the same level of high end systems paid for as required rather than each facility managing their own system.

Integration across services: Moving beyond the standardisation of services, justice facilities can be better equipped to reduce the reliance on paper. This would improve efficiencies when data sharing between agencies occurs, which is particularly important in state-wide or national emergencies.

OUR FUTURE VISION IN OUR HOMES WILL SEE THE OPPORTUNITY FOR ALL TO HAVE ACCESS TO DIGITAL INFORMATION AND CONTENT REGARDLESS OF PERSONAL CIRCUMSTANCES.

Improved life and comfort at home: High-speed broadband directly to homes will allow families the opportunity to enjoy an immersive hi-definition television environment, online 'presence' and instant video connection to family, friends and services such as physician where ever they may be located. Online access will not be restricted to a single device people allowing people to connect through their phone, their television or entertainment device at anytime they want.

Improved service for all: With an internet connection all Australian families will have ubiquitous access to information and computational power without the need to constantly upgrade or purchase expensive, power hungry personal machines. Online services can be used to provide an operating system, storage, processing power on a pay as you need basis.

ONE OF THE MOST IMPORTANT BENEFITS OF THE NBN IS HOW IT WILL PUSH AUSTRALIA AS A NATION INTO A TECHNOLOGY LEADERSHIP QUADRANT RATHER THAN STAYING AS LAGGARDS.

But being a technology leader will not come from infrastructure alone. The NBN will play a key role in helping Australians evolve into digital natives giving us an increased confidence, trust and belief in the digital ecosystem. This will potentially help foster an early adopter's mentality, drive the evolution and improvement of current ideas and open the door to completely different ways of interacting with digital information.

EARLY ADOPTION

Wireless internet access in new places: Once Australians become accustomed to being 'always connected' at high-speeds there will be a sudden emergence of wireless internet access points in places that we didn't expect we needed it. In March 2009 McDonalds Australia completed their roll out of free WiFi to 710 participating restaurants⁷ adding extra value to customers and clear differentiation from other food chains. There is no doubt that this trend will continue as customers further demand the same level of 'comfort' they have at home to accompany the services they purchase or use. In 2008, supported by CSC, Thalys International was the first commercial

passenger rail service provider to offer passengers internet connectivity. Going a step further internet connectivity while in flight is fast becoming a reality. Aircell and OnAir offer Wi-Fi connectivity in the cabin, with service expected to start on some U.S. airlines (e.g., American Airlines, Virgin America)⁸.

EVOLUTION AND IMPROVEMENT

Strengthened border security and police operations: The high-speed transmission of large amounts of video and data enabled by the NBN will encourage the adoption and creation of advanced optimised facial recognition, tracking and analytics technologies. These solutions, for example, could be leveraged by the Australian border control allowing all entry points to be managed. Furthermore, State Police authorities will be able to rapidly deploy similar recognition and surveillance technology for raids, crowd control in events or protests, and investigation activities.

NEW MODELS FOR INTERACTION

Interactive entertainment: ABC iView provides online television content. In April 2009 it averaged 90,000 visits per week, up from the 55,000 per week in September 2008⁹ indicating the value of online on-demand content which will be further strengthened by the NBN. This model however could be extended further. Rather than just interacting with reality television why not allow audiences to interact in real time with scripted content,

placing the audience in control. Taking this further, imagine watching TV, hitting pause to bring a new overlay that allows you to point your control at items on the screen to get more information or to directly purchase them. You click on an actors or actresses outfit which brings up more information about the retailer, you click to add to shopping cart and at the end of the show you confirm your purchases in a simple easy to use 'shopping cart' type tool.

THE OPPORTUNITIES CREATED CHANGE ALONG THE WAY...

ACHIEVING OUR FUTURE VISION WITH THE NBN WILL NOT COME EASY. OUTSIDE OF THE PHYSICAL INFRASTRUCTURE COSTS AND EFFORT IS THE NEED TO RETHINK AND CHALLENGE EXISTING MENTAL MODELS FOR COMMUNICATION, PRICING, TRUST AND SECURITY TO NAME A FEW.

To maximise the penetration of the NBN, given the impending release of Radio Frequency Spectrum that Australia will be able to re-use, old policy will need to be altered and new policies created. The NBN may be promoted as the trigger for change to encourage this assessment with the first test of it being our switchover from analogue to digital television, and the return of a large portion of the 700MHz Band, often labelled as the 'Digital Dividend'.

