Australian Government

Department of Broadband,
Communications and the Digital Economy

#au20

National Digital Economy Strategy

Leveraging the National Broadband Network to drive Australia's Digital Productivity

NBN
Empowering Australia

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MINISTER'S FOREWORD

The Australian Government is investing in the establishment of the National Broadband Network (NBN). The NBN will provide reliable, ubiquitous, high-speed broadband to all Australian premises. Now, as the first homes, schools and businesses are being connected to the NBN, it is appropriate to take a step back and contemplate where this infrastructure investment will take us.

The National Digital Economy Strategy outlines the government's vision for Australia's digital economy.

The government is committed to ensuring that by 2020, as the physical build of the NBN will be nearing completion, Australia is one of the world's leading digital economies. The NBN will provide the vital enabling infrastructure to achieve this vision.

To assist us in scoping the task that lies before us and to measure our progress towards achieving this vision, this strategy outlines eight Digital Economy Goals. It explains why they are important, where we are now and what initial steps the government will take to get us there. The goals focus on key areas such as online participation by Australian households, businesses and not-for-profit organisations; health; education; teleworking; regional Australia; government services and smart technology.

The task of ensuring that all sectors of Australian society and industry participate fully in the digital economy and enjoy its benefits, is one that requires collaborative effort between government, industry and the community. Consequently, in this strategy, the government invites industry, state and territory governments and local councils to join with it to contribute to this vision. I am particularly pleased to highlight some existing industry initiatives that have been undertaken to promote greater digital engagement around the country.

This strategy is the outcome of your suggestions, ideas and participation at the Realising Our Broadband Future forum—www.broadbandfuture.gov.au—held in Sydney on 9–10 December 2009.

I look forward to continuing to collaborate across government, industry and the community to achieve the vision of Australia as a global leading digital economy by 2020.

Finally, I invite you to visit www.nbn.gov.au and join the conversation about how we can all work together to achieve this vision for Australia.

Stephen Conroy

Senator Stephen Conroy
Minister for Broadband, Communications and the Digital Economy
Minister Assisting the Prime Minister on Digital Productivity

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EXECUTIVE SUMMARY

The Australian Government's aim is that by 2020, Australia will be among the world's leading digital economies.

EXECUTIVE SUMMARY

The Australian Government's aim is that, by 2020, Australia will be among the world's leading digital economies.

Ensuring that Australia becomes a leading digital economy will contribute to Australia's productivity, maintain our global competitiveness and improve our social wellbeing. The government's commitment to build the enabling infrastructure for the digital economy, the National Broadband Network (NBN), is a key step towards this vision.

To measure our progress in realising this vision, the government has set eight 'Digital Economy Goals' that focus on the areas of:

> online participation by Australian households

> online engagement by Australian businesses and not-for-profit organisations

> smart management of our environment and infrastructure

> improved health and aged care

> expanded online education

> increased teleworking

> improved online government service delivery and engagement

> greater digital engagement in regional Australia.

The comprehensive transition of Australia's economy and society to a digital economy is appropriately a market-led phenomenon. Maximising the benefit of the digital economy requires action by all levels of governments, industry and the community as a whole. The government invites industry, state and territory governments and local councils to join with it to contribute to the vision of Australia becoming a leading digital economy by 2020.

Online participation by Australian households

Digital Economy Goal: by 2020, Australia will rank in the top five Organisation for Economic Cooperation and Development (OECD) countries in the portion of households that connect to broadband at home.

Increasing the number of Australian households that connect to broadband at home will deliver positive benefits for Australian families and communities in the form of improved access to business and job opportunities, health, education and government services.

Allen Consulting estimates that if the number of Australian households connected to the internet increased by 10 percentage points, this would provide gains to households of $2.4 billion a year in current prices in terms of the change in the value of consumption that they are expected to obtain. These gains are achieved through timesaving activities such as telecommuting, remote work and study opportunities, information gathering, price/product discovery and access to health services.[1]

Targeted action is required to minimise the extent to which digital exclusion overlaps with, and exacerbates, social exclusion, and to maximise the extent to which the benefits outlined above are enjoyed by all Australian families and communities.

To help increase the portion of Australian households that are online, the government will provide $23.8 million over three years for a Digital Communities initiative, a focus of which will be to establish a 'Digital Hub' in each of the 40 communities that will first benefit from the NBN. These hubs will assist local residents to better understand how they can benefit from the NBN and to improve their digital literacy skills. In the 2011–12 Budget, the government also provided a further $10.4 million over four years from July 2011 to continue the Broadband for Seniors program.

Online engagement by Australian businesses and not-for-profit organisations

Digital Economy Goal: by 2020, Australia will rank in the top five OECD countries in the portion of businesses and not-for-profit organisations using online opportunities to drive productivity improvements, expand their customer base and enable jobs growth.

The increasing availability of ubiquitous high-speed broadband connections and the establishment of an effective online presence will support Australian businesses, particularly small businesses, and not-for-profit organisations, to participate in a global marketplace. Greater use of online opportunities will enable Australian businesses to conduct their existing business processes more efficiently to maximise their overall competitiveness, grow revenues and increase productivity. For not-for-profit and community service organisations, engaging online can expand their supporter pool to include potentially the entire world and support more innovative fundraising models.

Presently, Australian businesses and not-for-profit organisations are not as digitally engaged as our international competitors. Australian Bureau of Statistics (ABS) data indicates that, as at June 2009, 41.5 per cent of Australian businesses had a web presence[2] and 27.1 per cent of Australian businesses took orders via the internet.[3] In 2008–09, internet income as a proportion of total income from sales of goods and services for all Australian businesses that received orders via the internet or web was only 5.2 per cent.[4]

A recent report also indicates that Australia's community service organisations may not be fully utilising broadband and digital technologies. A majority of surveyed organisations were found to lack digital proficiency and have no technology plan in place.[5]

The government will provide $12.4 million over three years to a Digital Enterprise initiative to assist small-to-medium enterprises and not-for-profit organisations (including local cultural organisations) in the 40 communities that will first benefit from the NBN. This program will assist local businesses and not-for-profit organisations to better understand how to take advantage of the NBN to improve the efficiency and reach of their operations. Recognising the importance of a vibrant retail sector for Australia's future digital economy, the government has hosted an Online Retail Forum and also asked the Productivity Commission to conduct an inquiry into the economic structure and performance of the Australian retail industry.

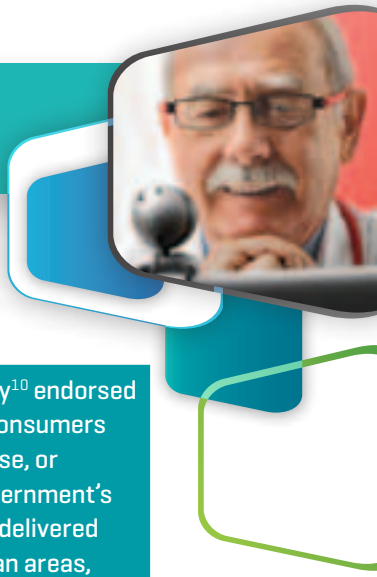
Smart management of our environment and infrastructure

Digital Economy Goal: by 2020, the majority of Australian households, businesses and other organisations will have access to smart technology to better manage their energy use.

An NBN-empowered digital economy can improve Australia's environmental sustainability by supporting applications that encourage more efficient use of water, energy, transport and infrastructure.

Australia's population has grown over the past 40 years at an average annual rate of 1.4 per cent a year, taking Australia's total population to about 22.4 million in 2010.[6] Australia also has a distinctive population distribution, being one of the most mobile and spatially concentrated of any country. It is highly urbanised, with 87 per cent living in urban areas, including 64 per cent in capital cities.[7] Current projections suggest Australia's population will continue to grow over time, but at slower rates than in the past.[8] This creates various policy challenges for governments at all levels. Together with a changing climate, this is altering the natural environment and having a significant impact upon the way we live. Smart use of technology in an NBN-empowered digital economy can be an important tool to assist in the managing of these challenges.

To date, there have been a number of initiatives by the Australian, state and territory governments to demonstrate the ability of smarter use of technology to better manage our natural and built environment. Chief among these is the Smart Grid, Smart City initiative.[9] The government has also committed to fund smart infrastructure technologies to reduce congestion and improve traffic demand management and the overall efficiency of the transport network in major cities.



Improved health and aged care

Digital Economy Goal: by 2020, as identified in the National E-Health Strategy[10] endorsed by the federal, state and territory governments, 90 per cent of high priority consumers such as older Australians, mothers and babies and those with a chronic disease, or their carers, can access individual electronic health records. Through the government's investments in telehealth, by July 2015, 495 000 telehealth consultations will have been delivered providing remote access to specialists for patients in rural, remote and outer metropolitan areas, and by 2020, 25 per cent of all specialists will be participating in delivering telehealth consultations to remote patients.

Increasing pressures on Australia's health system from an ageing population, increased rates of chronic disease, and health workforce shortages mean it is critical to consider opportunities to deliver high-quality services more effectively and efficiently.

The NBN will provide a platform that allows homes, doctors' surgeries, pharmacies, clinics, aged-care facilities and allied health professionals to connect to affordable, reliable, high-speed and high-capacity broadband. This represents a major opportunity to improve the way healthcare is delivered in Australia.

A recent report[11] analysed the potential impacts of telehealth under the NBN and identified a range of benefits from telehealth to healthcare services, medical effectiveness, decreased travel and increased employment. Based on previous studies in the US and Australia, the report estimated that the ongoing benefits to Australia from wide-scale implementation of telehealth may be between $2 billion and $4 billion a year.

To encourage a wider adoption of telehealth in Australia, from 1 July 2011, the government is undertaking a Medicare Benefits Schedule Expansion that will enable a wider range of telehealth-based medical consultations to attract a Medical Benefits Schedule rebate. In addition, the government will initiate a number of telehealth trials to better understand and address outstanding barriers to wider adoption of telehealth.

Expanded online education

Digital Economy Goal: by 2020, Australian schools, TAFEs, universities and higher education institutions will have the connectivity to develop and collaborate on innovative and flexible educational services and resources to extend online learning resources to the home and workplace; and the facilities to offer students and learners, who cannot access courses via traditional means, the opportunity for online virtual learning.

Australia requires people with high-quality skills to maintain its long-term economic and social prosperity. The Council of Australian Governments (COAG) has set qualifications targets to reduce gaps in skill levels and substantially deepen Australia's skills base.[12] Skills Australia has also outlined the need to increase tertiary sector enrolments (which include vocational education and training (VET)) by at least 3 per cent a year over the next 15 years.[13]

The availability of ubiquitous, high-speed broadband has the potential to significantly extend the reach, availability and quality of education services, particularly in regional areas, to help meet these needs. This can be achieved by supplementing teaching and training with access to subject matter

experts and teachers outside of the local area. In addition, the greater data capacity of the NBN (both download and upload) can enable more intensive and immersive online interactions, resulting in higher-quality learning outcomes for students. This can either occur through greater use of the increasing array of educational materials now being posted online through initiatives such as YouTube University, iTunes U and the OpenCourseWare initiative, access to videoconferencing with other classrooms or cultural and educational institutions in Australia or overseas, or through the increased use of bandwidth intensive applications such as high-definition video for interactive instruction and learning.

The government is already investing more than $2.4 billion in the Digital Education Revolution (DER), providing access to a computer to all secondary school students in Years 9 to 12, as well as supporting teachers and parents to use information communication technologies to support students. The government will implement an NBN-enabled tele-education trial to expand delivery of online education material and classes using high-speed broadband in the further education sector. It will also establish an NBN-enabled Education and Skills program, a four-year initiative investing $27.2 million to source, develop and implement innovative online and interactive education and skills services.

Increased teleworking

Digital Economy Goal: by 2020, Australia will have at least doubled its level of teleworking so that at least 12 per cent of Australian employees report having a teleworking arrangement with their employer.

The digital economy allows us to log in and connect anytime, anywhere, including to the office. By delivering reliable, high-speed broadband to all Australian premises, the NBN will give more employees and employers the confidence to engage in teleworking. A recent survey of Australian businesses revealed that 20 per cent believed the NBN would change their employment model by facilitating increased flexibility in the location of staff and expanding the supply of skilled labour.[14]

Teleworking is broadly defined to include work undertaken at home, use of mobile devices in transit or at a different place of business (telecentres).

It is also estimated that the value of a 10 per cent increase in Australian employees that telework 50 per cent of the time is between $1.4 billion and $1.9 billion a year.[15] By reducing the need for people to commute to the office at the same time each day, teleworking can also reduce transport congestion, leading to reduced impact on our natural and built environment. It is estimated that a 10 per cent increase in Australian employees that telework 50 per cent of the time would save an estimated 120 million litres of fuel, avoiding 320 000 tonnes of carbon dioxide (equivalent to $6 million worth of emissions) and would reduce traffic at peak periods by five per cent, resulting in a reduction of $470 million in congestion costs, which would have a flow-on benefit of reducing strain on infrastructure.[16]

Australia presently lags internationally in levels of teleworking. To help develop a consensus around how best to take advantage of the NBN to boost teleworking in Australia, the government will hold a Telework Forum of key experts, industry leaders and government agencies.

Improved online government service delivery and engagement

Digital Economy Goal: by 2020, four out of five Australians will choose to engage with the government through the internet or other type of online service.

Effective participation in the digital economy by government can reduce costs, increase customer satisfaction and promote innovation. Encouraging people to access government services online, and making it easier for them to do so, increases people's digital confidence and digital literacy. This makes it easier for government to facilitate online engagement and collaboration with citizens to improve service delivery or provide input into policy and regulatory matters.

A recent report by PricewaterhouseCoopers for the UK Government found that face-to-face transactions cost £10.53 (about $A16), the cost of a telephone engagement was £3.39 (about $A5.15) and engagement with the government by mail cost £12.10 (about $A18.40) compared with the cost of an online transaction cost at just £0.08 (about 12 cents Australian).[17]

There has been some significant progress in Australia to expand delivery of government services and programs online. Recently, the government released a draft paper, *Strategic Vision for ICT,* to outline a long-term plan for the government's use of information and communication technology (ICT) to support increased public sector productivity.[18] However, it continues to be the case that to complete many transactions with government, even where they are commenced online, the client is still required to visit a government office. For example, currently about 62 per cent (69.5 million) of Centrelink transactions are made onsite, which involves people travelling to a Centrelink office. This is inconvenient and costly for many clients, noting that four out of five clients of government services have indicated a preference for not having to visit a government office to access a government service. It also means that government agencies must maintain much larger client waiting areas and transaction counters.

