

TRANSPORT ENERGY WATER TELECOMMUNICATIONS

infrastructure report card 2010
South Australia



ENGINEERS
AUSTRALIA

TELECOMMUNICATIONS

11.1 Summary

Infrastructure type	SA 2010	SA 2005	National 2005	National 2001
Telecommunications	C	Not rated	Not rated	B

This rating recognises that while telecommunication services are generally available to a high percentage of the population in SA, there are still many blackspots in broadband and mobile coverage, and areas of network vulnerability due to a lack of competitive backhaul.

In 2007, Engineers Australia rated telecommunications in the *Telecommunications Infrastructure Report Card 2007*. It used Local Government Statistical Divisions as the geographic basis for rating fixed and mobile infrastructure. Below are its ratings.

Statistical Division Name	Fixed Infrastructure Rankings (2007)	Mobile Infrastructure Rankings (2007)
Adelaide	D	C
Outer Adelaide	D	D
Yorke and Lower North	F	E
Murray Lands	D	E
South East	E	E
Eyre	F	F
Northern	F	E

Developments since the 2007 Telecommunications Infrastructure Report Card have included:

- ▶ Increased demand for high speed broadband services
- ▶ Continual growth in mobile phone ownership
- ▶ Increased competition in the provision of telecommunication services
- ▶ Increased provision of backhaul fibre and microwave links
- ▶ Increased capability of mobile telephone networks including increases in coverage, reliability, function and capacity
- ▶ Backhaul Blackspots Initiative projects.

Major in-progress infrastructure projects include:

- ▶ The Australian Government's National Broadband Network (NBN) Project
- ▶ The SA Government's Broadband Development Fund projects.

Challenges to improving telecommunications infrastructure include:

- ▶ Generating broadband consumer demand
- ▶ Creating a value proposition for ubiquitous high speed broadband
- ▶ Selecting optimal technologies
- ▶ Strengthening resilience of the telecommunications backbone.

11.2 Infrastructure overview

11.2.1 System description

SA's telecommunications infrastructure consists of infrastructure that delivers customer access networks (CAN) and backhaul transmission networks. The key elements rated in this chapter are:

- ▶ Fixed line CAN infrastructure
- ▶ Mobile CAN infrastructure
- ▶ Backhaul infrastructure.

The provision of telecommunications services operates within a market structure comprised of:

- ▶ **Carriers.** The owner of a network used to supply carriage services to the public.
- ▶ **Carriage service providers.** The organisations that use a carrier service to supply telecommunications services to the public using a carrier-owned network. Internet service providers (ISPs) are carriage service providers.
- ▶ **Content service providers.** The organisations that supply radio and TV broadcasting and on-line services to the public.

This chapter does not address content service provision or private telecommunication systems that have no impact on public telecommunications.

Table 11.1 lists the infrastructure that this section assesses.

Table 11.1: Infrastructure assessed in the Report Card⁷⁰²

Type	Purpose	Technologies
Customer Access Network (CAN) <ul style="list-style-type: none"> • Fixed line • Mobile • Fixed wireless 	Connects customer to an aggregation point	<ul style="list-style-type: none"> • Copper twisted pairs • DSL Access Multiplexers (using twisted pairs, possibly in the form of ULL or LSS) • Coaxial access part of hybrid fibre-coaxial (cable TV) systems • Access fibre networks (fibre to the premises/home) • Cellular 2G, 2.5G and 3G mobile networks • WiMAX technologies
Backhaul	Connects aggregation points to major nodes in capital cities or regional centres, and provides high-capacity links between capital cities, or from regional centres to capital cities	<ul style="list-style-type: none"> • Transmission fibre • Fibre trunks • Microwave links • Satellite links

Fixed line CAN infrastructure

The fixed line CAN represents the link between the telephone exchange and the customer. Fixed line infrastructure includes twisted pair copper wire, and fibre to the home/premises, and it provides telephony, data transfer and internet connections. Copper wire has been the standard medium for connecting fixed line services to end-user premises but this is being replaced with optical fibre. The fixed line CAN owner in SA is Telstra.

Mobile CAN infrastructure

Mobile CAN infrastructure provides mobile telephone, data and multimedia services to mobile handsets. There are four mobile carriers operating in SA. These networks use either 2G/2.5G or 3G services.

2G/2.5G (henceforth known as GSM) networks in SA are operated by:

- ▶ Telstra
- ▶ Optus

- ▶ Vodafone.

3G networks in SA are operated by:

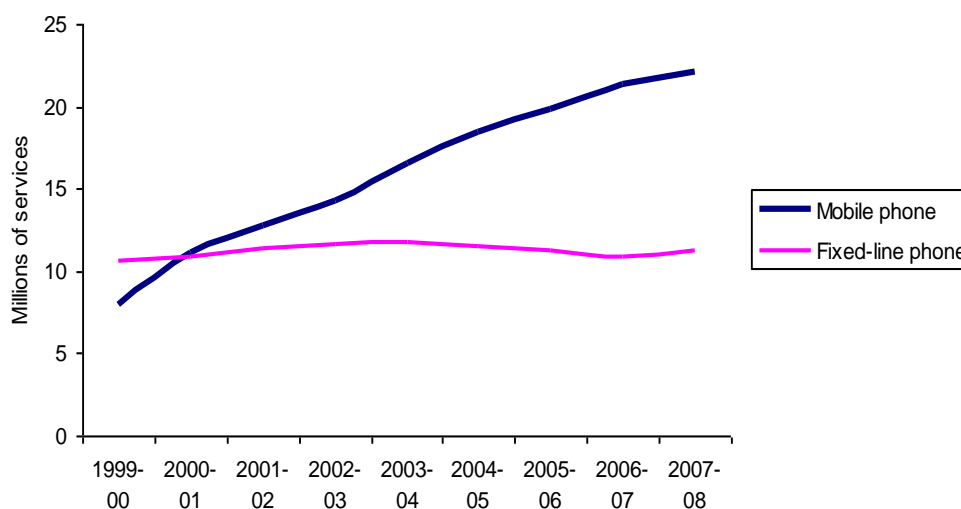
- ▶ Telstra's Next G Network
- ▶ Hutchinson '3' (Hutchinson/Telstra network)
- ▶ Optus/Vodafone (shared network).

In June 2009, Vodafone and Hutchison 3G Australia merged to form Vodafone Hutchison Australia. Although these companies now operate as a single entity, as of November 2009 they are yet to announce any plans to merge the 'Vodafone' and '3' networks or offer roaming between them.

The GSM networks were primarily designed for voice services but are capable of supporting data services at a lower rate than 3G networks. The 3G network allows much higher data transfer rates than the GSM networks, allowing consumers to access a wider range of applications. The 3G technology allows carriers to offer a wider range of service to consumers and achieve a more efficient use of spectrum that allows for greater network capacity. 3G networks provide access to data and the internet through either a mobile handset or a data card that is inserted into a computer. The 3G networks can provide peak download speeds of up to 14.4 Mbps and upload speeds of up to 1.9 Mbps. However, it should be noted that mobile broadband capacity is typically shared amongst multiple simultaneous users and is therefore subject to contention.

Figure 11.1 shows that the growth in mobile phones has been substantial over the last decade. The number of mobile phones has exceeded the number of fixed-line phones from 2000.

Figure 11.1: Take-up of fixed-line and mobile phones (Australia-wide)⁷⁰³



While the primary use of mobile phones and other devices is voice, increasingly, non-voice services are providing a greater share of total revenue. The main uses of mobile phones are:

- ▶ Short Message Service (SMS) and Multimedia Message Service (MMS)
- ▶ Email
- ▶ Web browsing and other data services
- ▶ Personal aids, including personal digital assistants (PDAs), GPS-enabled navigation and USB drives
- ▶ Mobile TV and video streaming
- ▶ Mobile commerce, interactive services and location-based services.⁷⁰⁴

The growth in mobile broadband speed is significant and likely to accelerate the update of mobile phones for applications that require large amounts of data in near real-time. It is expected that by

2012, mobile networks will be capable of speeds of 100Mbps.⁷⁰⁵ given sufficient bandwidth allocation.

Broadband

Broadband is a class of data transmission technologies, including optic-fibre (FTTx), xDSL (such as ADSL, ADSL2+ and VDSL), HFC cable and wireless (such as WiMAX, HSPA and LTE).⁷⁰⁶

Broadband speed is continuing to increase, with the faster speeds being delivered by fixed line, followed by wireless networks. Australia-wide, the percentage of connections using different broadband technologies is shown in Figure 11.2. While there is no public data that is specific for SA, the split is likely to be very similar in the State. The dominant broadband connection is DSL/ADSL, followed by cable and wireless.