This freed spectrum can be considered as over-the-air real estate that is typically sold as licences for high prices and in large blocks, often purchased by large operators. For example in 2008 the U.S sold 1,099 licences raising \$19.6 billion with 80% of the sales coming from telecommunication giants Verizon Wireless and AT&T Inc¹⁰. Some of

the purchased blocks can be further divided and on-sold to smaller service companies or consumers, however there are cases where blocks are not used, rather held, either for a strategic future technology or business case, or simply to reduce the chance a competitor can purchase and use the spectrum, thus potentially holding up the advancement of new technologies and applications.

With the ongoing freeing up of analogue television within the 700MHz range and the known expiration of various other spectrum band licences in 2013-2017¹¹, the Government has recognised the importance of this area by announcing initiatives to gather public interest criteria that might form the basis for decision making, and publishing papers and requests for comment on the devolving of spectrum to market and license trading.

Although the move is positive, comprehensive policy around the management of the entire spectrum, and indeed the restacking if it occurs, will take time, and the outcome while ultimately positive, will not please all respondents.

However, it is acknowledged there is a need to address the potential use of the Digital Dividend which appears to be following the traditional path of price based allocation. In the end the Government is responsible for the planning decisions that involve reviewing the boundaries of the Broadcasting Services Band (BSB) and the creation of policy.

It is therefore important that the potential benefits are not understated due to the additional capacity which may be afforded to the NBN by the restacking of this Band and the use of the released spectrum for Wireless Access Services (WAS). With a review of the

boundaries and replanning to support the use of the 700MHz band as a WAS Band it may be possible for the NBN organisation to obtain full or partial (51%) "ownership" of a piece of the 700MHz band to be offered as an Australian service to benefit both consumers and the economy. While this may be viewed as "anticommons" behaviour, it should not be viewed as strategic or as behaviour directed to underutilise or stymie competition or development.

The primary use of this segment would be to maximise social welfare by providing services using an internationally recognised frequency space to remote and less privileged elements of the Australian population. By using a known and internationally recognised segment in economies larger than Australia, we have the benefits of a vast global market, product development and availability, and significant economies of scale.

As a "service" the price for connectivity could be greatly reduced, particularly for those in remote and less privileged areas considered to be the 'last mile' of transmission; Australians who may be classified as the 10% unable to receive the 100Megabit per second fibre directly to their homes and businesses. While the re-banding and the actual use of existing licensed spectrum may afford an opportunity to provide services, the 700MHz range in particular would provide the chance to improve performance and coverage using technologies like WiMAX and the LTE 4th gen mobile broadband. In

addition, a service based model may have a significant benefit for industries operating remotely such as mining.

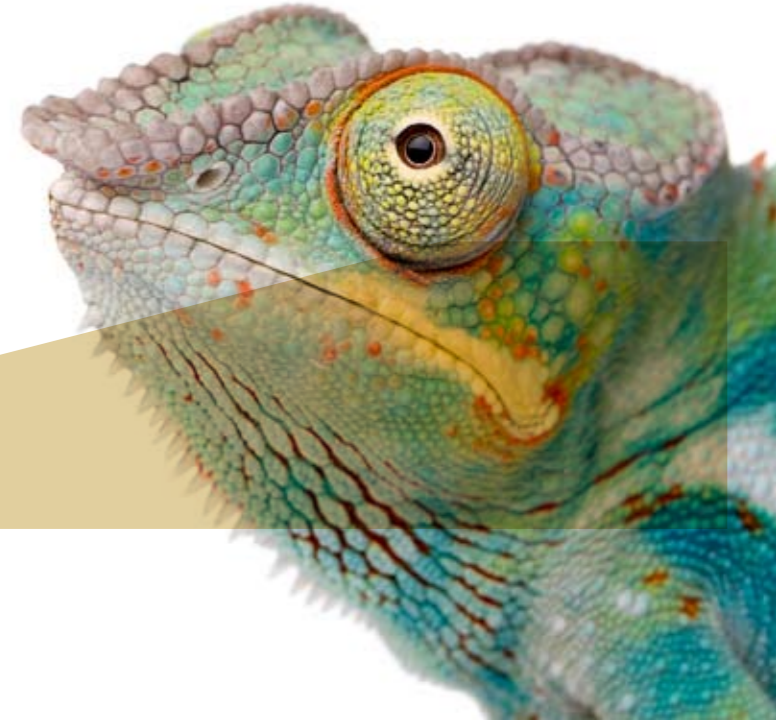
Rather than a remote organisation bidding and paying for a licensed radio frequency band from the Australian Communications and Media Authority (ACMA) in an inflated Price Based Allocation Auction, for these licensed WAS bands covering a geographical area 100 times the size of their operation, they would be able to lease a service within that licensed range from the NBN organisation for the term the license is required for use in their geographical area of operations.