As part of a 'Tell Us Once' initiative, the government is undertaking investigation and testing of some preliminary developments to improve people's ease of use and access to government services. In addition, the Department of Human Services has committed to significantly expand the range of services it makes available online. Finally, to promote online engagement with government and provide opportunities for greater public participation in the development of policy and service delivery, the government has released an online catalogue of government data at data.gov.au

Greater digital engagement in regional Australia

Digital Economy Goal: by 2020, the gap between households and businesses in capital cities and those in regional areas will have narrowed significantly.

In the digital economy, distance—once a defining characteristic and barrier for regional Australia—becomes increasingly irrelevant. The NBN will enable all Australian communities to have greater access to goods, services, education and employment opportunities. Economic modelling shows that regional areas stand to benefit more than metropolitan areas from increased internet connectivity. On average, a 10 per cent increase in connectivity would raise regional output by 0.53 per cent compared with a 0.38 per cent increase in metropolitan areas.[19]

A key government objective for the NBN is that a person's ability to receive affordable high-speed broadband services should not be affected by where they live or work. The NBN will ensure that every community in regional Australia gets fair access to affordable high-speed broadband. This includes the delivery of a uniform national wholesale price.

There is still more work to be done to ensure that the benefits of the digital economy are enjoyed equally by those Australians living in metropolitan and regional areas. Current data indicates that the number of Australians who have never used the internet is higher among those people living in regional and remote areas. For example, 34 per cent of people from outer regional and remote areas aged 15 and over did not use the internet in 2008–09, compared with only 23 per cent of people in Australia's major cities.[20] Data indicates that 29.7 per cent of businesses located outside of capital cities had a web presence, compared with 39.5 per cent of business located in capital cities.[21]

Elements of the Digital Communities and Digital Enterprise initiatives will help address these gaps. Similarly, the telehealth trials and NBN-enabled tele-education trials will occur in regional areas and allow expertise to be developed locally. In addition, the NBN Regional Legal Assistance Services initiative will promote delivery of legal assistance services and attract and retain staff in selected regional areas.

The way forward

The NBN, and the devices and applications it can support, will deliver benefits and inspire innovation that we cannot yet imagine. Consequently, it will be an ongoing process to bring about this transformation and realise the benefits of an NBN-empowered digital economy.

The government welcomes the contribution that industry is making to promote greater digital engagement. The Getting Australian Business Online nationwide campaign by Google and MYOB and the recent Australian Retailer Association's Engage in E-tail seminar series are two examples of these.

The government invites industry, state and territory governments and local councils to join with it to contribute to the vision of Australia becoming a leading global digital economy by 2020.

For its part, the government has made the decision that direct investment in the NBN is required to provide the world-class infrastructure necessary to support Australia's digital economy. The government has, as part of this strategy, committed to further measures to grow Australia's digital economy and advance the proposed digital economy goals. The government will closely monitor the implementation of these initiatives and the progress against the goals outlined in this strategy. Further measures may be identified and implemented over the duration of the strategy.

The NBN: key enabling infrastructure

There are several specific characteristics of the NBN that will support Australia in realising its vision to be a leading digital economy by 2020. The headline download speed of up to one gigabit a second is just one such characteristic. Other characteristics include:

- the support for high-speed download and upload services
- the stability/reliability of service and capacity for future upgrades
- ubiquitous coverage
- uniform national wholesale pricing.

These characteristics respond to current and likely future trends in online engagement. An increasing number of Australians are getting online and using faster speeds to do so. At the end of December 2010, there were 10.4 million active internet subscribers in Australia.[22] Once Australians are online, their data consumption increases. In December 2010, Australians downloaded 191 839 terabytes of information.[23] This is a significant increase compared with the 99 249 terabytes downloaded in the 2009 June quarter—close to twice as much.[24]

Based on existing trends, in the future the online experience will become richer and more data intensive and increasingly integrated into everyday life, at home and at work.

A historical look at the speed of impact of new media suggests that the online experience will rapidly evolve, becoming more rewarding more quickly with each successive iteration. Radio broadcasters took 38 years to reach an audience of 50 million. Television took 13 years. The internet took just four.[25]

'While it may once have made sense to ask about the size of the "electricity economy", that question is now moot. Electricity is fully woven into the fabric of the developed economies.'

Australia will have successfully made the transition to a leading digital economy when the efficient use of digital technologies has become so interwoven with citizens' business, professional and personal lives, that they move seamlessly between the digital and physical world as appropriate. A recent report by the Boston Consulting Group on the impact of the internet on the UK economy noted:

> 'While it may once have made sense to ask about the size of the "electricity economy", that question is now moot. Electricity is fully woven into the fabric of the developed economies.'[26]

THE VISION AND THE STRATEGY

The government's aim is, by 2020, Australia will be among the world's leading digital economies based on key indicators such as broadband penetration and usage rankings.

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The government's aim is that, by 2020, Australia will be among the world's leading digital economies based on key indicators such as broadband penetration and usage rankings.

The digital economy is essential to Australia's productivity, global competitiveness and improved social wellbeing. In the *Australia's Digital Economy: Future Directions* paper,[27] the government said that the digital economy refers to:

> 'the global network of economic and social activities that are enabled by information and communications technologies, such as the internet, mobile and sensor networks'.

Greater digital engagement can boost productivity. It can bridge distances and improve service delivery for regional and rural Australians. It can improve educational and health outcomes, allow for better management of the country's growing and ageing population, promote social inclusion and facilitate more environmentally sustainable better management of the built and natural environment. To ensure that these benefits are properly realised, it is important to ensure that Australian households and businesses understand how to engage safely and securely online.

The government's commitment to build the enabling infrastructure for the digital economy, in particular the commitment to build the NBN, will allow Australia to participate in and enjoy the benefits of the global digital economy. The NBN will offer ubiquitous coverage, which will allow all Australian households and businesses to participate in the digital economy regardless of where they live. It will support high-speed symmetrical services giving more people access to new tools to manage their business or receive education services. It will also offer greater stability and reliability of broadband services to support a growing number of critical applications, such as health services.

The digital economy is

'the global network of economic and social activities that are enabled by information and communications technologies, such as the internet, mobile and sensor networks.'

Australia presently lags behind the world's leading digital economies. The OECD reports that, as of June 2010, Australia was ranked 18th amongst member states for broadband penetration.[28] The World Economic Forum ranked Australia 17th in its 2010–2011 Network Readiness Index, behind such competitor economies as the US, UK, Singapore, Hong Kong, Korea, and Taiwan.[29] The Network Readiness Index measures how economies leverage information and communications technology advances for increased growth and development.

By investing in the NBN, the government is putting in place the essential underlying infrastructure, which will form the platform for Australia's future engagement in the digital economy (see the chapter 'NBN: key enabling characteristics' on page 49 for further details). Effective utilisation of the NBN by governments, industry and the community will be needed to transition Australia into a leading digital economy.

Australia will have successfully made this transition when the efficient use of digital technologies has become so interwoven with citizens' business, professional and personal lives, that they move seamlessly between the digital and physical world as appropriate. A recent report by the Boston Consulting Group on the impact of the internet on the UK economy noted:

> 'While it may once have made sense to ask about the size of the "electricity economy", that question is now moot. Electricity is fully woven into the fabric of the developed economies.'[30]

Digital economy goals

To measure our progress in realising this vision by 2020, the government has set the following goals:

	Australia ranks in the top five OECD countries in the portion of households that connect to broadband at home.
	Australia ranks in the top five OECD countries in relation to the portion of businesses, and not for profit organisations, using online opportunities to drive productivity improvements, expand their customer base and enable jobs growth.
	The majority of Australian households, businesses and other organisations will have access to smart technology to better manage their energy use.
	As identified in the National E-Health Strategy endorsed by the federal, state and territory governments, 90 per cent of high priority consumers such as older Australians, mothers and babies and those with a chronic disease, or their carers, can access individual electronic health records. Through the government's investments in telehealth, by July 2015, 495 000 telehealth consultations will have been delivered providing remote access to specialists for patients in rural, remote and outer metropolitan areas, and by 2020, 25 per cent of all specialists will be participating in delivering telehealth consultations to remote patients.
	Australian schools, TAFEs, universities and higher education institutions will have the connectivity to develop and collaborate on innovative and flexible educational services and resources to extend online learning resources to the home and workplace; and the facilities to offer students and learners, who cannot access courses via traditional means, the opportunity for online virtual learning.
	Australia will have at least doubled its level of teleworking so that at least 12 per cent of Australian employees report having a teleworking arrangement with their employer.
	Four out of five Australians will choose to engage with the government through the internet or other type of online service.
	The gap between households and businesses in capital cities and those in regional areas will have narrowed significantly.

Way forward

As outlined in the *Australia's Digital Economy: Future Directions* report (July 2009),[31] maximising the benefit of the digital economy requires action by governments, industry and the community as a whole. The government's role is to fill a gap left by the market, to address social inequity, to protect the community, to assist markets to work fairly and efficiently and to address market failures.

Where a role for government action is identified, there are various forms that this action can take. Policy levers can include: regulatory changes; direct investment; the funding of trial projects to demonstrate a business case and evidence base to inform future activity by government or industry; education and information awareness campaigns; or, in relation to government services, trials to test parameters and identify areas for improvement and change.

The government recognises the importance of also working with state and territory governments and local councils to coordinate strategies to drive digital economy growth throughout the country. The approach that the government is taking draws on input from ongoing discussions over the past 18 months with state and territory governments and local councils.

The government has made the decision that direct investment in the NBN is required to provide the world-class infrastructure necessary to support Australia's digital economy. The following initiatives represent initial measures the government is taking to enable effective use of the NBN. The government will closely monitor the implementation of these and progress against the goals outlined in this strategy. Further measures may be identified and implemented over the duration of the strategy.

Government initiatives

To advance the Digital Economy Goals, the government will implement the following initiatives:

Digital Communities. To help more Australian households get online and to narrow the gap between Australian households and businesses in capital cities compared with those in regional, rural and remote Australia, the Digital Communities initiative will provide $23.8 million over three years. A focus of the initiative will be to establish a 'Digital Hub' in each of the 40 communities which will first benefit from the NBN. Through these Digital Hubs, local residents will be able to experience the NBN and receive training to develop the digital skills necessary to participate safely and securely and have trust and confidence in the digital economy.

Broadband for Seniors. To ensure that older Australians, a community group that is disproportionately digitally disengaged, have the skills and confidence necessary to participate in an NBN-empowered digital economy, the government will continue its Broadband for Seniors program, and has provided $10.4 million over four years from July 2011.

Digital Enterprise. To enable more Australian businesses and not-for-profit organisations, particularly those located in non-metropolitan areas, to leverage the benefits of broadband-empowered online engagement, a Digital Enterprise initiative will provide $12.4 million over three years to provide advice and support services to small and medium enterprises and not-for-profit organisations, including local cultural institutions, in communities which will first benefit from the NBN. This initiative will assist these organisations to achieve cost savings, productivity enhancements and improved marketing through greater online engagement.

Online Retail. To ensure that Australia's retail industry is well placed to maximise the benefits of the digital economy, the government hosted an Online Retail Forum to highlight the importance of a vibrant Australian online retail sector, promote industry dialogue and facilitate networking. The government has also asked the Productivity Commission to conduct an inquiry into the economic structure and performance of the Australian retail industry and consider the drivers of structural change in the retail industry, including globalisation and increasing household and business access to the digital economy.

Smart Grid, Smart City. To investigate the synergies of the NBN and other utilities, in 2009 the government provided $100 million to the implementation of the Smart Grid, Smart City project, a collaborative initiative together with the energy sector that will roll out Australia's first commercial scale smart grid. In addition, to lessen congestion on roads and reduce carbon emissions, the government will collaborate with industry to promote the greater adoption of teleworking.

Sustainable Australia-managed motorways. To reduce congestion and improve traffic demand management and the overall efficiency of the transport network in major cities, the government has committed to fund smart infrastructure technologies. As part of the Sustainable Australia-managed motorways initiative, the government has provided $61.4 million over three years to fund smart infrastructure technologies to reduce congestion and improve traffic demand management and the overall efficiency of the transport network in major cities.

Telehealth Trials. To support Australia's health system to effectively integrate digital technologies and broadband-delivered services to drive efficiency, improve patient outcomes and temper the rate of growth in hospital and other admissions, the government will conduct two Telehealth Trials. One trial will occur in Armidale and Kiama and focus on the delivery of high-quality NBN-enabled telehealth services to older Australians living at home with serious medical conditions. The other trial will be conducted in Townsville and will deliver high-quality monitoring and video-conferencing services to people suffering type 2 diabetes.

Medicare Benefits Schedule. To ensure that Australia's health system supports greater adoption of telehealth, the government is expanding the Medicare Benefits Schedule to include items for telehealth services, starting from 1 July 2011.

NBN-enabled Education and Skills Services. To promote innovative educational uses of the NBN, the government will establish an NBN-enabled Education and Skills Services program over four years that will fund, source, develop and implement projects to trial improved online and interactive education and skills using the NBN.

NBN-enabled tele-education project. To help Australia's education system secure the benefits from a high-speed broadband classroom environment and at-home learning, the government will provide funding for an NBN-enabled tele-education project utilising state-of-the-art virtual interactive training rooms, laboratories and community learning capability through a partnership between the NSW TAFE New England Institute and University of New England. This project will demonstrate the potential for the development and delivery of new models of further education services and resources to students and learners Australia-wide.

Telework Forum. To encourage greater adoption of teleworking across all sectors of the economy using the NBN, the government will host a Telework Forum that will bring together senior executives from industry and the Australian Public Service to explore the business case for increased teleworking and successful examples from industry.

Tell Us Once. To contribute to government services being more customer-centric, efficient and cost-effective, the government will provide $2.3 million in 2011–12 to investigate and test some preliminary developments to improve people's ease of use and access to government services under a Tell Us Once initiative (the Improved Access to Australian Government Service initiative). This funding will be used for a scoping study, technical pilot and business case. Improvements to be explored include allowing individuals to communicate updated details to multiple agencies simultaneously; pre-fill forms using information previously submitted to a government agency; and view all government communications in one place.