Figure 11.2: Type of broadband connection, Australia-wide⁷⁰⁷

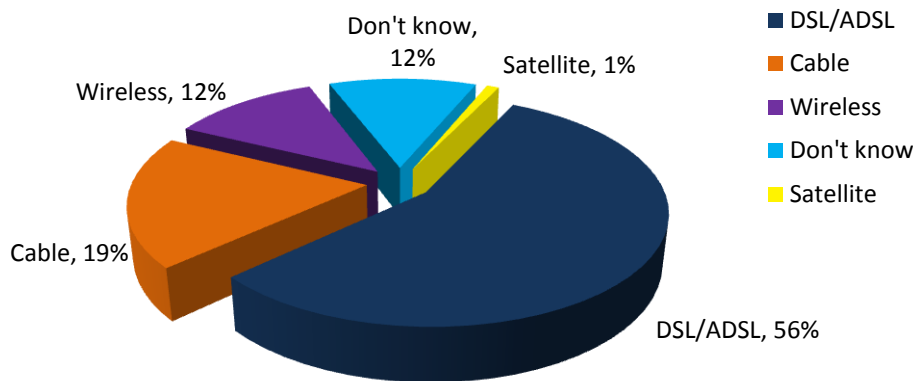
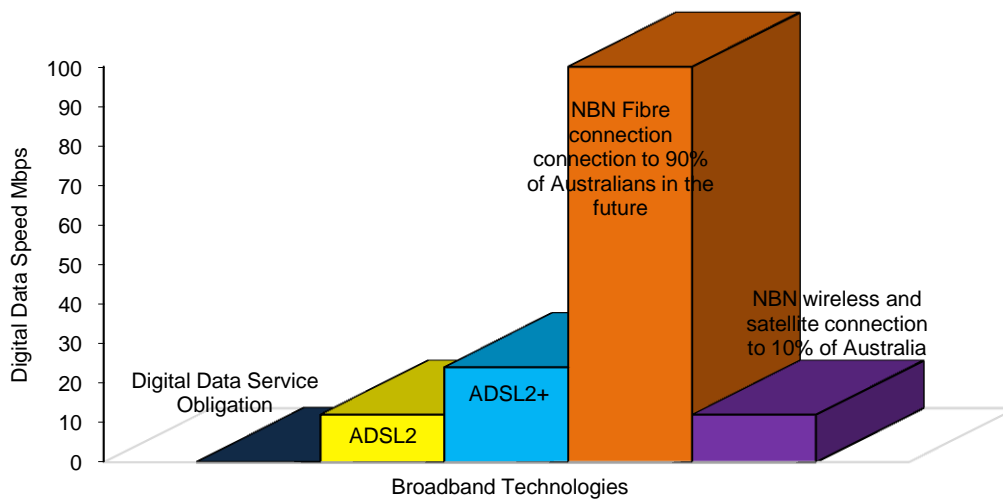


Figure 11.3 illustrates the speed comparisons for different broadband technologies.

Figure 11.3: Digital data speed comparison⁷⁰⁸



The above speeds are peak speeds. The actual speed experienced by users depends on the quality of the line/connection, number of simultaneous users, traffic congestion on the internet, physical location, distance from an exchange/node, and broadband speed caps applied by internet providers. While higher speeds are often in excess of what is needed by customers currently, over time, new applications will invariably be developed that will utilise the high speed.

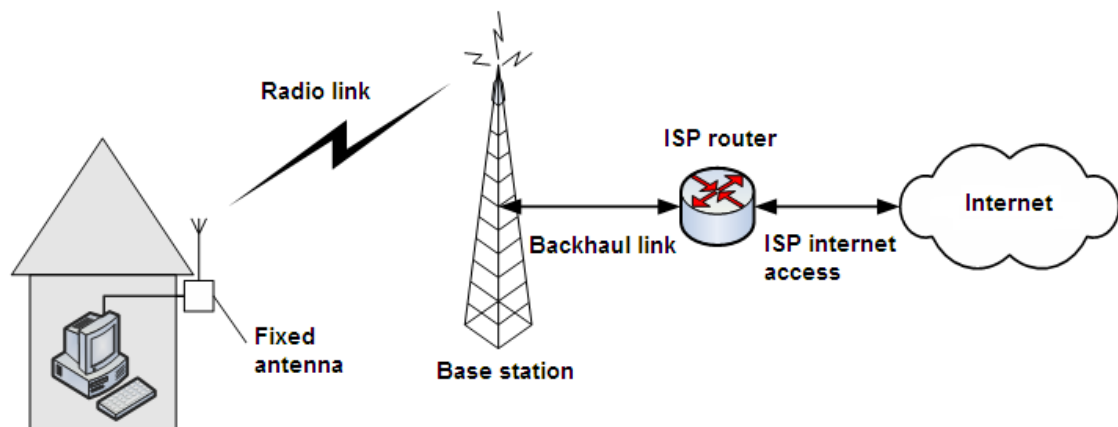
There is a range of other broadband technologies that can be used, such as broadband over power line (BPL). This involves using the electricity networks for the transmission of data, voice and video.

While BPL has potential, particularly in areas that are unserved by other broadband technologies, its greatest limitations are that it will result in leakage of radiofrequency emission into the surrounding environment and this may interfere with radiocommunications services.⁷⁰⁹

Fixed wireless

Fixed wireless is a technology that provides broadband and phone services without the use of mobile phone infrastructure or local wireless routers. It involves using a wireless modem or card in a computer to connect to the internet as seen in Figure 11.4. Wireless broadband is usually more affordable than mobile wireless (e.g. 3G phone subscribers), however it has a smaller network coverage. Its quality of service is limited by the spectrum available, radio frequency interference and distance from transmitter.

Figure 11.4: Fixed wireless broadband⁷¹⁰



Backhaul infrastructure

Backhaul infrastructure connects telecommunication aggregation points to major nodes in capital cities or regional centres, and provides high-capacity links between capital cities, or from regional centres to capital cities. Backhaul is provided by fibre or microwave technologies, and while fibre-based infrastructure provides the highest bandwidth, its construction is more capital intensive.

Figure 11.5 identifies the existing backhaul routes in SA.

Significant backhaul projects recently completed include:

- ▶ The Port Lincoln Broadband project, which involved:
 - ◆ An optical fibre and wireless point-to-multi-point services in Port Lincoln, Whyalla and Port Augusta, and
 - ◆ A new backhaul connection to Adelaide through the construction of new microwave point-to-point links between Port Lincoln and Port Augusta and interconnection with the national inter-capital fibre route.⁷¹¹
- ▶ Microwave connection from Mount Gambier to Bordertown's intercapital fibre
- ▶ Linking of Murray Bridge and Berri with new microwave link, and associated spurs into sections of the region
- ▶ Microwave connection from Adelaide to the Barossa Valley⁷¹²
- ▶ Microwave backbone connection from Adelaide to Port Wakefield and to the Mindarie sand mine in the Murraylands.

Due for completion in 2010 is a new backbone link from Binnies Hill to Lameroo and Pinnaroo in the Southern Mallee.

Figure 11.5: Existing backhaul routes in SA⁷¹³



11.2.2 Policy and governance

The Australian Government’s strategic vision for telecommunications reflects that while telecommunications can be an enormous contributor to the economy and to the lifestyle, health and safety of the community, telecommunications provision and innovation are primarily driven by market forces. The SA Government, in its *Strategic Plan*, has outlined the importance of telecommunications to meeting its challenges and opportunities in the 21st Century. Both governments consider that their major role is to encourage the uptake of telecommunications and the development of telecommunications goods and services. The key to achieving this is a

supportive regulatory framework and selective intervention when markets fail to deliver competition or appropriate services. Key national priorities, as defined in the *Australia's Digital Economy: Future Directions* paper (2009), are to address Australia's lower take-up rate of internet use and business adoption of e-commerce compared with international peers, provide national broadband infrastructure via the National Broadband Network, free up spectrum by the switchover to digital television, reallocation/renewal of licenses for various spectrum bands, and refining Australia's communications framework.⁷¹⁴

SA telecommunication documents are:

- ▶ **Information Economy Agenda 2009-2014 (2009).** This identifies three key priorities for the State's information economy strategy, which are:
 - ◆ Facilitating the provision of broadband infrastructure so as to increase affordable internet connectivity
 - ◆ Creating a digitally literate population
 - ◆ Supporting local creative content and ICT skills.
- ▶ **ICT Blueprint: Information and Communication Technology Driving Growth for South Australia (2007).** This recognises the need for affordable and quality broadband as a key infrastructure concern and outlines the following actions to achieve this outcome:
 - ◆ To work with the Australian Government to strengthen SA's broadband infrastructure
 - ◆ Review and, if necessary, revise the *State Broadband Strategy*
 - ◆ Continue the operation of the SA Broadband Development Fund.⁷¹⁵
- ▶ **State Broadband Strategy (2004).** This outlined the importance of broadband technology to the future needs of South Australians and set a target of affordable broadband services for all South Australians by 2008.⁷¹⁶ A key component of the strategy was the Broadband Development Fund (BDF), which was created to assist in the achievement of broadband infrastructure development through the funding of strategic projects.
- ▶ **South Australia's Strategic Plan (2007).** This includes a broadband objective (Target 4.8) which states that "*Broadband usage in South Australia (is) to exceed the national average by 2010, and be maintained thereafter.*"