Rather than selling an entire band to one organisation, in a very large geographical area (the 2.3GHz Rural and Remote Australia Residual Band was initially split into very large geographical regions) or for one application, the service could be leased as required, enabling licensed space for consumers which would reduce interference (something witnessed in the existing 2.4GHz ISM space), and potentially enhance site based governance of RF use.

This would allow a band being leased in one area to be used somewhere else for a completely different application, for example to be used to provide last mile wireless services in a rural school, or enhanced border security, with passport solutions over PDA devices deployed to areas like the Torres Strait Islands.

Providing the licensing of radiofrequency bands as a service will create repeat revenue for the NBN and Australia. This may remove some of the one time revenue generated from the sale of spectrum, which may not be the most readily accepted proposition given budgetary pressures from Government being imposed upon all departments, and the potential one time revenue available from this resource. However, anecdotal evidence shows the value of a piece of spectrum is generally not realised at the sale, rather a number of years later when the deployed infrastructure and market are providing a significant ROI, and encouraging organisations to reinvest profits, develop and enhance services and branch out into new geographical areas). The use of and availability of the 700MHz band for WAS presents an opportunity to further align frequency allocation to global standards.

Using WiMAX or LTE technology as an example, if our approved range was aligned to the spectrum ranges in the US or Europe, we would have the benefit of potentially capitalising on the grand economies of scale introduced by the US market. Rather than a large operator purchasing the spectrum for a strategic purpose, the use of this range and the encouragement of productive use of this spectrum may further contribute to economic growth, with a geographically diverse market providing ongoing lease return for the use of solutions which may be active, in a mining environment for instance, for 10 to 30 years.





The standardisation and global alignment of our bands has significant implications due to the pervasive connectivity of all devices. This may be best seen in the 2.4GHz ISM Band. WiFi devices are deployed in almost every continent and country; from Antarctica to the jungles of Liberia, WiFi devices are providing wireless connectivity for end users and applications. Devices produced for this market, due to the international alignment of the ISM band, are very cheap; in Australia a wireless router used to connect to the Internet, can often be cheaper than the first months internet access charges.

While this ISM, Class Licensed, Band does come with limiting factors such as overuse and interference, being internationally recognised it does afford the end user, an owner of a laptop with an inbuilt WiFi card for instance, the ability to surf the Internet in Starbucks in Melbourne, Shanghai, Manila, or London, with no hardware or software changes ever required. The laptop analogy could be further extended to an example in the automotive industry. Imagine if car manufacturers decided to globally standardise on a technology that uses a

particular frequency for high-speed in-car communication devices. If Australia was not aligned or had sold that particular band there would be a missed opportunity in both leveraging any new global technology that gets released and in selling our own solutions back to the global market.

Although the idea may seem futuristic, due to a need for differentiation Gartner believes that by 2012 majority of car makers will focus on products that enable wireless data connectivity¹². The next generation car system may utilise wireless technologies to provide enhanced communication capabilities, augmented reality displays for information, provide warning on hazardous roads or have smart emergency services, creating a range of business opportunities.

For instance the insurance industry has identified opportunities to leverage current in-car monitoring technologies by tracking driving habits and rewarding low risk customers, in particular the U.S insurance market honed in around in-car monitoring to help parents with teen drivers.

TIME FOR CHANGE

With the roll out of the NBN, Australia will be embarking on a journey into a digital economy. The high-speed transmission of information, knowledge and business services will enable a new wave of opportunities for both the public and Australian businesses. Furthermore as we gain a greater trust in online transactions and develop an expectation to receive high speeds, we will open the door to a new generation of ideas and improvements that we have not yet envisaged. The foundations provided by the NBN will not change the need to rethink and challenge existing mental models, an activity that we as a nation should always engage in. From our extensive research, current and future digital disruptions will “raise questions, alter behaviours, trigger new business models, and ultimately become part of the foundation of a new economy”. As demonstrated, the NBN will play a role in all facets of our lives; it signifies our goal to better position Australia.

To find out more about how CSC can help your organisation, please visit www.csc.com.au

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Worldwide CSC Headquarters

Australia

26 Talavera Road
Macquarie Park, NSW 2113
Australia
+61 (02) 9034 3000

The Americas

3170 Fairview Park Drive
Falls Church, Virginia 22042
United States
+0 703 876 1000

Asia

139 Cecil Street
#06-00 Cecil House
Singapore 069539
Republic of Singapore
+65 6221 9095

Europe, Middle East, Africa

Royal Pavilion
Wellesley Road
Aldershot, Hampshire GU11 1PZ
United Kingdom
+44 (0) 1252 534000