Service Delivery Reform. To ensure government service delivery is modern and flexible, the government has committed to Service Delivery Reform initiatives within the Human Services portfolio that will transform the way people receive services and interact with government. Over time, this work may leverage the NBN through the use of real-time interactive customer service tools, including, for example, using the voice-over the internet protocol and high-definition video conferencing.

data.gov.au. To promote the development of innovative online applications and services by businesses and the community, the government has developed data.gov.au as a data catalogue of government information. The site provides data from the federal and state and territory governments in useful formats and under open licenses with the intention of encouraging public access to and reuse of government data.

Regional Australia. To ensure that the benefits of the digital economy are enjoyed equally by those Australians living in metropolitan and regional areas, elements of the Digital Communities and Digital Enterprise initiatives will help address these gaps. Similarly, the Telehealth Trials and NBN-enabled tele-education trial projects will occur in regional areas and allow expertise to be developed locally.

NBN Regional Legal Assistance Services. To demonstrate the ability of the NBN to improve service delivery in regional Australia, the NBN Regional Legal Assistance Services initiative will initiate the delivery of legal assistance services and attract and retain staff in selected regional areas.

Industry initiatives

The comprehensive transition of Australia's economy and society to a digital economy is appropriately a market-led phenomenon. Ensuring that Australia is a leading digital economy by 2020 requires collaboration by government, industry and the community. It also requires a transformation in how government and the private sector do business.

The NBN and the devices and applications it can support, will deliver benefits and inspire innovation that Australians cannot yet imagine. Consequently, it will be an ongoing process to bring about this transformation and realise the benefits of an NBN-enabled digital economy.

The research work undertaken by entities such as the Institute for a Broadband Enabled Society, the Commonwealth Science and Industrial Research Organisation (CSIRO) and the National ICT Centre of Excellence (NICTA), including through the CSIRO-NICTA joint Australian Centre for Broadband Innovation, will continue to be at the forefront of demonstrating the cutting edge applications and future trends of Australia's high-speed broadband enabled future. This demonstrates the importance of innovation through research and development.

Some of this research and development occurs in universities and research organisations that are widely dispersed across Australia and rely heavily on an effective IT infrastructure to undertake research and utilise research outcomes. The introduction of the NBN will help ensure researchers have the supporting infrastructure required to remain at the forefront of scientific endeavour.

In addition to research innovation, the NBN can also support private sector innovation. Recent research has indicated that businesses with broadband connections, a web presence and/or e-commerce are significantly more likely to engage in innovative effort, compared to businesses with no broadband connection.[32] This makes it important to promote private sector digital engagement.

The government has welcomed the contribution that industry is making to promote greater digital engagement. The Getting Australian Business Online nationwide campaign by Google and MYOB and the recent Australian Retailer Association's Engage in E-tail seminar series are two examples of these.

The government has invited industry, state and territory governments and local councils to contribute to the vision of Australia becoming a leading digital economy by 2020. The government will continue to collaborate with industry, state and territory governments and local councils to progress the digital economy goals and will promote dialogue and networking on identified issues of national importance to Australia's digital economy, similar to the recently held Online Retail Forum[33] and the upcoming Telework Forum.

INDUSTRY INITIATIVE

Engage in E-tail

Jointly hosted by the Australian Retailers Association and the Australian Sporting Goods Association, the Engage in E-tail seminar series is designed to get Australian retailers online and aware of the opportunities created by multi channel retailing. The first seminar occurred on 13 April, 2011 in Melbourne[34] and brought together 150 retailers to hear from online and ecommerce experts such as Quantium, Deals Direct and Google. Topics discussed included the importance for retailers to engage in the online marketplace, observed changes in online shopping behaviours of Australian consumers, understanding which types of consumers are purchasing online, and methods for establishing and maintaining online competitiveness. A series of Engage in E-tail seminars is planned for roll out in 2011.

INDUSTRY INITIATIVE

Getting Aussie Business Online[35]

A nationwide campaign by Google and MYOB to give every organisation with an Australian Business Number a website, free for 12 months. The goal is to have more than 50 000 Australian small businesses online. The initiative will also provide ongoing tips and education via email and a free online advertising trial (to the value of $75) with Google AdWords. Since its launch in March, the Getting Aussie Business Online campaign has already helped more than 10 000 small businesses set up new websites.

Online participation by Australian households

Where should we be?

Digital Economy Goal: by 2020, Australia will rank in the top five nations in the OECD in the portion of households that connect to broadband at home.

Why is it important?

Effective participation in the digital economy will deliver positive benefits for Australian families and communities in the form of improved access to business and job opportunities, health, education and government services. The ability for people to share common interests will become easier through the rollout of high speed broadband to all Australian homes, businesses and community centres. Allen Consulting has stated that:

> 'households benefit from access to new online services and information and from the connection to the social community'.[36]

Allen Consulting estimates that if the number of Australian households connected to the internet increased by 10 percentage points these households would gain $2.4 billion a year in current prices (in terms of the change in the value of consumption that they are expected to obtain) through timesaving activities, including:

- teleworking, online shopping, remote work and study opportunities
- information gathering and accessing services
- price/product discovery
- education and knowledge
- access to social networking
- media, entertainment and professional services
- substitution of physical services to services delivered electronically
- inclusion and engagement in the online community.

In addition to benefits to households, a 10 per cent increase in Australians using the internet is estimated to produce an increase of 0.44 per cent to Australia's Gross Domestic Product (GDP).[37]

There are also indirect benefits to other sectors as a result of increased household connectivity:

- for businesses, the reduction in the costs of customer access and client servicing
- for government, improved public sector efficiencies and the returns from greater economic activity
- for community organisations, increased engagement/participation with community groups.

Online engagement can have social and personal benefits for Australian households, through an increased connection with an online social community. The term 'cognitive surplus' was popularised by the US writer, teacher and consultant Clay Shirky[38] to describe the creativity and knowledge that the internet makes available to the public. The internet and mobile networks are allowing consumers to create, connect and engage with people online on unprecedented levels. This can reduce feelings of isolation and enhance family relationships through greater interaction with extended family and the wider national and global community.

Enhanced digital engagement can be of particular value to families and/or family members who are geographically isolated or who live away from home. There is evidence in the US that internet use bolsters community vitality in rural America through the promotion of civic engagement and community participation.[39]

Where are we now?

Targeted action is required to minimise the extent to which digital exclusion overlaps with, and exacerbates, social exclusion and to maximise the extent to which the benefits outlined above are enjoyed by all Australian families and communities.

About 26 per cent of Australians 15 years or over did not use the internet in 2008–09. This figure is much higher for retired persons, low-income earners, Indigenous Australians and those living in remote areas.[40]

Thirty-seven per cent of people aged 55–64 did not use the internet in 2008–09, compared with 69 per cent of people aged 65 or more. Similarly, 34 per cent of people earning less than $40 000 a year did not use the internet in 2008–09 and nor did 34 per cent of people living in outer regional and remote areas.[41] People with a profound or severe disability requiring assistance with core activities have significantly lower access to the internet and broadband than other Australians. For example, about 28 per cent of people with a disability requiring assistance with core activities have broadband access in comparison to about 48 per cent of people who do not need assistance with core activities.[42]

GOVERNMENT INITIATIVE

Digital Communities

The government has provided $23.8 million over three years for a Digital Communities initiative to narrow the gap between those who engage in the digital economy and those who do not. A key focus of the initiative will be to establish a 'Digital Hub' in each of the 40 communities that will first benefit from the NBN. These Digital Hubs will enable local residents to experience NBN-empowered services and technology and also access education and training to learn skills required to participate in the NBN-empowered digital economy. A critical aspect of the program is the inclusion of place-based services which recognises that individual communities have different opportunities and challenges.

Training will be delivered through a mix of group sessions and one-on-one tutorials to enable participants to engage in basic online activities such as: setting up an email account; conducting effective internet searches; participating in e-commerce and online shopping; accessing government services; and connecting with family and friends online. The hubs will also demonstrate the benefits provided by the NBN-empowered digital economy including e-health, digital education, ways to save money by participating online and tools for person-to-person visual communication online.

Digital Hub users will also have the opportunity to learn about cybersecurity and cybersafety, empowering them with the awareness and confidence to maximise the benefits of the digital economy, while minimising their exposure to the risks of the online environment.

As the Australian Communications Consumer Action Network has noted '… a potential barrier to widespread community benefit is lack of familiarity and comfort with the use of the technology.'[43] Similarly, Swinburne University has called for 'programs focused on digital literacy and citizenship to be implemented to add to the capacity of the NBN to contribute to these ends.'[44]

Without such assistance, there is a very real risk of a widening gap for the most disadvantaged groups, of declining productivity and competitiveness, and of regional communities becoming economically stranded because of lack of up-take of new technology.

GOVERNMENT INITIATIVE

Broadband for Seniors

In the 2011–12 Budget, the government provided a further $10.4 million over four years from July 2011 to continue this program, which provides seniors with free access to the internet and assists them in gaining confidence in using computer technology. Kiosks are located where seniors can gain access including in community centres, retirement villages, nursing facilities, libraries and clubs.

The initiative commenced in June 2008. It has been well received in the community and has delivered outcomes across 2000 sites reaching about 94 000 seniors. As a result of the Broadband for Seniors program, 84 per cent of kiosk participants now use the internet more frequently; 85 per cent of participants feel their computing skills have improved; and 60 per cent of participants agree that their level of social connectivity has improved.

Online engagement by Australian businesses and not-for-profit organisations

Where should we be?

Digital Economy Goal: by 2020, Australia will rank in the top five OECD countries in the portion of businesses and not-for-profit organisations using online opportunities to drive productivity improvements, expand their customer base and enable jobs growth.

Why it is important?

The increasing availability of ubiquitous high-speed broadband connections and the establishment of an effective online presence allow Australian businesses, particularly small businesses, and not-for-profit organisations, to participate in a global marketplace. Greater use of online opportunities will enable Australian businesses to conduct their existing business processes more efficiently to maximise their overall competitiveness, grow revenues and increase productivity. It will also spur new business processes and innovations that can drive Australia's future economic growth.

'the opportunities for small businesses in Australia's broadband future are limitless. The NBN presents Australian small businesses with a once-in-a-lifetime opportunity to grasp a global long-term advantage.'

The Council of Small Business of Australia has recognised that:

> 'the opportunities for small businesses in Australia's broadband future are limitless. The NBN presents Australian small businesses with a once-in-a-lifetime opportunity to grasp a global long-term advantage.'[45]

These advantages are available to all types of businesses, whether those businesses operate in, for example, the manufacturing industry, the services sector or retail. Digital technologies can streamline internal processes, improve information gathering, facilitate better customer service and permit more targeted sales and marketing campaigns, even for those businesses that still require a face-to-face transaction or need to deliver a physical product. A recent report by the Australian Communications and Media Authority indicated that Australians went online during the last quarter of 2009–10 to purchase a wide range of services, with travel, print and music related items being the most frequently identified purchases.[46]

The OECD estimated that participating in e-commerce as a sales channel with consumers can deliver efficiency improvements for businesses. Specific areas for efficiency gain identified by the OECD include: [47]

- a reduction in inventory costs due to the adoption of 'just-in-time' delivery and the ability to improve forecasting
- expanded opening hours to 24 hours, seven days a week, unrestricted to physical shop hours and open to a global marketplace
- reduced distribution costs and need for physical office/retail space.

The OECD estimated the impacts of e-commerce on distribution costs for some types of businesses could result in savings of 50 per cent to 89 per cent

The OECD estimated the impacts of e-commerce on distribution costs for some types of businesses could result in savings of 50 per cent to 90 per cent, compared to traditional bricks and mortar systems. Particularly for those businesses engaged in the retail industry, it is important that they are effectively engaging online and enjoying these cost savings because a global digital economy levels the playing field between local, national and international retailers, allowing them to compete at the click of a mouse on quality, price, customer service and delivery times.

A vibrant online retail industry in Australia could also have economy-wide benefits and advantage consumers. An Access Economics report stated that the economic benefits of e-commerce included an increase in consumer welfare as a result of greater choice and reduced information costs.[48] A PricewaterhouseCoopers report, commissioned by the UK Government, estimated that UK households that were not online were missing out on an estimated savings of £560 (about $A850) a year from shopping and paying bills online.[49]

For not-for-profit and community service organisations, engaging online could expand their supporter pool to include potentially the entire world and support more innovative fundraising models. Greater use of broadband and digital technologies could drive internal efficiencies and streamline member management processes.

In addition to improving current business models, an NBN-empowered digital economy could also drive new business models and greater firm-based innovation. Recent research undertaken by the ABS demonstrated that there was a strong relationship between the intensity of technology use and innovative activity in businesses. Based on firm level data for 6442 businesses tracked over time, the ABS concluded that:

> 'By enabling closer communication and collaboration, ICT assists businesses to be more responsive to innovation opportunities and provides significant efficiency gains. For example, having ICT technologies such as broadband internet, web presence and automated system linkages, assists businesses to keep up with customer trends, monitor competitor's actions and get rapid user feedback, thereby assisting them to exploit opportunities for all types of innovations.' [50]

Australia's ICT sector itself will be a key beneficiary of a growing digital economy.

Where are we now?

Australian businesses and not-for-profit organisations are not as digitally engaged as our international competitors.

ABS data indicated that, as at June 2009, 41.5 per cent of Australian businesses had a web presence[51] and 27.1 per cent of Australian businesses took orders via the internet.[52]

Data indicated that Australian businesses have high rates of using the internet and broadband as an input to the business, but low rates using it as a business output. Compared with international competitors such as the UK, Canada, South Korea and France, Australian businesses have lagged significantly in the number that have a website and in respect of the percentage of their total turnover from e-commerce.[53] While differences may be attributed to a range of factors such as differing industry structures and distance from relevant markets, this suggests that Australian businesses are not harnessing the full efficiency and productivity benefits of the digital economy relative to their international counterparts. In addition, various industry reports suggest that the Australian retail sector, in particular, is lagging international competitors in the take-up of e-commerce.[54]

In 2008–09, internet income as a proportion of total income from sales of goods and services for all Australian businesses that received orders via the internet or web was only 5.2 per cent.[55] This was less than half the level in leading digital economies. A recent report also indicated that Australia's community service organisations may not be fully utilising broadband and digital technologies. A majority of surveyed organisations were found to lack digital proficiency and have no technology plan in place.[56]

CASE STUDY

NBN enables efficiency and new business for Midway Point sign-writer

In Midway Point, just outside Hobart, sign-writer David Jones faced a challenge typical of his and other design industries: time lost trying to transfer large photo and image files over slow internet connections.[57]

In the past, David had large files couriered to him on disk or sent in the mail because his connection was too slow. After connecting to the NBN in November 2010, David can now download the larger files in seconds. He describes the change as going from 'walking around in sandshoes to driving a Ferrari.'