Australia's telecommunications industry is subject to a regulatory framework defined by the *Telecommunications Act 1997*. Its core aim is to promote the long-term interests of end-users of telecommunications services. The framework relies on industry self-regulation to develop codes and standards in all areas that apply to the sector. However, Government regulators have powers to intervene if industry self-regulation is not working effectively in specific instances. The key types of framework documents developed under self-regulation are:

- ▶ Industry Codes, which are rules or guidelines governing particular aspects of telecommunications, developed by industry
- ▶ Industry Standards, which are rules or guidelines similar to industry codes, but determined by the Australian Communications and Media Authority (ACMA)
- ▶ Technical Standards that cover the technical parameters of customer equipment, such as cables and networks.⁷¹⁷

Two other key elements of the regulatory framework are the:

- ▶ *Telecommunications (Consumer Protections and Service Standards) Act 1999*, which legislates a number of consumer protection matters, particularly the Universal Service Regime, the National Relay Service, and continued access to untimed local calls
- ▶ *Trade Practices Act 1974*, which includes two telecommunications-specific parts, Parts XIB and XIC, covering anti-competitive conduct provisions and a telecommunications-specific access regime respectively.^{bb}

^{bb} The access rules under this legislation provide a framework for determining the services to which content service providers have a right to access for the purpose of providing their own competing services, and the cost at which such services will be provided to them.

The radio spectrum framework is defined in the *Radiocommunications Act 1992* that sets out the tools to manage the spectrum including frequency planning, licensing and technical standards.

In September 2009, the Australian Government announced that it would be making major telecommunication reforms, as it stated that the existing telecommunications anti-competitive conduct and access regimes are cumbersome and provide insufficient certainty for investment.⁷¹⁸

The proposed reforms involve:

- ▶ A structural separation of Telstra that primarily involves separating the network operations/wholesale functions from the retail functions
- ▶ Streamlining the competition regime to provide more certain and quicker outcomes for telecommunications companies
- ▶ Strengthening consumer safeguards, notably the Universal Service obligation, Customer Service Guarantee and Priority Assistance
- ▶ Removing redundant and inefficient regulatory red tape.⁷¹⁹

The Commonwealth *Telecommunications Act 1997* exempts low-impact and certain other telecommunications facilities from most planning requirements under State legislation.⁷²⁰ However, for other facilities, State and local government planning schemes apply. In SA, there are no State-specific guidelines that local governments apply in their planning decisions for telecommunications facilities, so local governments use the national code.

Key multi-jurisdictional bodies and government agencies are:

- ▶ **Department of Broadband, Communications and the Digital Economy (DBCDE).** The DBCDE has a leading role in outlining the strategic direction of the telecommunications sector, and providing advice on all regulatory policy aspects of the telecommunications and radiocommunications sectors. Its Telecommunications Industry Division also provides advice on legislative and administrative arrangements for Telstra and Australia Post.
- ▶ **Australian Communications and Media Authority (ACMA).** ACMA is a regulator of the Australian communications industry, with specific responsibilities for the regulation of broadcasting, the Internet, radiocommunications, and telecommunications consumer and technical matters.
- ▶ **Australian Competition and Consumer Commission (ACCC).** The ACCC regulates competition in the telecommunications industry with specific responsibilities for the administration of regulation of anti-competitive conduct, and the approval and arbitration of access codes developed by the industry.
- ▶ **Telecommunications Industry Ombudsman (TIO).** The TIO provides an independent dispute resolution forum for complaints made by residential and small business consumers of telecommunications services. The TIO is funded through charges levied on carriers and service providers on the basis of complaints received against them.
- ▶ **Communications Alliance Ltd.** The Communications Alliance is the peak communications industry body and has primary responsibility for developing technical, operational and consumer industry codes and standards for the industry.⁷²¹

The SA Government agencies are:

- ▶ **Department of Further Education, Employment, Science and Technology.** This Department is responsible for building the research and innovative capacity of SA.⁷²² A key program area is Broadband SA, which is tasked with providing a coordinated approach to dealing with issues relating to broadband telecommunications services across the State. Its key responsibilities include:
 - ◆ Policy advice on achieving SA's *Strategic Plan* Target 4.8 on broadband usage
 - ◆ Operating the Broadband Development Fund
 - ◆ Mapping the coverage and capacity of broadband infrastructure and access in SA

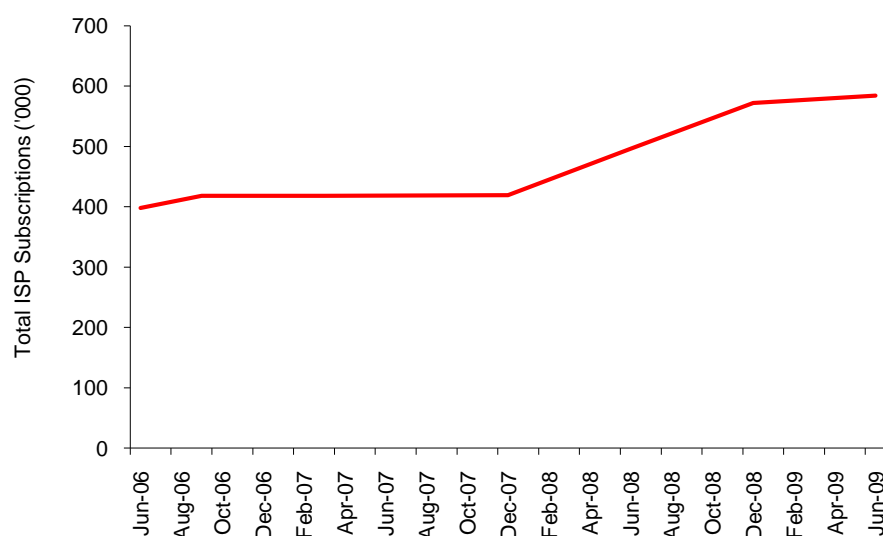
- ◆ Identifying broadband drivers and usage across the State
- ◆ Providing input and feedback into national broadband policies and initiatives.⁷²³

11.2.3 Sector trends

Growth in internet connections

The number of SA consumers with internet connections continues to rise as seen in Figure 11.6. The graph illustrates that in the past year, growth has slowed, which may indicate that the market is reaching saturation given the current price and quality packages. However, the number of consumers is likely to rise as services become available in unserved areas and the rollout of the NBN commences.

Figure 11.6: Total ISP subscriptions in SA⁷²⁴



Some 36% of SA residents have an ISP subscription, which is below the national average of 38% as seen in Table 11.2.

Table 11.2: Percentage of population with ISP subscriptions, June 2009.

State	Population (thousands) ⁷²⁵	People with ISP subscriptions (thousands) ⁷²⁶	Proportion of population with ISP subscriptions
New South Wales	7099.7	2713	38%
Victoria	5427.7	1952	36%
Queensland	4406.8	1746	40%
South Australia	1622.7	584	36%
Western Australia	2236.9	919	41%
Tasmania	502.6	182	36%
Northern Territory	224.8	83	37%
Australian Capital Territory	351.2	241	69%
Australia	21874.9	8420	38%

The availability of reasonably priced fourth generation (4G) cellular and wireless telecommunication technology and the rollout of the NBN are expected to accelerate this. In May 2010, Telstra commenced a trial of Long Term Evolution (LTE), a 4G technology, to assess its capability and performance as the next evolution of the Next G network. Based on the trial, Telstra will spend the next three to six months testing the feasibility and technical capability of LTE for future commercialisation.⁷²⁷

Rollout of Australian Government broadband infrastructure

In response to the increasing demand for high-speed broadband services, and the need to provide broadband services in regional and other areas with limited access, the Australian Government has initiated a number of projects to develop broadband networks.

National Broadband Network

In early 2009, the Australian Government announced that it would be building the National Broadband Network (NBN). The NBN aims to connect 90% of Australian homes, schools and workplaces with 100Mbps broadband services through fibre-to-the-premises (FTTP) connections. The remaining 10% will be provided with 12Mbps next generation wireless and satellite broadband services.

The network will be built and operated by a new company specifically established by the Australian Government for the project. Investment in the company will, according to preliminary estimates, total up to \$43 billion over eight years. Funding for the company will come primarily from the Australian Government through the *Building Australia Fund*, which will be the majority shareholder. The Australian Government expects private sector investment in the company through the issuing of Aussie Infrastructure Bonds (AIBs). The Australian Government intends to sell its interest in the company after the network is built and fully operational.