With the faster speed, David has been able to take on new business from interstate and sees the potential to improve the way he works with customers overseas now that he has the ability to send and receive large image files almost instantly.

> 'In the past some customers have thought it's too hard to physically send me their artwork files, so they chose somewhere closer,' David said. 'Whereas now, over the NBN, location is no longer a problem—there are no obstacles at all.'
>
> 'I can download most of the files clients send me in seconds and it doesn't matter how close or far away the customer is. The possibilities are endless.'

'If an overseas customer suddenly wants something, I can just draw it up and email it over straight away even if it's a large file,' he says. 'It's just easy to do with that kind of speed and capacity over the NBN.'

Before connecting to the NBN, there were many things David just couldn't do from his home workshop.

His connection was not fast enough to effectively download artwork larger than five megabytes which meant he had to travel to Hobart 15 times a month to physically collect photos from a graphic designer, or pay to have a disk sent in the mail.

> 'Before the NBN, I had ADSL broadband set up with kilobits of download speed rather than megabytes,' David said. 'If someone sent me a three or four megabyte file it would take half an hour to download. I couldn't download photos from websites and buy them because my connection just wasn't fast enough.'

David's business has benefitted from his connection to the NBN. The time saved in the transfer of files has meant that everything he does can move much faster and he can deliver his signs to customers in almost half the time it took before.

> 'The first thing I did was download a 17 megabyte file from a graphic artist that took just eight seconds. Before the NBN, I would either have sent it over on a DVD, or let the download max out my connection. The difference is just astonishing,' David said.
>
> 'If an overseas customer suddenly wants something, I can just draw it up and email it over straight away even if it's a large file,' he says.
>
> 'It's just easy to do with that kind of speed and capacity over the NBN.'

GOVERNMENT INITIATIVE

Digital Enterprise

The government will provide $12.4 million over three years to a Digital Enterprise initiative to assist small-to-medium enterprises and not-for-profit organisations (including local cultural organisations) in the 40 communities that will first benefit from the NBN to better understand how they can take advantage of the NBN and online opportunities more generally. The program will provide advice to businesses on how to use the NBN to diversify their operations by allowing them to improve their online presence, offer new products and services, expand their market, improve their competitiveness, and increase their means of communicating with customers and suppliers.

This program will also assist not-for-profit organisations to engage online by using the NBN to extend their reach into the community, expand their donor pool and achieve administrative efficiencies such as improved utilisation of their volunteers and members.

Local cultural institutions participating in the program will be assisted to use the NBN to engage online to enhance their standing as community based centres and reach a wider audience, while helping foster a sense of environment of shared knowledge and understanding.

Submissions to the House of Representatives Inquiry into the role and potential of the National Broadband Network highlighted a number of key concerns in the Australian business community, particularly those based in regional Australia. Regional Development Australia Moreton Bay said:

> 'a major challenge will be to work with business, especially small business to convert them to using applications and technology via the NBN.' [58]

GOVERNMENT INITIATIVE

Online Retail

Recognising the importance of the retail sector, the government hosted a half-day forum in Sydney on 18 February 2011.[59] The forum brought together more than 100 retailers and other parts of the supply chain to identify the opportunities, discuss the challenges and map the solutions for online retail in Australia. Key outcomes achieved from the event were to highlight the importance of a vibrant Australia online retail sector, promote industry dialogue and facilitate networking.

The event was live webcast and over 2300 people tuned in from around the world (including people located in countries such as New Zealand, the US, the UK, Canada, Chile, Brazil and France). The event was live tweeted and more than 500 tweets were posted. The hashtag #orf11 became a trending topic in both Sydney and Melbourne and tweets were posted from people in Brisbane and Hobart, as well as at the event itself.

The government has also asked the Productivity Commission to conduct an inquiry into the economic structure and performance of the Australian retail industry.[60] The commission is due to deliver its final report in November 2011. The inquiry will consider the drivers of structural change in the retail industry, including globalisation and increasing household and business access to the digital economy.

Smart management of the environment and infrastructure

Where should we be?

Digital Economy Goal: by 2020, the majority of Australian households, businesses and other organisations will have access to smart technology to better manage their energy use.

Why is it important?

An NBN-empowered digital economy could improve Australia's environmental sustainability by supporting applications that encourage more efficient use of water, energy, transport and infrastructure.

Australia's population has grown over the past 40 years at an average annual rate of 1.4 per cent a year, taking Australia's total population to about 22.4 million in 2010.[2] Australia also has a distinctive population distribution, being one of the most mobile and spatially concentrated of any country. It is highly urbanised, with 87 per cent living in urban areas, including 64 per cent in capital cities.[61] Current projections suggest Australia's population will continue to grow over time, but at slower rates than in the past.

This population pressure, together with a changing climate, is altering the natural environment and having a significant impact upon the way Australians live. The effects of climate change present challenges requiring new and innovative ways to make more efficient use of energy in order to help reduce Australia's current and projected levels of greenhouse gas emissions.

Additionally, better use of existing infrastructure—changes in the operation, pricing or use of existing infrastructure to solve problems without the need for investment in additional capacity—was identified as one of the challenges facing Australia in the *National Infrastructure Priorities* report.[62]

Smart use of technology in an NBN-empowered digital economy could be an important tool to assist in the managing of these challenges by:

- improving productivity and efficiency in use of energy infrastructure to assist maintaining our energy needs and minimise our environmental impact
- promoting increased adoption of teleworking, including within the government sector, assisted by the availability of ubiquitous high-speed broadband to all premises and businesses
- using sensors to enable more efficient use of existing infrastructure and transport systems and reduce pressure for new infrastructure
- reducing pressure on capital cities by allowing businesses to establish and conduct their operations online in regional and rural Australia, as easily as in a metropolitan area.

An Australian study has estimated that the adoption of smart technologies in electricity, irrigation, health, transport and broadband could add more than 70 000 jobs to the economy by 2014 and increase GDP by 1.5 per cent over the next decade.[63]

Where are we now?

There have been a number of initiatives by government to demonstrate the ability of smarter use of technology to better manage Australia's natural and built environment. Chief among these is the Smart Grid, Smart City initiative. As the US Department of Energy said: 'think of the smart grid as the internet brought to our electric system.'[64]

The government has undertaken to require all new major urban road projects to have minimum levels of intelligent transport system technology incorporated into their design. Looking to the future this will not be just about roads. All investors in infrastructure will need to look at how to incorporate smart systems into designs from the outset. The government is already taking steps with, for example, a $90 million investment through the Australian Rail Track Corporation for a trial of the Advanced Train Management System.[65] This system will enable digital monitoring of the interstate rail network, providing more reliable rail services, operator savings and increased safety.

The rapid growth of our cities, as well as the outward expansion of cities over the past 50 years, has created significant congestion on urban roads, which has had an impact on residents' quality of life and reduced family and social time. Managed motorways can be effective in improving productivity by reducing congestion on busy roads, whilst also delivering important sustainability and liveability outcomes from our transport network. Given that vehicles under congested conditions use more fuel and emit more pollutants than vehicles under free-flow conditions, managed motorway systems deliver sustainability improvements through greater fuel efficiency and reduced emissions from cars and trucks standing idle on congested roads.

In addition, there have also been various trial demonstrations of the benefits of applying smart technologies to water management and traffic congestion. For example, the Water Information Networks project developed by NICTA has developed methods for controlling and integrating canal networks with on-farm irrigation systems so that they can become water reserves and make an 'on-demand' water supply available to the farmer. Using this technology, dairy trials employing flood irrigation for dairy pasture production used 26 per cent less water and experienced a 27 per cent improvement in water productivity. In addition, the farms in the trial enjoyed a 38 per cent improvement in gross margins measured in dollars earned a hectare.[66] NICTA's Smart Transport and Roads Project[67] demonstrated how technology can be used to better manage urban traffic congestion.

Advice from industry suggests that increasing the use of information technology, facilitated by the NBN, will also have a profound effect on the way the built environment is planned, designed, procured, constructed and operated. For example, the use of technology such as building information modelling (BIM) could improve productivity in the sector by a very significant 6 to 9 per cent. Accelerated uptake of BIM would provide significant productivity benefits to Australia, in particular a 0.05 per cent boost to GDP by 2025[68], according to a recent report, *Productivity in the Buildings Network: Assessing the Impacts of Building Information Models*, commissioned on behalf of the Built Environment Industry Innovation Council by the Department of Innovation and industry partners. The NBN will enable smoother transition for the uptake of this technology across industry.

GOVERNMENT INITIATIVE

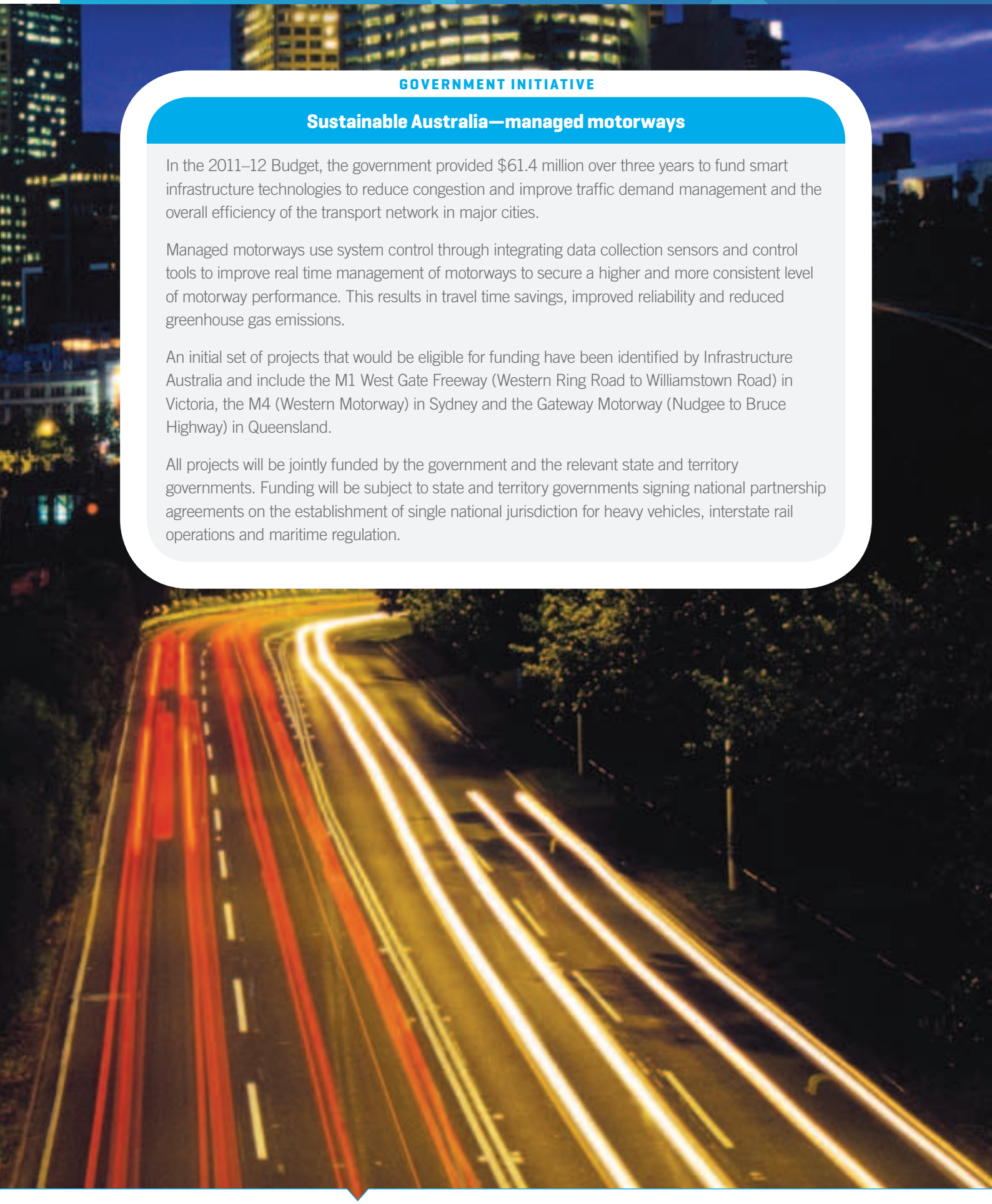
Smart Grid, Smart City

The government has provided up to $100 million to the Smart Grid, Smart City[69] initiative that will demonstrate an electricity system of the future—one that uses ICT to improve the efficiency of power production, delivery and use. The project will employ a mix of innovative technologies to demonstrate the potential of smart grids to manage peak electricity demand, identify and resolve faults on the grid, and help customers make informed choices about their energy use. The project, conducted in NSW's Newcastle and the Hunter regions, is currently being rolled out. The energy utility Ausgrid is leading the industry consortium, which includes IBM Australia, GE Energy Australia, AGL Energy, Sydney Water, Hunter Water Australia, and Newcastle City Council.

The project will gather robust information about the costs and benefits of smart grids, and roll out Australia's first commercial scale smart grid. Information gathered from the project will inform the business case for future deployment of smart grid technologies and applications and decisions by government, electricity providers, technology suppliers and consumers across Australia.

The proposed NBN synergy projects under the Smart Grid, Smart City project are:

- Project 1—Smart Home Digital Gateway. This project involves the design of a 'smart meter base' that could be used to consolidate an optical network termination unit and smart meter on to the same footprint, allowing use of NBN services for smart metering with minimal overhead.
- Project 2—NBN Support for Smart Grid. This project involves a physical trial of NBN services used by Ausgrid meters for the delivery of both smart grid and smart metering applications. Subject to NBN Co's endorsement and support, the trial would cover about 3000 homes/endpoints. It would concern developing NBN Co's service offerings relevant to an energy utility, associated business models and technical synergies.



GOVERNMENT INITIATIVE

Sustainable Australia—managed motorways

In the 2011–12 Budget, the government provided $61.4 million over three years to fund smart infrastructure technologies to reduce congestion and improve traffic demand management and the overall efficiency of the transport network in major cities.

Managed motorways use system control through integrating data collection sensors and control tools to improve real time management of motorways to secure a higher and more consistent level of motorway performance. This results in travel time savings, improved reliability and reduced greenhouse gas emissions.

An initial set of projects that would be eligible for funding have been identified by Infrastructure Australia and include the M1 West Gate Freeway (Western Ring Road to Williamstown Road) in Victoria, the M4 (Western Motorway) in Sydney and the Gateway Motorway (Nudgee to Bruce Highway) in Queensland.

All projects will be jointly funded by the government and the relevant state and territory governments. Funding will be subject to state and territory governments signing national partnership agreements on the establishment of single national jurisdiction for heavy vehicles, interstate rail operations and maritime regulation.

Improved health and aged care

Where should we be?

Digital Economy Goal: by 2020, as identified in the National E-Health Strategy endorsed by the federal, state and territory governments, 90 per cent of high priority consumers such as older Australians, mothers and babies and those with a chronic disease, or their carers, can access individual electronic health records. Through the government's investments in telehealth, by July 2015, 495 000 telehealth consultations will have been delivered providing remote access to specialists for patients in rural, remote and outer metropolitan areas, and by 2020, 25 per cent of all specialists will be participating in delivering telehealth consultations to remote patients.

Why is it important?

Increasing pressures on Australia's health system because of an ageing population, increased rates of chronic disease, and health workforce challenges mean it is critical to consider opportunities to deliver high-quality services more effectively and efficiently.

The NBN will provide a platform that allows homes, doctors' surgeries, pharmacies, clinics, hospitals, aged-care facilities and allied health professionals to connect to affordable, reliable, high-speed and high-capacity broadband. This is a major opportunity to improve the way healthcare is delivered in Australia.

The NBN will assist in improving health service delivery, delivering care to the home, enabling innovation in healthcare, facilitating widespread adoption of electronic records and reducing funding pressures on the health system. The NBN will also enable the connection of health clinics and facilities in regional Australia with major metropolitan health institutions, increasing the availability of remote consultation services.

Telehealth to the home will have positive effects including reducing hospitalisation rates, informal care burdens and travel costs. Telehealth to the home could delay entry into residential care by improving quality of life for patients in their home.

A recent Access Economics report[70] analysed the potential impacts of telehealth under the NBN and identified a range of benefits from telehealth for healthcare services, medical effectiveness, decreased travel and increased employment. Based on previous studies in the US and Australia, the report estimated that the ongoing benefits to Australia from widescale implementation of telehealth may be between $2 billion and $4 billion a year.

Another Access Economics[71] report modelled the financial impacts of introducing a telehealth intervention into existing aged and veteran care programs. Their analysis, based on three communities to first benefit from the NBN, concluded the net financial benefits of telehealth in this instance were 1.61 to 1 or a 61 per cent return on investment over two years. When quality of life benefits such as reduced pain and suffering were factored in, the benefit to cost ratio increased to 2.49 to 1 or a 149 per cent return on investment.

Where are we now?

The average real cost of aged care is expected to rise at 1.5 per cent a year. In 2004–05, an estimated 77 per cent of Australians had a long-term condition described as a disease or other health problem that had lasted, or was expected to last, six months or more.

The proportion in the 2004–05 National Health Survey reporting long-term conditions increased with age from 41 per cent of those aged less than 15 years to more than 95 per cent of persons aged 45 years and over.[72] Not only do people living with chronic disease need regular treatment; the proportion of health expenditure related to chronic disease is also projected to rise steadily year on year. Costs from diabetes alone are projected to increase 436 per cent from $1.6 billion in 2002–03 to $8.6 billion in 2032–33. These trends are largely caused by the increasing numbers of overweight and obese people (for diabetes) and the ageing population (for both disease groups).[73]

GOVERNMENT INITIATIVE

Telehealth Trial (NSW)

An NBN Telehealth Trial in Armidale and Kiama will commence in late 2011. It will focus on the delivery of high-quality NBN-enabled telehealth services to older Australians with chronic conditions in their homes. Patients selected to participate in the trial may receive such services as:

- in-home telehealth monitoring of patient health and well-being indicators such as blood pressure, glucose levels and lung function
- home video consultations to allow patients to communicate with relevant health providers through high-quality video
- preventive care and healthy living support providing coaching, up-to-date information and relevant social networking opportunities to promote healthier lifestyles.

The trial will also include a mental health element enabling young Australians with mental illnesses or drug-related problems to better access NBN-empowered mental care services.

The trial will provide a practical demonstration of the NBN's transforming impacts, particularly in the delivery of essential health services regional communities, taking advantage of the NBN's ubiquity, high-speed download and upload services as well as network stability and reliability.

The trial will be funded through a National Partnership Agreement under the Digital Regions Initiative. It will be delivered by the Hunter New-England Local Area Health Network and the Shoalhaven Illawarra Local Area Health Networks in collaboration with the NSW Department of Health.

GOVERNMENT INITIATIVE

Telehealth Trial (Queensland)

A Townsville NBN-enabled diabetes Telehealth Trial will commence late in 2011. It will deliver high-quality monitoring and video-conferencing services to the homes of diabetics. Trial participants may receive services such as:

- home telehealth monitoring and medical alert systems
- virtual patient visits allowing patients to communicate with relevant health providers through high-quality video
- healthy living information and support.

The NBN-telehealth services to be delivered through this trial will support Australians with diabetes in managing their health needs from home, and provide information on how such services could be more broadly deployed.

The trial will initially target people living in the NBN first-release suburbs of Aitkenvale and Mundingburra in Townsville. The trial will extend to include participants in the second-release Townsville site.

The trial will be funded through a National Partnership Agreement under the Digital Regions Initiative. It will be delivered by the Townsville General Practice Network in collaboration with the Townsville Health Service District and Queensland Health.

GOVERNMENT INITIATIVE

Medicare Benefits Schedule Expansion

From 1 July 2011, the government is expanding the Medicare Benefits Scheme to include items for telehealth services. This will include $352.2 million for Medicare rebates for online consultations, incentives for GPs and specialists to participate, online training and $50 million to allow the GP After Hours Helpline to include videoconferencing.

The NBN will empower patients in remote, regional and outer metropolitan Australia to have better access to specialists through new investments in telehealth consultations via the internet. With twice as many specialists a person in major cities compared to regional and remote areas, this investment will help to reduce barriers to specialist medical services for patients. The roll out of the NBN will play a key part in allowing patients to experience clinical grade telehealth.

Expanded online education

Where should we be?

Digital Economy Goal: by 2020, Australian schools, TAFEs, universities and higher education institutions will have the connectivity to develop and collaborate on innovative and flexible educational services and resources to extend online learning resources to the home and workplace; and the facilities to offer students and learners, who cannot access courses via traditional means, the opportunity for online virtual learning.

Why is it important?

The government has recognised that Australia requires people with high-quality skills to maintain its long-term economic and social prosperity. The Council of Australian Governments (COAG) has set qualifications targets to reduce gaps in skill levels and substantially deepen Australia's skills base.[74] Skills Australia has also outlined the need to increase tertiary sector enrolments (which include VET by at least three per cent a year over the next 15 years.)[75]

The availability of ubiquitous, high-speed broadband has the potential to significantly extend the reach, availability and quality of education services, particularly in regional areas, to help meet these needs. This can be achieved by supplementing teaching and training with access to subject matter experts and teachers outside of the local area. In addition, the greater data capacity of the NBN (both download and upload) can enable more intensive and immersive online interactions, resulting in higher-quality outcomes for students. This can either occur through greater use of the increasing array of educational materials now being posted online through initiatives such as YouTube University, iTunes U and the OpenCourseWare initiative, access to videoconferencing with other classrooms or cultural and educational institutions in Australia or overseas, or through the increased use of bandwidth intensive applications such as high-definition video for interactive instruction and learning.

Based on international experience, the increased use of online learning enabled by high-speed broadband has the potential to increase the reach of education services, the availability of open education resources, and an improvement in education outcomes. For example:

- Carnegie Mellon University's Open Learning model has shown that online learning can substantially reduce the time required to learn a subject (50 per cent of the time required using more traditional methods) while greatly increasing course completion rates (99 per cent compared to 41 per cent for more traditional methods)[76]
- high-school students attending Florida Virtual Schools outscored the states' standardised assessment average by more than 15 per cent points in grades 6 through 10[77]
- a study conducted by the European Union (EU) found that broadband access in classrooms results in significant improvements in pupils' performance in national tests taken at age 16.[78]

Where are we now?

The Skills Australia Report 2010, *Creating a Future Direction for Australian Vocational Education*, states that the VET workforce is ageing with many practitioners needing to be replaced due to retirement or supplemented with additional staff due to scaling down to part-time work. This is especially evident with TAFE staff where 66.9 per cent of the workforce was aged 45 years or more in 2005. The report concluded that the future capacity of the sector would be compromised without sufficient qualified and experienced staff.[79]

To contribute sustainable and meaningful change to teaching and learning in Australian schools that will prepare students for further education, training and to live and work in a digital world, the government has put in place the Digital Education Revolution (DER), including providing funding of more than $2.4 billion for the National Secondary Schools Computer Fund. The program is on track to deliver access to a computer to every Year 9 to 12 student by the end of 2011.

The government has also invested in ensuring that teachers and parents are well-equipped to make use of ICT to improve childrens' learning outcomes through initiatives, such as Online Diagnostic Tools, the Online Curriculum Resources and Digital Architecture Initiative, and the Digital Strategy for Teachers and School Leaders.

The DER is providing students and educators with the tools and training needed to equip them for an NBN-empowered digital economy. Together with the roll out of the Australian curriculum, this will result in greater demand for, and use of, online educational resources for teaching and learning purposes. The sector is actively engaged in developing curriculum resources that take advantage of digital technology and that can be shared across traditional boundaries. The NBN will support access to these resources and, in addition, offers new opportunities to ensure that specialist resources and educational opportunities are enjoyed by all Australians, no matter where they live.

GOVERNMENT INITIATIVE

NBN-enabled education and skills services program

This four-year program will, from July 2011, invite proposals for innovative online and interactive education and skills services using the NBN. The program aims to demonstrate the benefits of high-speed broadband connectivity to be provided in and across the NBN first-release site areas, including improving online accessibility to individuals at home and in workplaces. It will contribute to the development of services that:

- connect teachers with learners to address skills shortages and improve teaching and learning experiences
- improve professional development (for example, sharing of resources)
- enhance community links
- facilitate workplace training and assessment to improve workplace productivity.

The program will make $27.2 million available to source, develop and implement projects associated with NBN first release sites. Projects are expected to commence in 2012 and preference will be given to proposals which are supported by co-contributions.

GOVERNMENT INITIATIVE

NBN-enabled tele-education project

This NBN-enabled tele-education project in Armidale will commence in late 2011 and deliver state-of-the-art virtual interactive training rooms, laboratories and community learning capability.

The partnership between the TAFE NSW – New England Institute and University of New England will deliver:

- High-definition, internet-protocol-delivered television, video on demand and three-dimensional trade skilling packages
- open access courseware combining University and TAFE content that will be available free to the user from any NBN footprint
- high-quality open learning and support services for teaching professionals
- cloud technology enabling software licensing to the server to ensure individuals do not pay licence fees
- enhanced community access services for 30 regional community technology centres in NSW.

The project will take advantage of the NBN's ubiquitous and reliable high-speed broadband to assist in the development and delivery of new models of education services and resources to students and learners Australia wide.

The project will be funded through a National Partnership Agreement under the Digital Regions Initiative. It will be delivered by the TAFE NSW – New England Institute in partnership with the University of New England and Community Technology Centres Associations.

CASE STUDY

Circular Head Christian School uses NBN to improve learning

In August 2010, Circular Head Christian School became the first Australian school to be connected to the NBN.[80]

Based in Smithton, north-western Tasmania, the school of 385 children from Kindergarten to Year 12 had built a strong reputation for the quality of its VET stream as well as standard academic subjects.

In recent years though, Circular Head had found it increasingly difficult to attract and retain the number and breadth of teachers required to deliver VET subjects.

When the NBN arrived, Patrick Bakes, Principal of the Circular Head Christian School, immediately identified the opportunity to overcome that challenge. Face-to-face teaching could be supplemented with high-definition video conferencing and access to subject matter experts and teachers in other states and territories across Australia.

> 'Our little school might not have been able to deliver all the subjects our Year 11 and 12 students wanted onsite, but we could link to another school that would effectively let us into their classroom,' Patrick said.

Before Circular Head was connected to the NBN, Patrick says staff viewed the internet as a research tool only—an extension of traditional encyclopaedias as opposed to an intrinsic part of the classroom.

> 'On our previous internet connection, students would have to sit and wait for ages for content to download. Because the online experience was so frustrating, teachers were often reluctant to use the internet in the classroom.'

The benefits of being connected to the NBN are reverberating through the school and teachers are being encouraged to actively explore new ways to use internet-based learning in the classroom.

> 'We are finding that students are engaged, they can move from one task to another much more quickly, they can access a range of media when they are researching, they can get onto the latest maps, instead of having to use an atlas which is five years old,' Patrick said.

> 'It's exciting that the NBN is fast—yes. But most important to us is that it has enabled us to offer our students access to the kind of technology and subjects that their metropolitan classmates can access without question.'

Increased teleworking

Where do we want to be?

Digital Economy Goal: by 2020, Australia will have at least doubled its level of teleworking so that at least 12 per cent of Australian employees report having a teleworking arrangement with their employer.

Why is it important?

The digital economy allows Australians to log in and connect anytime, anywhere, including to the office. By delivering reliable, high-speed broadband to all Australian premises, the NBN will give more employees and employers the confidence to engage in teleworking. Teleworking is broadly defined to include work undertaken at home, use of mobile devices in transit or at a different place of business (telecentres).