The Australian Government claims that the NBN will lead to a significant reform in the telecommunication industry as it will create a complete separation between the infrastructure provider and retail service providers. This separation is expected to lead to greater retail competition and lower prices.

Rollout of the network will begin in SA in the second half of 2010, with connection to 1,000 premises in Willunga, approximately half way between Adelaide and Victor Harbour. This site will be used as a test to determine the final design and construction elements of the eight year network roll-out. The network is expected to be accessible for this site by early 2011.⁷²⁸

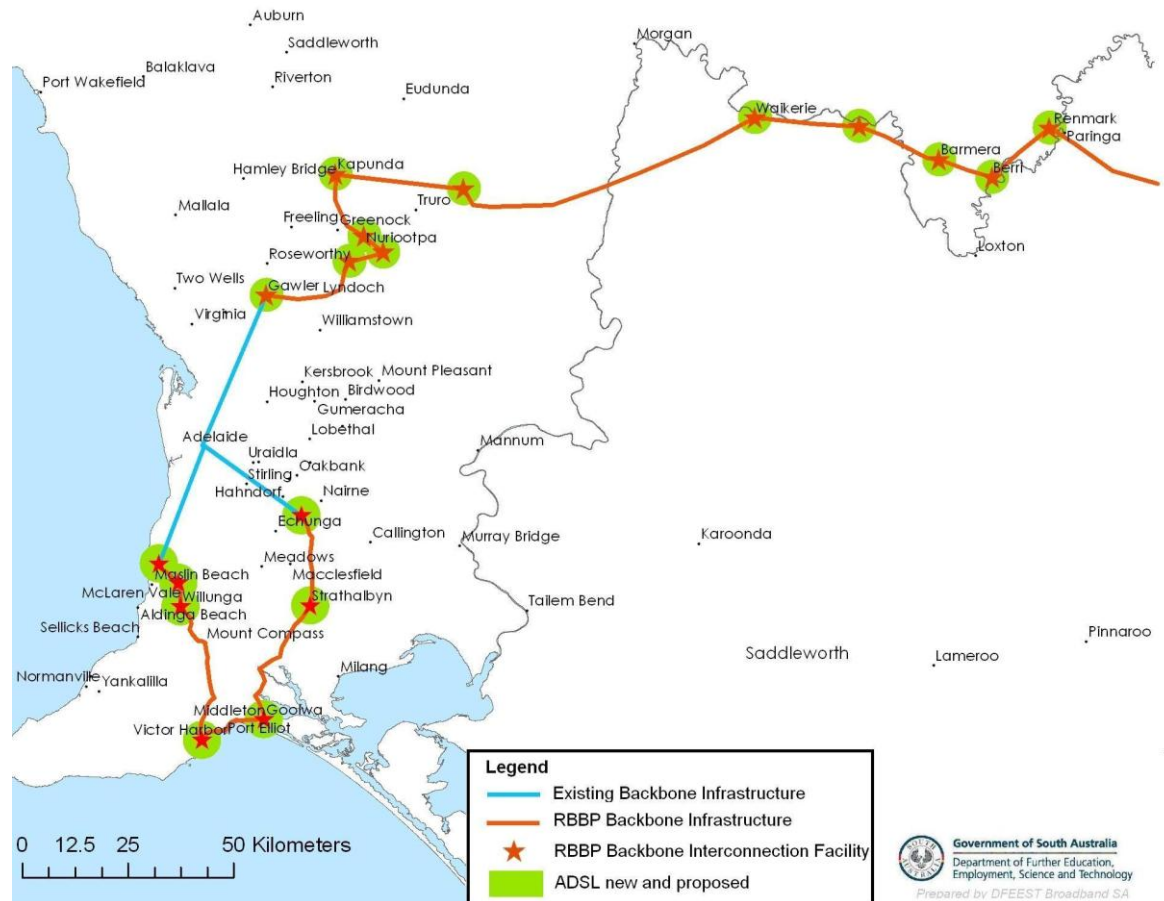
Fibre in greenfield estates

The Australian Government has announced that as part of the NBN all greenfield developments that receive planning approval after 1 July 2010 will require fibre-to-the-premises infrastructure. This initiative is designed to ensure that homes built in new developments or major redevelopments are connected via fibre infrastructure. In December 2009, the Australian Government released an exposure draft of a bill to implement the changes.⁷²⁹

Staff from Broadband SA provide SA Government representation on the national Stakeholders Reference Group on the implementation of this policy, and advise the SA Government. Together with specific advice from the Department of Planning and Local Government, consideration is currently being given as to whether changes to State planning legislation and/or regulation will be required.

Backhaul Blackspots Initiative

To immediately enhance broadband access in regional Australia, the Australian Government announced the Backhaul Blackspots Initiative in April 2009. This program provides \$250 million to be used to immediately address 'backbone blackspots' in regional Australia. In June 2009, the Australian Government announced that Victor Harbor had been named as one of six initial locations in the first round of the program. The contract for the initiative was awarded to Leighton Holdings owned Nextgen Networks in December 2009 and was announced as part of the first building blocks of the National Broadband Network.⁷³⁰ The other SA funded project was a new fibre route from Mildura to Gawler via the Riverland. This project will provide route diversity/protection for Broken Hill. These projects are identified in Figure 11.7.

Figure 11.7: Regional Backbone Blackspot Projects in SA⁷³¹

Expansion of SABRENet

The South Australian Broadband Research & Education Network (SABRENet) is a 120km fibre-optic broadband network linking over 50 research and education sites in metropolitan Adelaide.^{cc} It provides data speeds in excess of 1 gigabit per second. The network was commissioned in 2006 and continues to grow with the most recent connections being to:

- ▶ TECHPORT Australia, SA's naval defence precinct
- ▶ Tea Tree Gully TAFE
- ▶ Port Adelaide TAFE.

Figure 11.8. identifies the route of the SABRENet backbone. Further extensions are being planned, including to Noarlunga, connecting the area's hospital, TAFE and university sites.

Broadband Development Fund

The Broadband Development Fund (BDF) was a SA Government initiative of the 2004 *State Broadband Strategy*. Some \$7 million was allocated to the Fund and all funds are expected to have been allocated by June 2009. The following projects were funded through the scheme:

- ▶ **Broadbanding the Yorke Peninsula.** This \$2.8 million project, including \$550,000 from the BDF, was a two stage project. Stage 1 provided the backbone for the network and broadband coverage to some of the larger towns on the Peninsula. Stage 2 provided broadband across the entire district through the construction of a WiMAX (Worldwide interoperability for Microwave Access) fixed wireless broadband network with speeds of up to 6 Megabits per second. Stage 2 was completed in 2008.⁷³²
- ▶ **Kangaroo Island Broadband Connectivity.** This \$2.6 million project, including \$427,000 from the BDF, involved Telstra enabling ADSL in its exchanges in Kingscote, Penneshaw, American

^{cc} SABRENet Ltd is a non-profit public company formed to oversee the development, management and effective use of SABRENet. The members of SABRENet Ltd are Flinders University, the University of Adelaide, the University of South Australia and the South Australian Government.

River, Parndana, Harriet, Cygnet River, Karatta, MacGillivray, Stokes Bay, Gosse and Wisanger with DSLAMs (technology located at exchanges or in roadside cabinets that take the copper lines from a customer premises and convert signals on/off them into a high speed pipeline to the internet) to provide DSL services over copper cables, and building an optical fibre backbone for transmission links on land as well as upgraded microwave radio links for backhaul to the mainland and Adelaide.⁷³³

- ▶ **Connecting Salisbury and Beyond.** This \$1 million project, including \$550,000 from the BDF, involved Amcom installing DSLAMs in two Telstra exchanges to offer ADSL2+ services, and building wireless broadband base stations.⁷³⁴
- ▶ **Coorong Rural Broadband Network.** This \$1 million project, including \$398,950 from the BDF, involved developing a regional broadband network with infrastructure consisting of eleven new radio towers and ADSL2+ DSLAMs in Tailem Bend, Meningie, Coonalpyn and Tintinara.⁷³⁵ Since then, several basestations have been upgraded to WiMAX.
- ▶ **Barossa and Light Broadband Connectivity Infrastructure Project** This \$1,354,500 project, including \$596,500 from the BDF, involved the construction of high capacity wireless backhaul to Adelaide, three new DSLAMS and eight new wireless broadband basestation nodes.⁷³⁶