The NBN will also significantly expand the sectors of the economy that can confidently conduct teleworking. For example, much of the services sector will be able to utilise high-quality video conferencing and the advertising, graphics, video and other industries will be able to share and collaborate on high-resolution graphics and audiovisual files. A recent survey of Australian businesses revealed that 20 per cent believed the NBN would change their employment model by facilitating increased flexibility in the location of staff and expanding the supply of skilled labour.[81]

Teleworking is important because it creates economic, social and environmental benefits. It is estimated that the value of a 10 per cent increase in Australian employees who telework 50 per cent of the time is between $1.4 billion and $1.9 billion a year.[82]

By facilitating flexibility in workplace practices, teleworking can increase productivity, lead to reduced office expenses and increase labour force participation and staff retention.

Teleworking delivers benefits to Australian workers by increasing their workplace flexibility, allowing them to better balance their work and family lives, and by giving people living in regional and rural Australia greater employment opportunities.

By reducing the need for people to commute to the office at the same time each day, teleworking can also reduce transport congestion, leading to reduced impact on our natural and built environment. It is estimated that a 10 per cent increase in Australian employees who telework 50 per cent of the time would also save an estimated 120 million litres of fuel, avoiding 320 000 tonnes of carbon dioxide (equivalent to $6 million worth of emissions) and would reduce traffic at peak periods by 5 per cent, resulting in a reduction of $470 million in congestion costs, which would have a flow-on benefit of reducing strain on infrastructure.[83]

Where are we now?

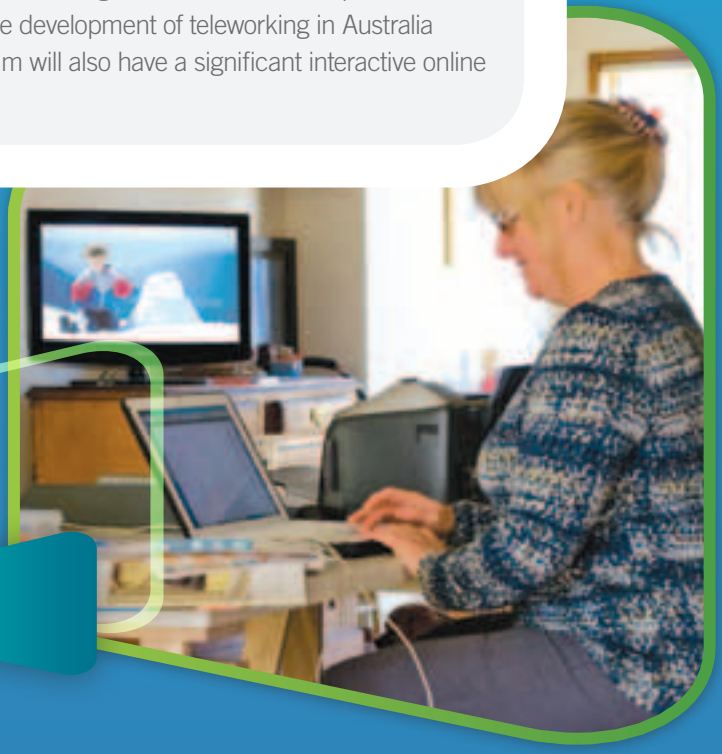
Australia presently lags internationally in levels of teleworking. Just 6 per cent of workers in Australia reported having teleworking arrangements of any form with their employer in 2006.[84] In the US, 11 per cent of US employees teleworking at least one day a month, while eight EU countries report that more than 10 per cent of workers were involved in teleworking 'a quarter of the time or more' in 2005.

The government currently promotes the take up of teleworking through initiatives such as the Telework Australia website, www.teleworkaustralia.net.au, and through workshops and presentations to government on how to introduce teleworking to their organisations. Work is continuing on extending these workshops to industry.

GOVERNMENT INITIATIVE

Telework Forum

The government will convene a Telework Forum in 2011 to help identify how Australian businesses and government agencies can use the catalyst of the NBN to boost the rate of teleworking in Australia. This is a key step in an ongoing strategy to extend teleworking across all sectors of the economy. By providing stable and consistent high-speed broadband across the country, the NBN will make it feasible for more people to perform the full range of their work from home or from sites close to their home through, for example, multi-party videoconferencing, intensive collaborative environments and massive file sharing in real-time. Greater utilisation of the NBN to engage in teleworking represents a significant opportunity to realise social, environmental and workforce productivity benefits. The forum will bring together senior executives from industry and government agencies to explore the business case for increased teleworking and successful examples from industry and government. Attendees will workshop the development of teleworking in Australia utilising the capability delivered by the NBN. The forum will also have a significant interactive online presence, featuring live video feed and social media.



Improved online government services delivery and engagement

Where should we be?

Digital Economy Goal: by 2020, four out of five Australians will choose to engage with the government through the internet or other type of online service.

Why is this important?

Effective participation in the digital economy by government can reduce costs, increase customer satisfaction and promote innovation. Encouraging people to access government services online, and making it easier for them to do so, increases people's digital confidence and digital literacy. This makes it easier for government to facilitate online engagement and collaboration with citizens to improve service delivery or provide input into policy and regulatory matters.

A recent report by PricewaterhouseCoopers, for the UK Government, found that face-to-face transactions cost £10.53 (about $A16), the cost of a telephone engagement was £3.39 (about $A5.15) and engagement with the government by mail was £12.10 (about $A18.40) compared with the cost of an online transaction at just £0.08 (about $A0.12).[85]

Given a choice, most people would prefer to avoid visiting a physical government office for a face-to-face transaction. For example, in 2009 45 per cent of people indicated they would prefer to use the internet for accessing government services.[86] The Department of Finance and Deregulation's *Interacting with Government 2009*[87] report indicates that those who contacted government by internet have the highest level of satisfaction (91 per cent).

All levels of government play a critical role in sustaining the economic and social growth of communities by providing a range of services to residents and local businesses. Actively participating in the digital economy will enable state and local governments to significantly upgrade the quality, timeliness and range of services they can deliver online. State and local governments are also a frequent touch-point for individuals and households in managing their day-to-day affairs. Consequently, more digitally aware state and local governments will drive greater digital engagement by Australian families and communities.

As well as the increased online client-facing tools, cost savings and efficiencies in government service delivery can also be achieved through the greater internal use of bandwidth-intensive applications. This is particularly so with regard to greater adoption of high-definition video conferencing and cloud computing. The federal and state and territory governments, for example, have used high-definition telepresence technology for numerous COAG meetings. The National Telepresence System has been operational since July 2010. Benefits from the use of the system from October 2009 to March 2011 include estimated savings of $4.5 million and reduced greenhouse gas emissions attributed to the government of an estimated 899 tonnes.

The combination of high-speed broadband and emerging cloud computing services offers a range of opportunities for improved government services to be delivered more cheaply and effectively to a much wider range of the population. These benefits were estimated by the US Government to provide infrastructure savings of about 30 per cent.[88]

Extending ubiquitous, reliable, high-speed broadband to all Australian premises can also promote online engagement with government that provide opportunities for greater public participation in the development of policy and service delivery. The use of online platforms and the release of more government data can promote innovative applications and services by businesses and the community.

Where are we now?

There has been some significant progress in Australia to expand delivery of government services and programs online. Recently, the government released a draft *Strategic Vision for ICT* that outlines a long term plan for the government's use of ICT to support increased public sector productivity.[89] However, it continues to be the case that fully completing many transactions with government, even where they are commenced online, still requires the client to visit a government office. For example, currently about 62 per cent (69.5 million) of Centrelink transactions are made onsite, which involves people travelling to a Centrelink office. This is inconvenient and costly for many clients, noting that four out of five clients of government services have indicated a preference for not having to visit a government office to access a government service. It also means that Centrelink must maintain much larger client waiting areas and transaction counters.

Use of high-definition video conferencing and cloud-based solutions are not yet widespread throughout all levels of government in Australia. Increasingly, state and territory governments around Australia are becoming aware of the potential benefits of cloud services and are considering the use of these services to provide a wider range of citizen-facing services while reducing the cost of developing these services. Many of Australia's local governments lack the resource base to develop sophisticated online service offerings for their ratepayers if they had to be developed individually by each council.

GOVERNMENT INITIATIVE

'Tell Us Once'

The government has committed in the 2011–12 Budget to an Improved Access to Australian Government Services measure to provide $2.3 million to investigate and test some preliminary developments to improve people's ease of use and access to government services. This funding will be used for a scoping study, technical trial and business case. Improvements to be explored include allowing individuals, if they choose, to:

- communicate updated details to multiple agencies simultaneously
- pre-fill forms using information previously submitted to a government agency
- view all their communications with government in one place.

GOVERNMENT INITIATIVE

Service Delivery Reform

On 16 December 2009, the Minister for Human Services announced the start of the reform to government service delivery to develop a modern, flexible, whole-of-government service delivery system. This will enable the government to better meet the needs and expectations of the Australian people and deliver services more efficiently. The service delivery reform initiative will transform the way people receive services from, and interact with, the Human Services portfolio through more one-stop-shops and by providing intensive support for people who need it. Over time, it may also leverage the NBN through the use of real-time interactive customer service tools, including, for example, using voice-over the internet protocol and high-definition video conferencing. The reform draws on the benefits of an NBN-empowered digital economy by allowing people to access services at a time and place that suits them. People will be able to undertake a range of transactions online including registering for services, claiming benefits and updating personal details. The initiative is utilising technological advances to provide modern services such as online forms and letters, single online accounts and the automation of customer transactions to reduce the time people have to interact with government.

GOVERNMENT INITIATIVE

data.gov.au

The Department of Finance and Deregulation has developed data.gov.au as a data catalogue of government information. The site provides an easy way to find, access and reuse public datasets from the federal, state and territory governments. The main purpose of the site is to encourage public access to and reuse of government data by providing it in useful formats and under open licences. It was created following the government's Declaration of Open Government[90] and response to the Government 2.0 Taskforce.[91]

The site provides both downloadable datasets and, in some cases, links to other data catalogues or sources. Improving the quantity and quality of the site's data will be an ongoing process. Members of the public can leave feedback on data by leaving a comment or rating on the data pages, and can also suggest data that they believe should be made available on the site. Other upgrades and new features will also be made to the site over time.

Mash-up contests and hack days are promoted via the site. Several of these have been held around the country, including the recent Libraryhack[92], a mash-up and apps competition designed to encourage the creative and innovative reuse of library data and digital content, and CodePlay,[93] a competition run by the ABS to help drive collaboration between students, developers and national and international statistical agencies and reward innovative ways of making statistical data more appealing, relevant and useful.

Greater digital engagement in regional Australia

Where should we be?

Digital Economy Goal: by 2020, the gap between households and businesses in capital cities and those in regional areas will have narrowed significantly.

Why is it important?

In the digital economy, distance—once a defining characteristic and barrier for regional Australia—becomes increasingly irrelevant. Economic modelling shows that regional areas stand to benefit more than metropolitan areas from increased internet connectivity. On average, a 10 per cent increase in connectivity raised regional output by 0.53 per cent compared with only a 0.38 per cent increase in metropolitan areas.[94] The NBN will enable all Australian communities to have greater access to goods and services and education and employment opportunities. It will provide a reliable and ubiquitous network that supports the smart use of technology and improve the productivity and competitiveness of regional businesses.

A key government objective for the NBN is that a person's ability to receive affordable high-speed broadband services should not be affected by where they live or work. The NBN will ensure that every community in regional Australia gets fair access to affordable high-speed broadband. This includes the delivery of a uniform national wholesale price.

'... So it's not just about businesses moving from the city into the bush, it's actually enabling country businesses—be they farms or be they small business—in towns or regional centres to actually expand their business opportunity.'

In the UK, the Rural Commission has noted the positive impact of broadband on rural communities. Specifically:

- businesses owners have relocated from urban areas to enjoy a better quality of life
- home-working and online services have slowed down out-migration and attracted in-migration
- businesses can now tap into worldwide markets
- the retention of rural services.[95]

For businesses located in regional areas, getting online can improve productivity and expand their customer base to include the entire country. As one regional business owner has said:

> '… there is no reason why you can't run any business that's in the city in the bush these days, particularly with the internet …
>
> … So it's not just about businesses moving from the city into the bush, it's actually enabling country businesses—be they farms or be they small business—in towns or regional centres to actually expand their business opportunity.'[96]

'… there is no reason why you can't run any business that's in the city in the bush these days, particularly with the internet …'

Where are we now?

There is still more work to be done to ensure that the benefits of the digital economy are enjoyed equally by those Australians living in metropolitan and regional areas. Current data indicates that the number of Australians who have never used the internet is higher among those people living in regional and remote areas. For example, 31 per cent of people from non-metropolitan areas aged 15 and over did not use the internet in 2008–09, compared with only 23 per cent of people in capital cities.[97]

Data indicates that in 2007–08 29.7 per cent of businesses located outside of capital cities had a web presence, compared with 39.5 per cent of business located in capital cities.[98]

GOVERNMENT INITIATIVE

Regional Australia

The government's commitment to prioritise the roll out of the NBN in regional Australia will promote greater engagement in the digital economy in these areas. For the Digital Communities and Digital Enterprises initiatives, a minimum of 23 communities targeted will be in regional Australia. The Digital Communities initiative will deliver economic and social benefits to regional communities by improving access to information, health, education and government services. The Digital Enterprise initiative will assist local businesses and not-for-profit groups, including local cultural institutions, to increase their productivity, expand their customer base and grow their revenues. The Telehealth Trials, the NBN education and skills services program and the NBN-enabled Tele-education project in regional areas will clearly demonstrate the benefit to regional Australia in these important areas and allow expertise to be developed locally.

GOVERNMENT INITIATIVE

NBN Regional Legal Assistance Services

In the 2011–12 Budget, the government provided $4.07 million over four years to initiate the delivery of legal assistance services, and to attract and retain staff, in selected regional areas by providing grants to legal assistance providers (legal aid commissions, family violence prevention legal services, Indigenous legal services and community legal services). Grants will give providers greater financial flexibility to address issues such as remote training and supervision and explore NBN-based options to increase access to services.

THE NBN:

key enabling infrastructure

By providing reliable, ubiquitous high-speed broadband to all of Australian premises, the NBN is an essential first step towards positioning Australia as a leading global digital economy by 2020.

THE NBN: key enabling infrastructure

By providing reliable, ubiquitous high-speed broadband to all of Australian premises, the NBN is an essential first step towards positioning Australia as a leading global digital economy by 2020.

Recent OECD statistics show Australia is now ranked 18th out of 31 countries for fixed broadband subscribers.[99] Australians also pay more for broadband than most OECD countries—for average subscription prices, Australia is the fifth most expensive overall.[100]

The open access, wholesale-only NBN will transform the competitive dynamics of the Australian telecommunications sector.

The NBN provides key enabling infrastructure to support Australia becoming one of the world's leading digital economies by 2020. The NBN will offer high-speed broadband to 93 per cent of Australian homes, schools and business via fibre optic cabling. The remaining 7 per cent of premises will be connected via a combination of next-generation, high-speed wireless and satellite technologies. These next-generation wireless and satellite technologies represent a significant step-change over speeds currently experienced by users of those technologies today.

The OECD report, *Economic Survey of Australia 2010*, released November 2010, stated that the NBN 'strategy will improve internet services for the entire population and promote a fairer competition between private firms on retail services.'[101]

The NBN has several specific characteristics that will support Australia realising this ambition. In addition to the headline download speed of up to one gigabit a second, other characteristics that will assist Australia along the path are:

- **Supports high-speed download and upload services.** The NBN will provide homes and businesses with the capacity to support both high download and upload speeds, which are essential for applications such as high-definition videoconferencing and are not available on current broadband networks in Australia. The NBN's capacity will enable households to simultaneously use a wider range of high-bandwidth applications without deterioration in service quality. It also means that small and medium-sized businesses, particularly those in regional Australia, will be able to access increasingly sophisticated business applications and greater data storage capacity via cloud computing that, in the past, have only been available to larger companies.
- **Stability/reliability of service and capacity for future upgrades.** Some applications, particularly health applications, rely on assured levels of stability/reliability of connection to a minimum level of internet speed and capacity. It is for these reasons that many of these applications are currently only used between larger hospitals that already have access to high-speed broadband. The NBN has the potential to extend a wider range of online health applications to the home and the local general practice surgery environment.
- **Ubiquitous coverage.** The NBN will be available to all Australians—no one will miss out. This will provide a sufficiently large customer base to justify development and deployment of advanced services and also maximises the potential network benefits for all customers. In Australia today there is a multiplicity of broadband access technologies such as HFC cable, ADSL, ADSL2+, fixed and mobile wireless and satellite each offering quite different characteristics. By introducing a minimum ubiquitous service of at least 12 megabits a second to all premises in Australia, the NBN will enable new and enhanced common service standards in healthcare, education and government service delivery.
- **Uniform national wholesale pricing.** The NBN will offer services at a uniform national wholesale price, which will give every community in rural and regional Australia the opportunity to get fairer access to affordable high-speed broadband. While retail pricing levels will be a matter for retail service providers that utilise the network, it is anticipated the level and range of retail prices will be comparable to existing prices in the market today, while providing a better service.

A network with these characteristics accessible to households and businesses throughout Australia provides a platform on which new services and applications, requiring these features, can be developed or can be deployed on a wider scale.

The characteristics of the NBN respond to likely trends in online engagement.

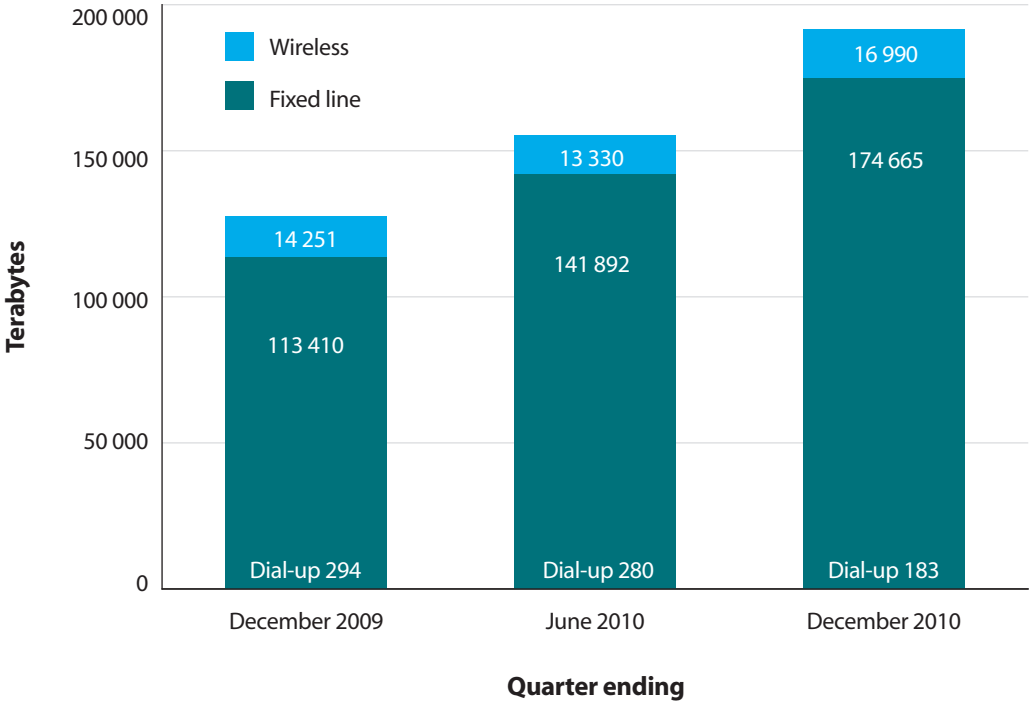
Current trends for online activity

An increasing number of Australians are joining the online community, using faster speeds to do so. At the end of December 2010, there were 10.4 million active internet subscribers in Australia.[102] Ninety-three per cent of internet connections are no longer dial-up and 81 per cent of connections offer a download speed of 1.5 megabits or greater.[103]

When Australians connect to the internet, they increase their online activity over time finding more and more uses for their connection. The amount of time people spend online and the amount of data they consume is increasing. From June 2005 to June 2010, the number of Australians considered heavy users (online activity of more than 15 hours a week) of the internet doubled.[104]

Once online, data consumption is increasing. In December 2010, Australians downloaded 191 839 terabytes of information.[105] This is a significant increase compared with the 99 249 terabytes downloaded in the 2009 June quarter—close to twice as much. The majority of data is downloaded via fixed-line broadband services (91 per cent of data downloads).[106]

Volume of data downloaded by Australian internet users



Source Data: ABS, 8153.0 Internet Activity, Australia, December 2010

Future trends for online activity

Based on existing trends the online experience will become richer and more data intensive in the future.

A historical look at new media's speed of impact suggests that the online experience will rapidly evolve, becoming richer and more rewarding more quickly with each successive iteration. Radio broadcasters took 38 years to reach an audience of 50 million. Television took 13 years. The internet took just four.[107] As each new transmission technology has emerged and developed in sophistication, there has been a correlating increase in the rate of change, building on the media of the past.

Based on existing trends, it likely that the online experience will become increasingly integrated into everyday life, at home and at work. Dr Jeffrey Cole, Director of the Annenberg School at the University of Southern California, said in an address to the Realising Our Broadband Future Forum, held in December 2009, that 'the broadband internet is not just a faster internet. It is a whole new world'.[108]

Dr Cole's research reviewed the early changes in households that came about because of broadband. In the early days of dial-up in the household, people aggregated their tasks of what they needed online beforehand so that they could do them all at once when they dialled in; in total they might spend 20–30 minutes at a time on the internet. With the introduction of broadband, people go online 30 to 50 times a day for two-to-three minutes at a time.

According to Dr Cole, this more frequent access to broadband during the day meant that the internet moved from the office into the family room or the lounge room or kitchen and became even more integrated into our daily lives.

As broadband internet becomes more integrated in daily Australian life, for those who are online, the future trends are likely to be an exponential increase in data demands. It is estimated that there were 5 exabytes of data online in 2002, which rose to 281 exabytes in 2009—56 times as much after seven years.[109] Google and HP executives predict that over the next four years, more data will be created than in the history of the planet.[110] Cisco predicts that global online traffic will grow at a compound annual growth rate of 34 per cent from 2009 to 2014 and that the average monthly traffic in 2014 will be equivalent to 32 million people streaming *Avatar* in 3D, continuously for an entire month.[111]

Contributing to the growth in online data is the 'sensor revolution', as part of which a growing number of devices are networked, and social media usage. It is estimated that the average person uploaded 15 times more data in 2009 than they did just three years ago.[112] It is expected that Australians will continue to use social media as a major component of their internet use. In their annual *Predictions*, Deloitte suggested that in 2011 social networks will pass the milestone of 1 billion unique members globally this year.[113]

Extensive availability of high-speed broadband via the NBN will itself be a catalyst for innovation and the development of new applications that rely on higher speeds, capacity and reliability.

Conclusion

The government is committed to maximising the benefit of an NBN-empowered digital economy for all Australians. It welcomes the opportunity to collaborate with industry, the community and between all levels of government to realise this commitment. The vision outlined in this strategy—that Australia be a leading global digital economy by 2020—will help guide this collaboration. The Digital Economy Goals will allow us to measure our progress towards this vision. The initiatives that this strategy announces will contribute towards achieving these goals.

The digital economy is highly dynamic and the government recognises that this may require additional steps be taken between now and 2020. Consequently, the government will closely monitor the implementation of the initiatives announced in this strategy and our progress against the Digital Economy Goals. Further measures will be identified and implemented as needed.

Defining the vision for Australia's digital future is a key step towards realising the benefits of an NBN-empowered digital economy. However, communicating this vision requires a comprehensive and multi-faceted approach.

To assist in communicating the vision, the government has refreshed the www.nbn.gov.au website to provide clear information to the public about the benefits of the NBN. Two videos have also been developed. One shows what health, educational and others services the NBN can deliver to Australian households in the not-too-distant future. The other contains business owners explaining what the NBN will mean for Australian businesses. Both are available from the website and can be embedded into other sites. Much of the information contained in the website is also being distributed offline to reach those Australians who do not regularly engage digitally.

Through an integrated online and offline approach, all Australian households and businesses will have the opportunity to understand the benefit of participating in an NBN-empowered digital economy.

www.nbn.gov.au/digitaleconomystrategy

Endnotes

1 The Allen Consulting Group, *Quantifying the economic gains of getting more Australian households online*, p. 39. November 2010

2 Source: ABS 8129.0 *Business Use of IT* 2007–08 www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/8631E43AA5A118F0CA2576170019131B/$File/81290do001_200708.xls

3 *id.*

4 Australian Bureau of Statistics 8167.0—*Selected Characteristics of Australian Business, 2008–09* http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/8167.0Main+Features62008-09

5 *Digital proficiency in small to medium Community Service Organisations: Consumer Report Executive Summary and key findings*, Infoxchange Australia, 2009, p. 3. www.ixa.net.au/sites/www.ixa.net.au/files/MeasureITsummaryReport.pdf

6 Infrastructure Australia, Major Cities Unit, *State of Australian Cities 2010*, 6 March 2010, http://www.infrastructureaustralia.gov.au/publications/files/MCU_SOAC.pdf

7 *id.*

8 *id.*

9 *Smart Grid, Smart City* project http://www.ret.gov.au/energy/energy_programs/smartgrid/Pages/default.aspx

10 Australia's *National E-Health Strategy*, http://www.health.gov.au/internet/main/publishing.nsf/content/national+Ehealth+strategy

11 Access Economics, *Financial and Externality Impacts of High-speed Broadband for Telehealth* (July 2010) http://www.dbcde.gov.au/__data/assets/pdf_file/0019/130159/Financialandexternalityimpactsofhigh-speedbroadbandfortelehealth-311.pdf

12 Council of Australian Governments' Meeting 29 November 2008, Attachment B http://www.coag.gov.au/coag_meeting_outcomes/2008-11-29/attachments.cfm#attachmentb

13 Skills Australia, *Creating a future direction for Australian vocational education and training, October 2010,* http://www.skillsaustralia.gov.au/VETdiscussionpaper.shtml

14 *Australian Business Expectations for the National Broadband Network*, Access Economics, 2010, p. 13. *www.macquarietelecom.com/reports/Business%20expectations%20for%20the%20NBN.pdf*

15 *Impacts of Teleworking under the NBN*, Access Economics, 2010 http://www.dbcde.gov.au/__data/assets/pdf_file/0018/130158/ImpactsofteleworkingundertheNBN.pdf

16 *id.*

17 PricewaterhouseCoopers, *The Economic Case for Digital Inclusion* (October 2009) http://www.parliamentandinternet.org.uk/uploads/Final_report.pdf

18 Department of Finance and Deregulation, Draft 2011 ICT Strategic Vision (April 2011) http://agimo.govspace.gov.au/2011/04/13/ict-strategic-vision/

19 The Allen Consulting Group, Quantifying the economic gains of getting more Australian households online, November 2010, p. 36–38.