Figure 11.8: route of the SABRENet backbones⁷³⁷



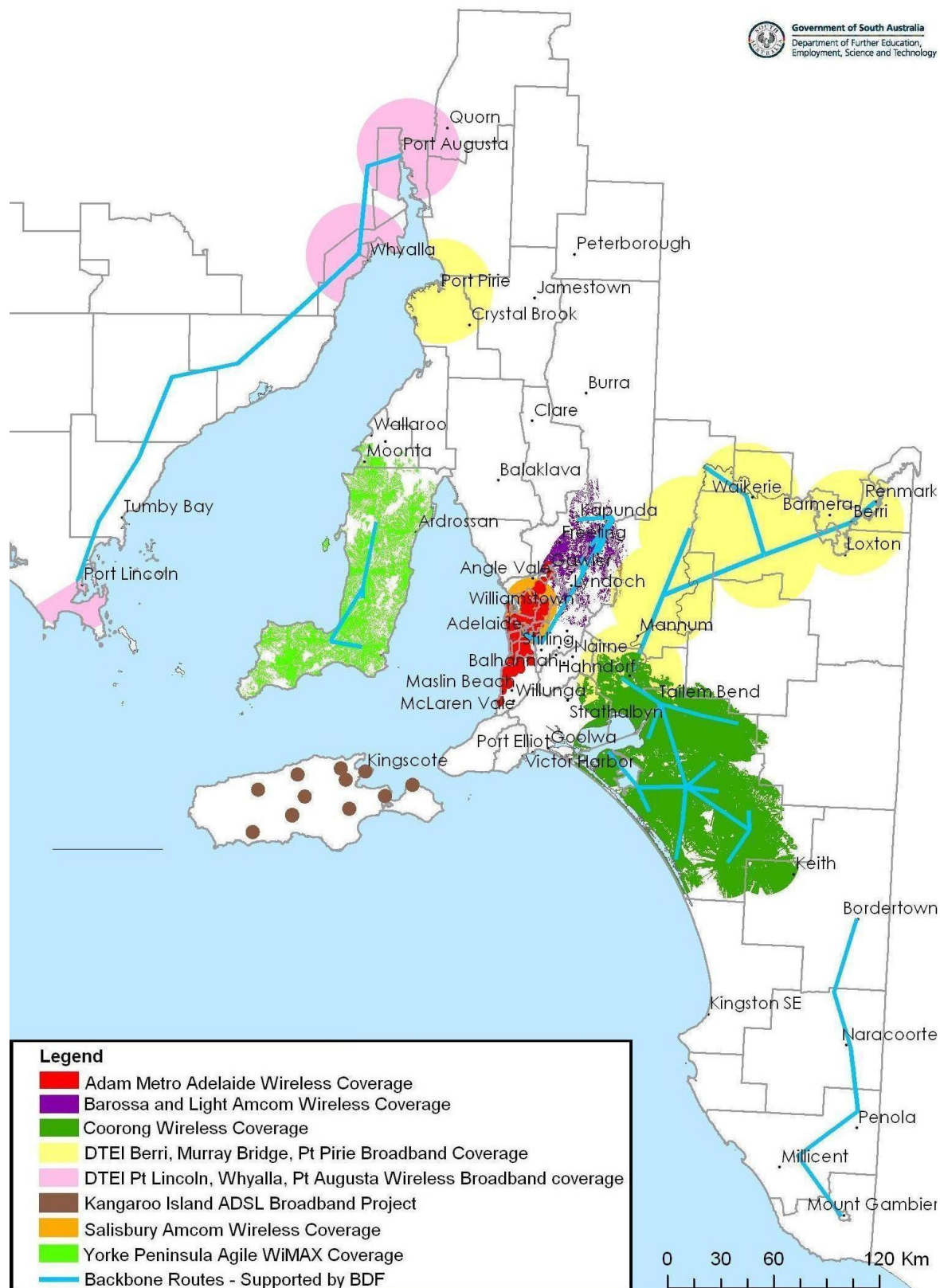
Figure 11.9 shows the broadband coverage resulting from Broadband Development Fund projects.

StateNet

StateNet is the SA Government’s wide area government telecommunications network made up of voice, data and radio networks. The voice network consists of shared telephony and PABX infrastructure, comprising over 100 PABX systems and approximately 35,000 extensions. The data network consists of a core network and associated agency access networks and provides government agencies with access to critical business systems, other central data processing environments, messaging services (via SAGEMS), shared directory services and the State

Government's shared internet gateway. The radio network incorporates around 200 dedicated transmitting sites State-wide that provide mobile, hand portable, and paging services to government emergency services personnel. The network is designed to support around 12,000 mobile and portable radio users and up to 50,000 paging devices. A dedicated independent data network is also operated from the State radio network transmitting sites that bound the Adelaide CBD and extended metropolitan areas.⁷³⁸

Figure 11.9: Broadband coverage resulting from Broadband Development Fund projects⁷³⁹



Over the last few years, StateNet has been extended to seven regional centres under the \$12.2 million StateNet Regional Broadband Program, which incorporates Federal and State Government funds as well as private partnership funds. This program is focussed on the establishment of broadband infrastructure and services at each of SA's 7 regional centres, in a manner that leverages the significant ICT footprint provided by the State's public sector to deliver telecommunications savings to Government and benefits to regional and rural communities. The Program connects over 171 government sites across the State⁷⁴⁰ via a high-speed broadband network in and to:

- ▶ Port Lincoln
- ▶ Mount Gambier
- ▶ Murray Bridge
- ▶ Port Pirie
- ▶ Berri
- ▶ Whyalla
- ▶ Port Augusta.⁷⁴¹

The telecommunications infrastructure involved the StateNet Regional Broadband Program includes:

- ▶ The establishment of around 100km of fibre optic cable to connect regional Government agencies
- ▶ The establishment of 850km of high-speed microwave backhaul to connect regional centres to the National inter-capital fibre grid
- ▶ The establishment of over 3,500km² of wireless broadband coverage to serve small business and local communities.

A 2010 economic review of the Program identified that it will deliver \$64 million in net economic benefits to the State over 10 years⁷⁴² and has a State-wide benefit cost ratio of 2.6.

Planned regional broadband developments include:

- ▶ The establishment of improved broadband infrastructure to the Riverland Lower Loxton area and the Mallee towns of Pinnaroo, Lameroo and One Tree Hill. These additional broadband works are due for completion in September 2010.
- ▶ StateNet regional broadband infrastructure will be established at Roxby Downs. This is currently programmed to take place in 2010/11, but is subject to Government approval of the expansion of Olympic Dam mining activities.
- ▶ Ongoing improvements in security and ICT service infrastructure to address the SA Government's changing risk profile, and the establishment of increased network capacity and functionality to meet agency operational requirements.⁷⁴³

11.3 Performance

Assessing the level of service and asset quality of telecommunications infrastructure requires evaluating not only infrastructure issues, such as coverage and capacity, but also market issues such as pricing and packages offered. While some of this information is publically available, much of it is commercially sensitive and not published by the telecommunication owners and providers.

11.3.1 Fixed line CAN infrastructure performance

Fixed line telephone provision is universal as it is a requirement for Telstra, under the Australian Government's universal service obligation (USO), to ensure that standard telephone services are reasonably accessible to all people in Australia on an equitable basis.^{dd} The cost of supplying loss-making services that are required to fulfil the USO is shared among all carriers. Given the almost

^{dd} The details of Telstra's fulfilling its obligations as universal service provider is contained in the Telstra policy statement and marketing plan approved by ACMA. These are available from <http://www.telstra.com.au/abouttelstra/commitments/uso.cfm>.