ENDNOTES

20 8146.0—*Household Use of Information Technology, Australia, 2008-09*: Chapter 3: Use of the internet; Table 1 Persons 15 and over, Use of the internet by location of access–*2008–09*
http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8146.02008–09?OpenDocument

21 ABS 8129.0 *Business Use of Information Technology, 2007–08*
http://www.abs.gov.au/ausstats/abs@.nsf/mf/8129.0

22 Australian Bureau of Statistics, 8153.0—*Internet Activity, Australia, December 2010*
http://www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0/*; last accessed 8 April 2011.*

23 *id.*

24 *id.*

25 United Nations, *United Nations Cyberschoolbus: Information and communications technology.*
http://www.un.org/cyberschoolbus/briefing/technology/tech.pdf

26 Boston Consulting Group, *The Connected Kingdom: How the Internet is Transforming the United Kingdom*, p. 9
http://www.connectedkingdom.co.uk/the-report

27 Department of Broadband, Communications and the Digital Economy, 2009. *Australia's Digital Economy: Future Directions.*
http://www.dbcde.gov.au/digital_economy/future_directions_of_the_digital_economy/australias_digital_economy_future_directions

28 Table 1d (1). OECD *Fixed (wired) broadband subscriptions per 100 inhabitants, by technology, June 2010*
http://www.oecd.org/document/54/0,3746,en_2649_37441_38690102_1_1_1_37441,00.html

29 World Economic Forum, *Global Information Technology Report 2010-2011*, p. xix
http://www.weforum.org/reports/global-information-technology-report-2010-2011-0

30 Boston Consulting Group, The Connected Kingdom: How the Internet is Transforming the United Kingdom, p. 9
http://www.connectedkingdom.co.uk/the-report

31 Department of Broadband, Communications and the Digital Economy, 2009. *Australia's Digital Economy: Future Directions.*
http://www.dbcde.gov.au/digital_economy/future_directions_of_the_digital_economy/australias_digital_economy_future_directions

32 Australian Bureau of Statistics, 1351.0.55.033—*Research Paper: Business Innovation and the Use of Information and Communications Technology,* Mar 2011
http://www.abs.gov.au/ausstats/abs@.nsf/mf/1351.0.55.033

33 See *Online Retail Forum*, 18 February2011,
http://www.dbcde.gov.au/digital_economy/public_engagement/online_retail_forum

34 See http://www.retail.org.au/index.php/articles/event/Engage_in_etail

35 See http://www.gettingbusinessonline.com.au/

36 The Allen Consulting Group, *Quantifying the economic gains of getting more Australian households online*, p. 39. November 2010

37 *id.*

38 See http://laughingsquid.com/clay-shirky-on-cognitive-surplus/

39 USDA, *Broadband Internet's Value for Rural America*, p. 23
http://www.ers.usda.gov/publications/err78/err78.pdf

40 ABS 2008-09 *Household Use of IT*, table 3.8 p. 36, http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/9B44779BD8AF6A9CCA25768D0021EEC3/$File/81460_2008-09.pdf

41 *id.*

42 *ABS, 8146.0.55.001—Patterns of internet access in Australia, 2006, Figure 29, p. 54* http://www.abs.gov.au/ausstats/abs@.nsf/mf/8146.0.55.001

43 Australian Communications Consumer Action Network, Submission to the House of Representatives Inquiry into the Role and Potential of the National Broadband Network, February 2011 (Submission Number 128) http://www.aph.gov.au/house/committee/ic/NBN/subs.htm

44 Swinburne University, Submission to the House of Representatives Inquiry into the Role and Potential of the National Broadband Network, February 2011 (Submission Number 174) http://www.aph.gov.au/house/committee/ic/NBN/subs.htm

45 COSBOA 2009 *Realising our broadband future for small business* http://www.cosboa.org/news.aspx?newsID=49

46 *ACMA, 2009–10 Communications report series Report 1—Australia in the digital economy: The shift to the online environment*

47 OECD (1999), 'Economic and Social Impact of Ecommerce: Preliminary Findings and Research Agenda' *OECD Digital Economy Papers*, No. 40, OECD Publishing. doi: 10.1787/236588526334 http://www.oecd-ilibrary.org/economic-and-social-impact-of-e-commerce_5kzdcc6tnfmp.pdf;jsessionid=a37w1hb8loto.delta?contentType=/ns/WorkingPaper&itemId=/content/workingpaper/236588526334&containerItemId=/content/workingpaperseries/20716826&accessItemIds=&mimeType=application/pdf

48 Access Economics, Household and Ecommerce Trends and Activity in Australia, November 2010 p. iii, http://www.dbcde.gov.au/__data/assets/pdf_file/0020/131951/Household_e-commerce_activity_and_trends_in_Australia-25Nov2010-final.pdf

49 PricewaterhouseCoopers, *The Economic Case for Digital Inclusion* (October 2009), p. 2, October 2009, http://raceonline2012.org/sites/default/files/resources/pwc_report.pdf.

50 Australian Bureau of Statistics, 1351.0.55.033—Research Paper: Business Innovation and the Use of Information and Communications Technology, Mar 2011 http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1351.0.55.033Main+Features1Mar%202011?OpenDocument

51 Source: ABS 8129.0 *Business Use of IT* 2007–08 www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/8631E43AA5A118F0CA2576170019131B/$File/81290do001_200708.xls

52 *id.*

53 Data: ABS *Business Use of Information Technology 8129.0 2005-06* (table 5.1 "Australia and selected countries") ranks Australia 23rd of the selected international countries in the percentage of businesses having a website. Australia's 54.8% compares with greater than 80% for the five leading countries (Japan, Switzerland, Sweden, Denmark and Finland) see www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/8D42EDD9E2BC4FBCCA2573A9001B4877/$File/81290_2005-06.pdf. The Partnership on Measuring ICT for Development *The Global Information Society: a Statistical View*, 2008, April 2008, table 16, at www.unctad.org/en/docs//LCW190_en.pdf also ranks Australia performance in web presence penetration low at 52% and well behind the EU, Canada and Japan. For e-turnover as a percent of total turnover, Australia was recently ranked at 14, with 12%, well behind the three leading countries with greater than 20% (see table 5 "E-Commerce leadership", p. 19, at www.itif.org/files/2010-25-years.pdf).

54 Access Economics, *Household E-Commerce Activity and Trends in Australia* (November 2010), p. 9 http://www.dbcde.gov.au/__data/assets/pdf_file/0020/131951/Household_e-commerce_activity_and_trends_in_Australia-25Nov2010-final.pdf

ENDNOTES

55 Australian Bureau of Statistics 8167.0—*Selected Characteristics of Australian Business, 2008–09*
http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/8167.0Main+Features62008-09

56 *Digital proficiency in small to medium Community Service Organisations: Consumer Report Executive Summary and key findings*, Infoxchange Australia, 2009, p. 3.
http://www.ixa.net.au/sites/www.ixa.net.au/files/MeasureITsummaryReport.pdf

57 NBN Co case study: *Small business—remote working:*
http://www.nbnco.com.au/wps/wcm/connect/main/site-base/main-areas/publications-and-announcements/research/

58 Regional Development Australia Moreton Bay Inc., submission received 21 February 2011
http://www.aph.gov.au/house/committee/ic/NBN/subs/Sub041.pdf

59 See http://dbcde.gov.au/onlineretail

60 See http://www.pc.gov.au/projects/inquiry/retail-industry

61 Infrastructure Australia, Major Cities Unit, State of Australian Cities 2010, 6 March 2010,
http://www.infrastructureaustralia.gov.au/publications/files/MCU_SOAC.pdf

62 *National Infrastructure Priorities: Infrastructure for an economically, socially and environmentally sustainable future*, May 2009
http://www.infrastructureaustralia.gov.au/publications/files/National_Infrastructure_Priorities.pdf

63 Access Economics, *The economic benefits of intelligent technologies* (May 2009), p. 37

64 The U.S. Department of Energy, *The Smart Grid: an Introduction*,
http://www.oe.energy.gov/DocumentsandMedia/DOE_SG_Book_Single_Pages(1).pdf

65 See http://atms.artc.com.au/

66 Case study: National ICT Centre of Excellence—Improving Water Use Efficiency (July 2009)
http://www.dbcde.gov.au/digital_economy/future_directions_of_the_digital_economy/australias_digital_economy_future_directions/final_report/appendix_case_studies/national_ict_centre_of_excellence_improving_water_use_efficiency

67 National ICT Centre of Excellence, Real-time Sensing and Surveillance
http://www.nicta.com.au/research/projects/smart_transport_and_roads/star_projects/starsense

68 Allen Consulting Group, *Productivity in the buildings network: assessing the impacts of Building Information Models*, report to the Built Environment Innovation and Industry Council (October 2010).

69 See http://www.ret.gov.au/energy/energy%20programs/smartgrid/pages/default.aspx

70 Access Economics, *Financial and Externality Impacts of High-speed Broadband for Telehealth* (July 2010)
http://www.dbcde.gov.au/__data/assets/pdf_file/0019/130159/Financialandexternalityimpactsofhigh-speedbroadbandfortelehealth-311.pdf

71 *Telehealth for aged care* and *Telehealth for veteran care*: Access Economics 30 November 2010

72 *Australia's Health 2008*, Australian Institute of Health and Welfare, (p.32)
http://www.aihw.gov.au/publications/aus/ah08/ah08.pdf

73 The *Intergenerational Report 2010: Australia to 2050: future challenges* (Box 4.1), circulated by the Hon. Wayne Swan MP, Treasurer of the Commonwealth of Australia, January 2010
http://treasury.gov.au/igr/igr2010/report/pdf/IGR_2010.pdf

74 Council of Australian Governments' Meeting 29 November 2008, Attachment B
http://www.coag.gov.au/coag_meeting_outcomes/2008-11-29/attachments.cfm#attachmentb

75 Skills Australia, *Creating a future direction for Australian vocational education and training, October 2010,* http://www.skillsaustralia.gov.au/VETdiscussionpaper.shtml

76 D. Carter, *Program goes beyond open course model*, ecampusnews.com, 16 September 2009 http://www.ecampusnews.com/top-news/program-goes-beyond-open-course-model/

77 Federal Communications Commission, *National Broadband plan: Connecting America*, Broadband.gov, 16 March 2010, http://www.broadband.gov/plan/11-education

78 European Commission, *The ICT Impact Report A review of studies of ICT impact on schools in Europe,* December 2006, http://ec.europa.eu/education/pdf/doc254_en.pdf

79 Skills Australia, *Creating a future direction for Australian vocational education and training,* October 2010, http://www.skillsaustralia.gov.au/VETdiscussionpaper.shtml

80 NBN Co case study: *Education—teacher retention:* http://www.nbnco.com.au/wps/wcm/connect/main/site-base/main-areas/publications-and-announcements/research/

81 *Australian Business Expectations for the National Broadband Network*, Access Economics, 2010, p. 13. http://*www.macquarietelecom.com/reports/Business%20expectations%20for%20the%20NBN.pdf*

82 Impacts of Teleworking under the NBN, Access Economics, 2010 http://www.dbcde.gov.au/__data/assets/pdf_file/0018/130158/ImpactsofteleworkingundertheNBN.pdf

83 *id.*

84 Australian Bureau of Statistics 2008, *Household Use of Information Technology*, Australia, 2007-08, cat. no. 8146.0, Canberra, 18 December 2008. http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/8146.0Main%20Features42007-08?opendocument&tabname=Summary&prodno=8146.0&issue=2007-08&num=&view=

85 PricewaterhouseCoopers, *The Economic Case for Digital Inclusion* (October 2009) http://www.parliamentandinternet.org.uk/uploads/Final_report.pdf

86 *Interacting with Government: Australians' use and satisfaction with e-government services*, December 2009, Australian Government Information Management Office http://www.finance.gov.au/publications/interacting-with-government-2009/docs/interacting-with-government-2009.pdf

87 *Interacting with Government 2009,* Department of Finance and Deregulation: http://www.finance.gov.au/publications/interacting-with-government-2009/docs/interacting-with-government-2009.pdf

88 US Government, Federal Cloud Computing Strategy (February 2010) http://www.cio.gov/documents/Federal-Cloud-Computing-Strategy.pdf

89 Department of Finance and Deregulation, Draft 2011 ICT Strategic Vision (April 2011) http://agimo.govspace.gov.au/2011/04/13/ict-strategic-vision/

90 See http://www.finance.gov.au/e-government/strategy-and-governance/gov2/declaration-of-open-government.html

91 See http://www.finance.gov.au/publications/govresponse20report/index.html

92 See http://libraryhack.org/

93 See http://www.codeplay.abs.gov.au/websitedbs/corporate.nsf/home/codeplay

94 The Allen Consulting Group, *Quantifying the economic gains of getting more Australian households online*, November 2010, p. 36-38 .

ENDNOTES

95 Commission for Rural Communities, *Mind the gap: Digital England—a rural perspective* in Williams, Tim, *Connecting Communities: The Impact of broadband on communities in the UK and its implications for Australia*, commissioned by Huawei Technologies, February 2011, p. 32.
http://www.huawei.com.au/connectingcommunities/docs/Huawei_CC_WhitePaper.pdf

96 B Glanville, Regional business hails broadband plan, 8 September 2010,
http://www.abc.net.au/lateline/business/items/201009/s3006648.htm

97 8146.0—Household Use of Information Technology, Australia, 2008–09: *Chapter 3: Use of the internet; Table 1 Persons 15 and over, Use of the internet by location of access–2008–09*
http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8146.02008-09?OpenDocument

98 ABS 8129.0 Business Use of Information Technology, 2007–08
http://www.abs.gov.au/ausstats/abs@.nsf/mf/8129.0

99 Table 1d (3) Broadband subscribers per 100 inhabitants in OECD countries Last updated on 6 Dec. 2010
http://www.oecd.org/document/23/0,3746,en_2649_37441_33987543_1_1_1_37441,00.html

100 Table 1d(3) Broadband Prices Monthly Subscriptions, Oct 2009
http://www.oecd.org/document/54/0,3746,en_2649_34225_38690102_1_1_1_1,00.html

101 OECD *Economic Survey of Australia 2010, Overview* p. 12
http://www.oecd.org/document/37/0,3343,en_2649_34569_46255013_1_1_1_1,00.html

102 Australian Bureau of Statistics, 8153.0—*Internet Activity, Australia, December 2010*
http://*www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0/*; *last accessed 8 April 2011*

103 Australian Bureau of Statistics, 8153.0—*Internet Activity, Australia, December 2010*
http://*www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0/*; *last accessed 8 April 2011*

104 Australian Media and Communications Authority, *Communications Report 2009–10 series, Report 1—Australia in the digital economy: the shift to the online environment*, p. 13.

105 Australian Bureau of Statistics, 8153.0—*Internet Activity, Australia, December 2010*
http://*www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0/*; *last accessed 8 April 2011*.

106 *id.*

107 United Nations, *United Nations Cyberschoolbus: Information and communications technology.*
http://www.un.org/cyberschoolbus/briefing/technology/tech.pdf.

108 Jeffrey Cole, *Presentation to the Realising Our Broadband Future Forum*, 10 December 2010,
http://webcast.viostream.com/?viocast=2230&auth=ac7aa355-0853-4b29-be91-793af259c03d]

109 Marissa Mayer, *Innovation at Google: the physics of data* (presentation). 2009
http://www.slideshare.net/PARCInc/innovation-at-google-the-physics-of-data.

110 Richard MacManus "The coming data explosion" *ReadWriteWeb* 2010
http://www.readwriteweb.com/archives/the_coming_data_explosion.php

111 Cisco, *Hyperconnectivity and the Approaching Zettabyte Era*, 2 June 2010
http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/VNI_Hyperconnectivity_WP.html

112 Richard MacManus "The coming data explosion" *ReadWriteWeb* 2010
http://www.readwriteweb.com/archives/the_coming_data_explosion.php

113 Deloitte, *Technology, Media and Telecommunications Predictions 2011*
http://www.deloitte.com/assets/Dcom-Australia/Local%20Assets/Documents/Industries/TMT/2011_TMT_Predictions_Australia_Web_FINAL.pdf