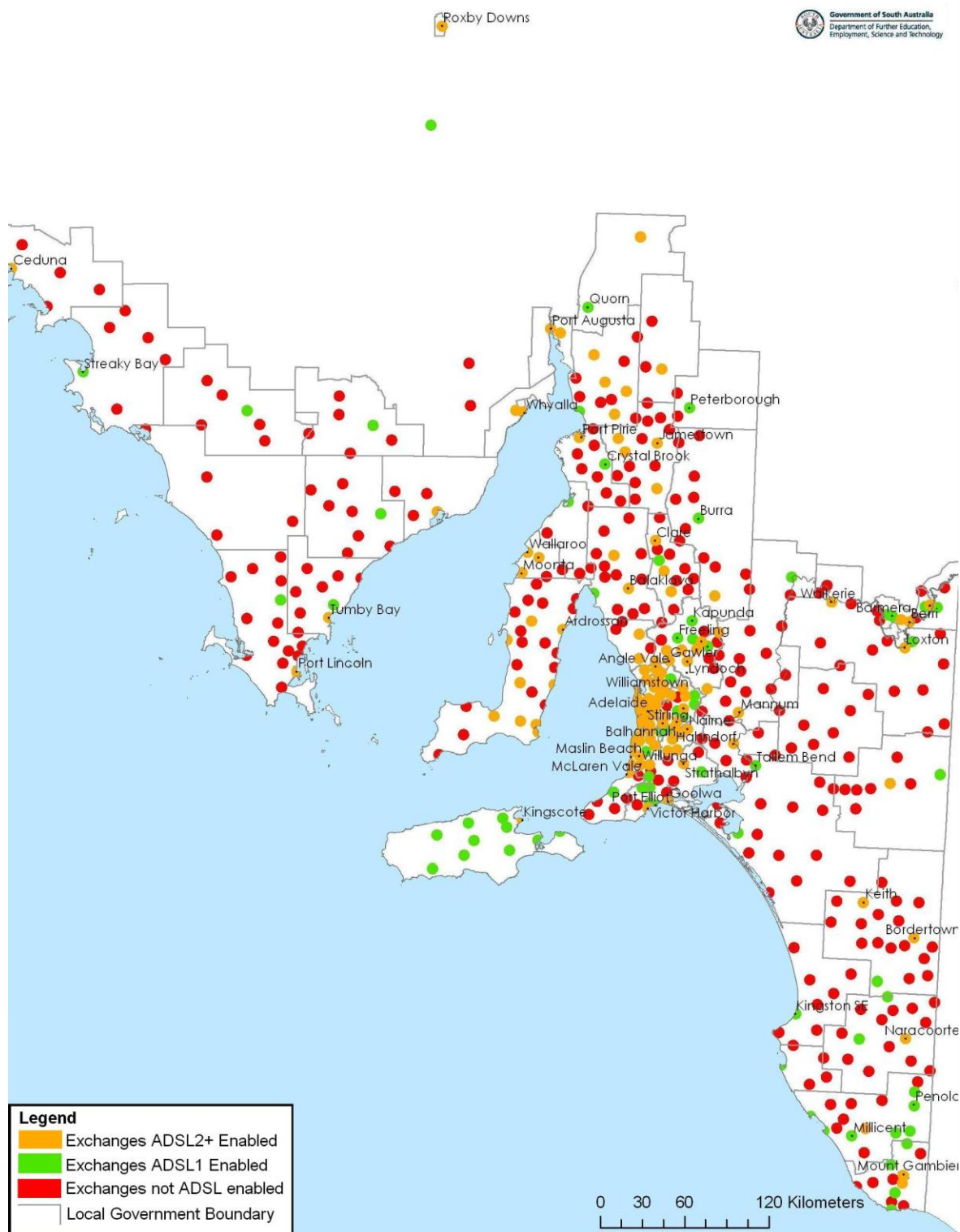
universal provision of fixed line infrastructure, a key performance indicator is customer satisfaction with the service. A 2008 Australia-wide survey found that over 80% of both metropolitan and non-metropolitan customers stated that their fixed line phone services met or exceeded their expectations. Only 6% of customers in metropolitan areas and 5% in non metropolitan areas stated that local call services rarely met their expectations.⁷⁴⁴ While there is no public information on the views of SA consumers, it is likely that it will be similar. Much of the copper network is old, but still fit for its purpose in terms of providing telephony services.

Broadband level of service and asset quality is far more variable due to the economics of providing broadband, and the technologies used. ADSL technology provides the majority of broadband connections and uses Telstra's copper phone network to provide the connection between the exchange to the home. While theoretically all homes with phone lines can access ADSL, due to limitations with the exchanges and phone lines, this is not always possible. For example as of February 2010, of Telstra's 498 ADSL-enabled exchanges, some 92 had no ports available for ADSL services and 19 had no ports for ADSL2+ Services, meaning no additional ADSL customers can be served.⁷⁴⁵ And even if there were ports available at the exchange for connections, customers still may not be able to access ADSL because they are:

- ▶ Located too far from an exchange, because the quality of ADSL decreases with distance
- ▶ Have a technology problem, such as:
 - ◆ Having a large pair gain system (LPGS) already on their line, which results in no additional capacity being available, or
 - ◆ Suffering from external interference, from something such as a tram line.⁷⁴⁶

Figure 11.10 shows the ADSL-enabled status of Telstra's exchanges in SA. It illustrates that a large number of exchanges are not ADSL enabled. As identified above, nearly 20% of those which are ADSL enabled have no excess capacity. In mid 2009, some 10% (55,000) of metropolitan Adelaide's premises were unable to access ADSL. These premises are in more than 350 separate blackspots, with more recently developed suburban areas having a disproportionately larger number of affected premises. The problem is most evident in the southern and northern areas of metropolitan Adelaide. These problems can only be addressed by improving the old copper network and exchanges, both of which require a commercial decision by the telecommunication companies. The large number of regional Telstra exchanges that are not ADSL enabled is a logical consequence of the fact that ADSL only works within 6km of the exchange. Regional exchanges probably cover much larger areas with the fixed copper telephone network and only a fraction of those users will be within 6km.

Figure 11.10: ADSL-enabled status of Telstra's exchanges in SA⁷⁴⁷



Upgrading of exchanges is continuously occurring and details of the availability of ADSL ports in exchanges and by CMUX are available from Telstra Wholesale at <http://telstrawholesale.com/products/data/adsl-reports-plans.htm> and on ADSL2exchanges.com.au under the RIM section

11.3.2 Mobile CAN infrastructure performance

The coverage provided by 3G and GSM networks is extensive in populated areas as seen by the coverage maps on the following pages of the three networks. None of the mobile phone carriers state the percentage of the population that their system covers in SA. Despite the wide coverage, the State continues to experience blackspots along regional highways and at small population centres. The asset quality of the mobile phone infrastructure is generally good due to its young age, and its capacity continues to increase in line with demand.

People who live beyond 3G or GSM terrestrial mobile coverage can obtain a subsidised satellite phone under the Australian Government's Satellite Phone Subsidy Scheme. Some 1,241 people living in SA took up the subsidy between 2002 and 2009, which equates to 7.8% of the national figure.⁷⁴⁸ Figure 11.11 shows Telstra's 3G and GSM network coverage map.

Figure 11.11: Telstra's 3G and GSM network coverage map, March 2010⁷⁴⁹

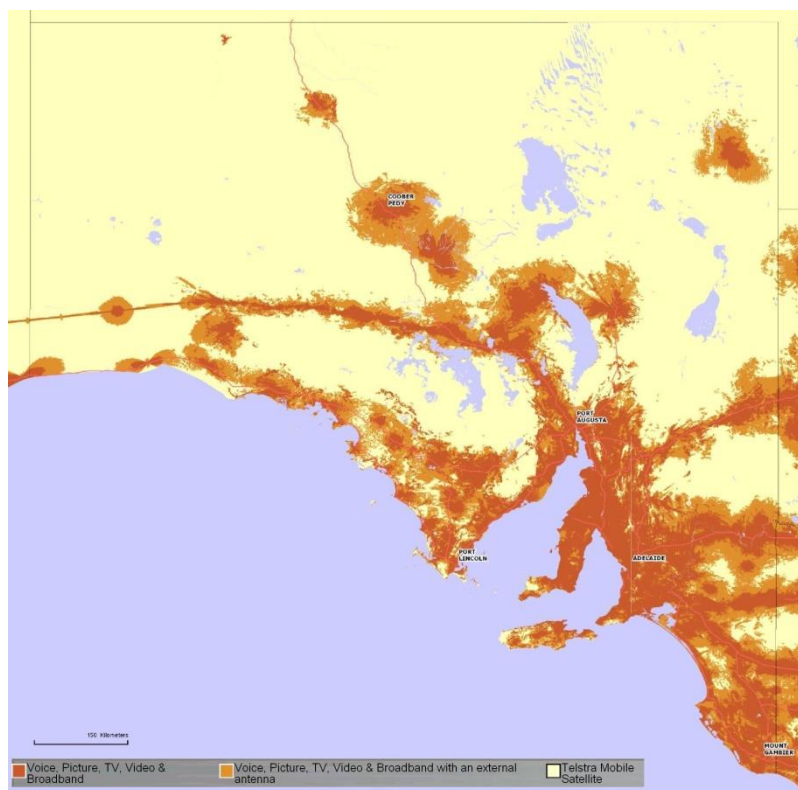


Figure 11.12 shows Optus's 3G and GSM network coverage map.

Figure 11.12: Optus's 3G and GSM network coverage map, March 2010⁷⁵⁰

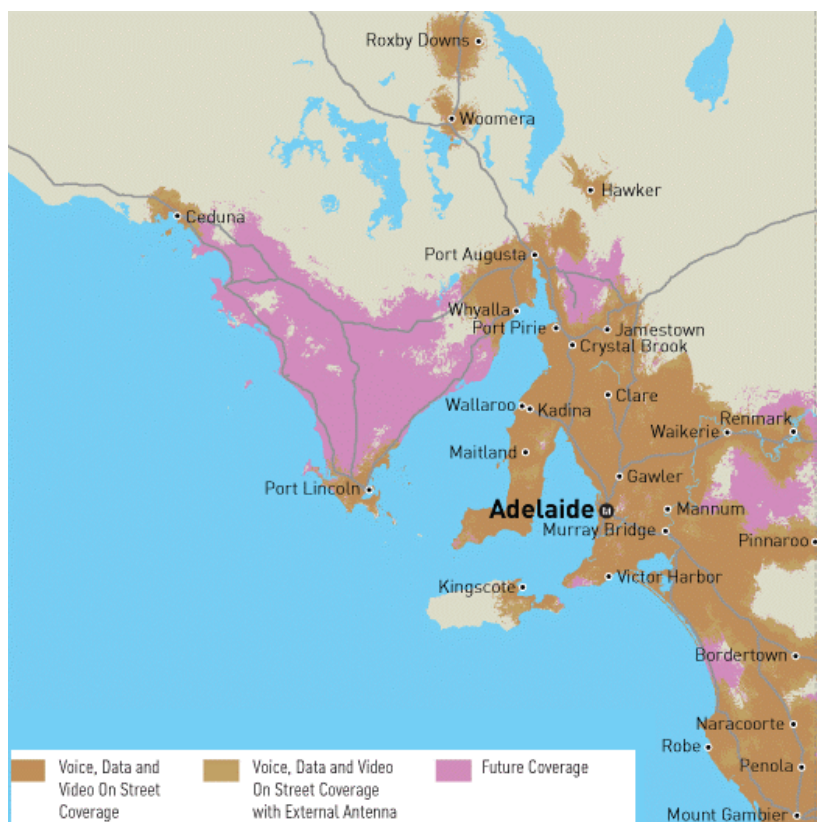
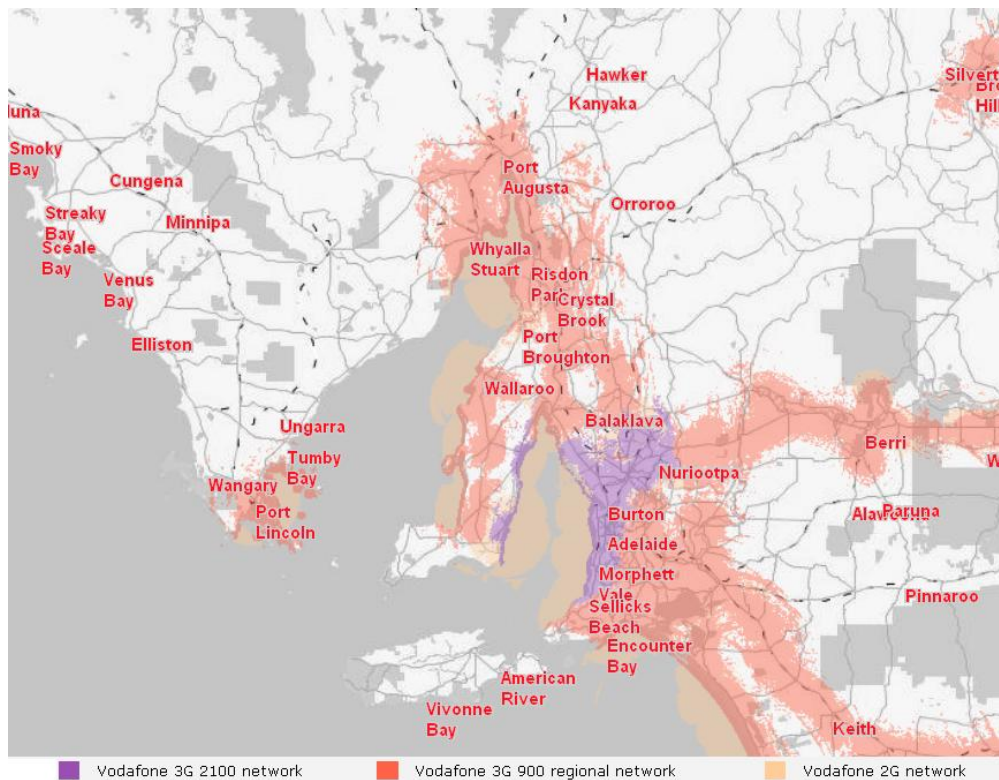


Figure 11.13 shows Vodafone's 3G and GSM network coverage map.

Figure 11.13: Vodafone's 3G and GSM network coverage map, March 2010⁷⁵¹



Mobile phone services attract the major of level of service complaints compared with fixed line and broadband services. A measure of customer satisfaction for fixed line, mobile and broadband, based on complaints, is provided by the Telecommunications Industry Ombudsman. It records the number of complaints for telecommunications services. The main areas of concern are billing and payment. The highest increase in complaints was among mobile phone users (79% rise), followed by internet (57%), landline (40%) and mobile premium services (13%). Figure 11.14. identifies the nature and location of complaints to the Ombudsman.

Figure 11.14: Location of complaints in Adelaide, September 2009⁷⁵²

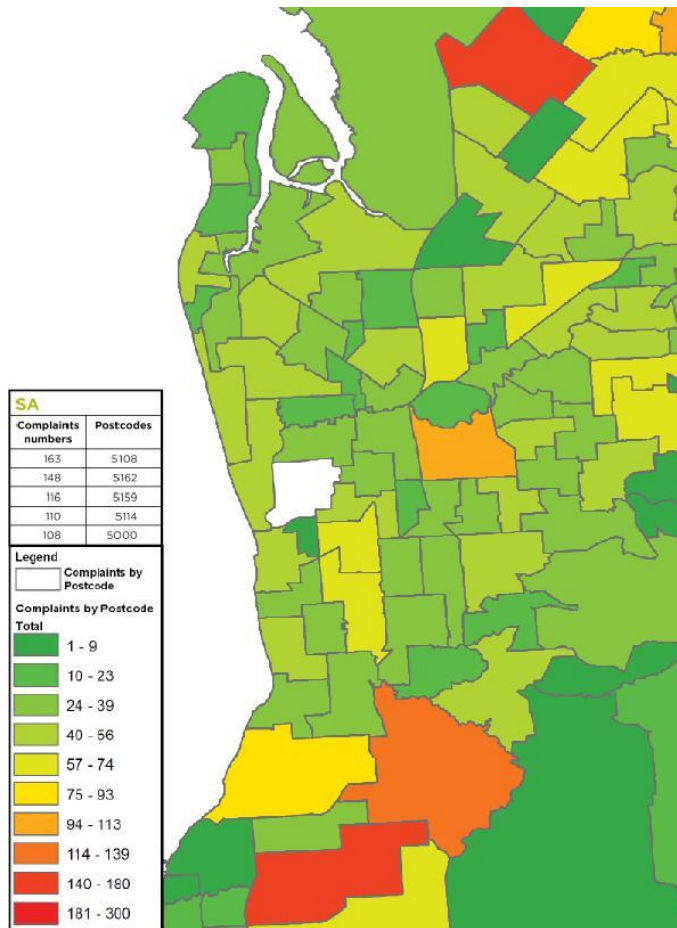
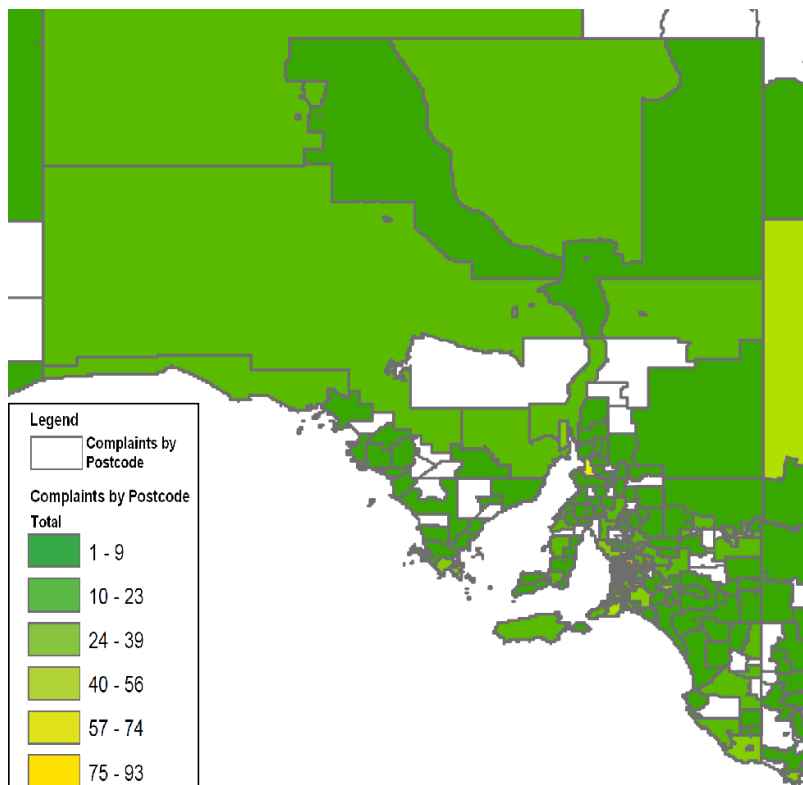


Figure 11.15. identifies the nature and location of the complaints across SA.

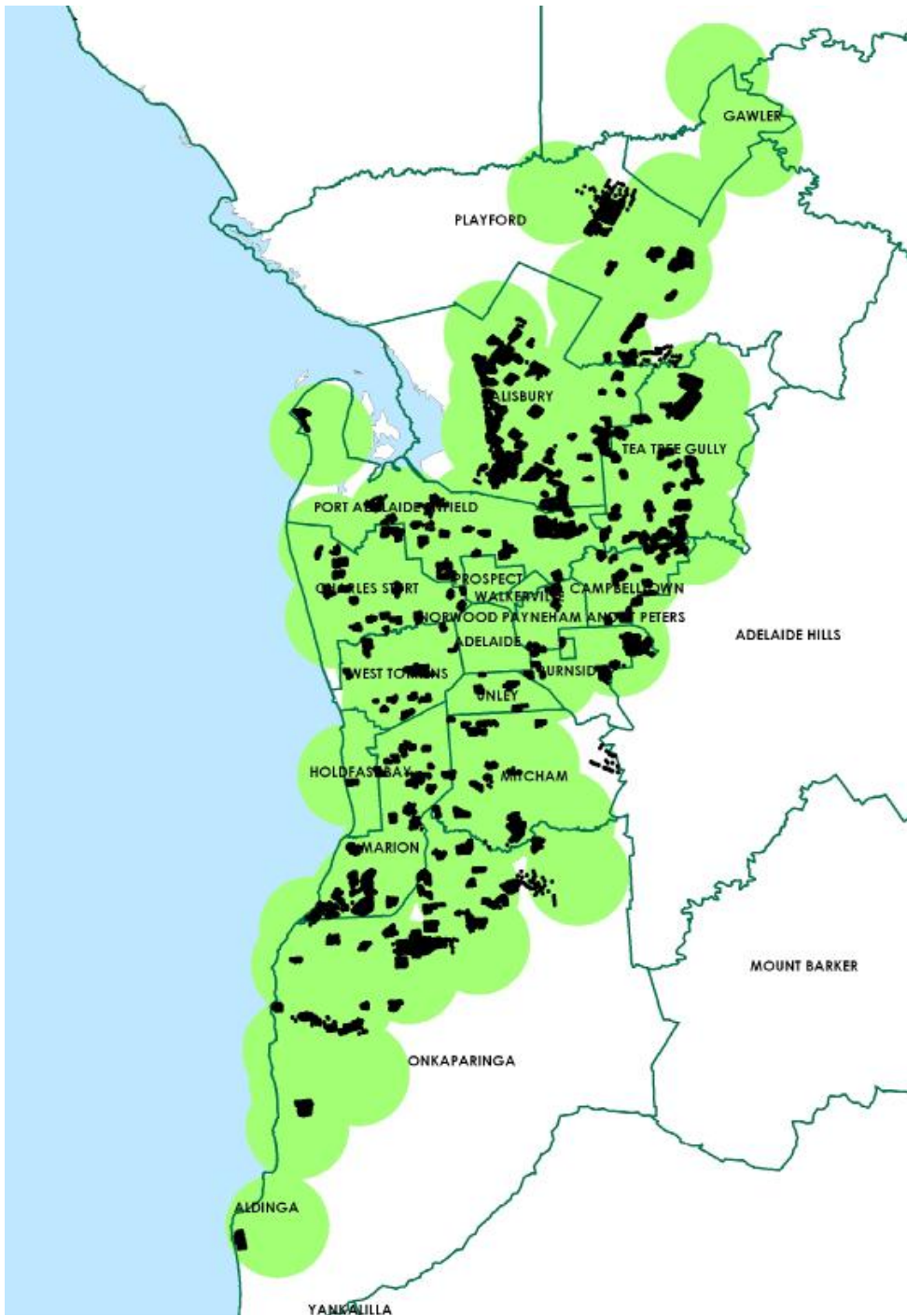
Figure 11.15: Location of complaints State-wide, September 2009⁷⁵³



11.3.3 Fixed wireless

In August 2009, the SA and Australian Governments announced a project to deliver a WiMAX network that will provide broadband services to identified blackspots. The project will be delivered by Adam Internet, and will take 15 months complete. The project involves installing equipment on existing towers, and a small antenna on customer premises that provides a line-of-sight connection. The towers/sites will be interlinked via high capacity optical fibre or microwave radio. The network will consist of 14 wireless service areas (WSAs) and each will have up to five base station transmitters. Each base station will have a coverage radius of about 3.5km, and the network will deliver speeds of up to 12 Mbps.⁷⁵⁴ Figure 11.16 shows the location of blackspots and coverage of the WiMAX network. The quality of assets is good due to their young age, and continues to improve in line with demand.

Figure 11.16: Location of blackspots and coverage of the WiMAX network⁷⁵⁵



11.3.4 Backhaul infrastructure

The SA Government has identified for many years that the lack of competitive backhaul has impeded the uptake of broadband.⁷⁵⁶ This is because providers in areas served by a single backhaul connection can exploit their monopoly position. When competitive backhaul connections have commenced in an area, additional ISPs have entered the market, as seen in Port Lincoln and Mount Gambier.

In some regions of SA, backhaul infrastructure consists of only one primary fibre cable. These can be cut, typically accidentally by a backhoe, which can result in a loss of most telecommunications access for many hours while the cable is repaired. The other major problem with single fibre links is that there is a lack of competition, resulting in high broadband prices. Figure 11.17 shows the location of the SA Government’s desired competitive backhaul routes, reflecting the areas where there is a lack of redundancy.

Figure 11.17: SA Government’s desired competitive backhaul routes⁷⁵⁷



11.4 Future challenges

The challenges to achieving improvements in telecommunications infrastructure in SA are:

- ▶ **Generating broadband consumer demand.** New broadband infrastructure provision relies on a commercially viable level of demand. Increasing demand in areas outside of the currently-served population centres will be a challenge in smaller population centres. Without increases in demand, competitive backhaul will not be provided by the market, keeping prices high and suppressing demand.
- ▶ **Creating a value proposition for universal high speed broadband availability.** The NBN aims to provide universal high speed broadband access, and it is claimed that this will deliver significant improvements in business efficiency and innovation, and quality of life improvements. However, while there is no doubt that its higher speed and universal access will be welcome, the cost of the NBN will be significant. Already the vast majority of all businesses have high speed access as do the majority of urban Australians, if they wish to purchase it. Thus a challenge facing the NBN will be in creating an appropriate value proposition that is sufficiently attractive for customers to make the infrastructure investment justified.
- ▶ **Selecting optimal technologies.** There are many technologies that telecommunications companies can deploy. All have tradeoffs in areas such as cost, risk, capability and compatibility. The selection of technologies is critical to prevent stranding of assets, particularly for smaller telecommunication companies that do not dominate the market, and for those wishing to be compatible with the NBN.
- ▶ **Strengthening the resilience of the telecommunications backbone.** The telecommunications network has become an essential service and its loss causes significant economic and social consequences. As telecommunications become embedded into more aspects of commercial and everyday life, ensuring its resilience and robustness becomes increasingly important. This requires reducing single points of failure and other vulnerabilities, and preventing accidental disruptions such as by cutting through cables with a backhoe.

11.5 Report Card Rating

Infrastructure type	SA 2010	SA 2005	National 2005	National 2001
Telecommunications	C	Not rated	Not rated	B

Based on considerations of planning, funding, and infrastructure capacity and condition, SA's telecommunications infrastructure has been rated C. This rating recognises that while telecommunication services are generally available to a high percentage of the population, there are still many blackspots in broadband and mobile coverage, and areas of network vulnerability due to a lack of competitive backhaul.

Positives that have contributed to the rating are:

- ▶ Expansion of StateNet and SABRENet
- ▶ Success of the Broadband Development Fund in initiating backhaul and broadband provision
- ▶ Commencing the WiMAX network project in Adelaide to address broadband blackspots
- ▶ Increase in the amount of competitive backhaul in regional areas
- ▶ Communication networks that have capacity for expansion
- ▶ Telecommunications providers have a rolling program for new technology.

Negatives that have contributed to the rating are:

- ▶ Lack of mobile phone coverage along regional highways and in small centres
- ▶ Inadequate backhaul competition in a number of regional areas
- ▶ Uncertainty about future commercial life of infrastructure due to technology and regulatory changes.