TELECOMMUNICATIONS INFRATSRUCTURE

ACTION PLAN





TWEED
ECONOMIC DEVELOPMENT
CORPORATION LTD
Thinking, Growing, Smarter!

Prepared By
Tweed Economic Development Corporation Limited

2009

Introduction

Broadband telecommunications, in its various forms (ie. Wireless and fixed line), is now recognised as the roads and railways of the 21st century that will generate the next wave of economic expansion. Just as transport opened up new economic horizons in the last century, advanced telecommunication networks will pave the way to open up new markets across the country and around the world, as well as achieving significant productivity gains for industry.

The Tweed Economic Development Corporation Ltd (TEDC) and Tweed Shire Council (TSC) both consider the area of telecommunications infrastructure to be a critical element in the development and commercial sustainability of business generally.

Access to high quality, affordable telecommunications services is more important than ever if the Tweed region is to keep pace with other regions of Australia, as well as overseas.

Telecommunications, and especially broadband communications, is a key enabling technology that successful countries will utilize more and more to allow their business and industry to gain a competitive advantage, to attract new investment in new product and industry development, to fully participate in international trade and to secure economic growth. It will also greatly enrich community life by allowing access to a wider range of information and services delivered with unprecedented convenience and flexibility.

TEDC in collaboration with TSC has prepared a Telecommunications Infrastructure Action Plan. It sets out to define broadband telecommunications from a global perspective and reviews approaches being undertaken to develop broadband infrastructure. An action plan has been prepared to provide direction and advice to Council on how to provide better telecommunications infrastructure for the Tweed.

Terms of Reference

The purpose of this project was to prepare an action plan which would provide direction and advice to Council on how to provide better telecommunications for the Tweed. There is a need to ensure that the Tweed is globally competitive in the availability, coverage, cost and capacity of telecommunications infrastructure and in the uptake and adoption of resulting technologies.

Initially TEDC prepared a background briefing paper, which provided a good overview of current and emerging telecommunications technology, its uses and applications, and examples of how other regions across Australia have approached the task of embracing and encouraging growth and expansion of this very significant and increasingly important infrastructure.

As the TEDC research developed, it became obvious that there was a need to seek external advice and expertise, with specific experience in the commercial applications and strategic planning aspects, involved with understanding the implications and strategies necessary, to guide the development of telecommunications technology and infrastructure in the Tweed.

The development of this Telecommunications Infrastructure Action Plan has drawn upon the wealth of corporate IT experience and knowledge of Tweed Shire Council, the business and industry experience of TEDC as well as the independent advice of GDI consulting. GDI consulting is an independent information and communications technology (ICT) consultancy practice, and was formed to provide ICT consulting services to corporate and government clients with the emphasis on enabling the delivery of real world economic benefits through the effective use of technology. This expertise has been bought together to provide direction and advice to Council on how to provide better telecommunications infrastructure for the Tweed.

The process for developing this action plan has included the following (refer to Appendix 1 for full brief from Tweed Shire Council):

- The review of and recommendations of the essential telecommunications infrastructure requirements for subdivisions and developments and proposed methods of using the planning process to impose such infrastructure requirements.

  A review of similar actions and initiatives being undertaken by other local governments both nationally and internationally has been provided, in order to develop a set of recommended actions that Tweed Shire Council could initiate within the context and relevance to the Tweed.

- The review of Internet Service providers operating in the Tweed.

  Interviews have been undertaken with all supply-side stakeholders that have an interest in telecommunications supply. This has included local internet service providers, telecommunications infrastructure providers, property developers, government telecommunications network owners and electricity distributors. From this information the current and future supply coverage has been mapped in order to identify infrastructure and capacity gaps in broadband delivery.

- A review of the current suite of government (Federal and State) policies and funding programs has been undertaken, in order to identify opportunities to access funding that could assist the development of broadband infrastructure.

- A number of regional telecommunications partnerships have been investigated.

  Successful partnerships result from a committed effort to align all parties interests positively, and that this only comes about through education, persuasion, persistence, strong personal relationships, trust and business competence.

  Establishing a clear vision for broadband development is an important infrastructure for economic development and is a critical first step. Having key stakeholders that can significantly influence broadband development and align with the vision is critical.

Executive Summary

Broadband technology is seen to be a key driver of economic growth over the next 20 years and will support information services that will permeate community life and business. It will pave the way to open up new markets and achieve productivity gains across global economies.

For the Tweed it will:

- Enable and encourage the attraction of new job generating investment in the fields of commercial and industry development as well as encourage growth in home based businesses,
- It will assist and is critical to managing future health and aging services, such as aging in place through tele-health and e-health,
- It will enable TSC to provide the type of telecommunication service interface necessary to enable improved delivery of services generally, but specifically in the lodgment, tracking and monitoring of DA's and other like local government services, and
- It is critical to encouraging and managing growth in education across the broad spectrum of tertiary and secondary services including trades and other skills development.

The importance of this technology has been realized by TEDC and TSC, who in collaboration have developed a Telecommunications Infrastructure Action Plan for the Tweed Region. It sets out to define broadband telecommunications from a global perspective and reviews approaches being undertaken to develop broadband infrastructure both internationally and domestically.

In most countries, broadband telecommunications infrastructure is delivered by private sector companies on a commercial basis and in most cases the private sector has not demonstrated a willingness to invest in regional areas without some strategic involvement by government.

Increasingly a view is being formed that broadband telecommunications infrastructure is a utility and strategic government involvement in its development is necessary.

The report has identified a number of common attributes across a broad spectrum of telecommunications infrastructure development projects both in Australia and overseas. These include:

- The identified need for strategic planning for telecommunications infrastructure to meet the future needs of business and residents,
- The need for government to take a leading role in facilitating the development of broadband infrastructure,
- The development of broadband infrastructure has been a partnership between key stakeholders from both the supply and demand side of the market,
- In all cases the focus of development of the broadband infrastructure is on the economic and social benefits derived from it, and
- The proponents have taken a long-term horizon view on the development of broadband, similar to the other utility infrastructure such as roads, electricity, sewage and water.

The Telecommunications Infrastructure Action Plan identifies a number of actions that Tweed Shire Council and TEDC can work together to facilitate the development of this critical infrastructure in conjunction with private and government partners, (see Appendix 2 Telecommunications Infrastructure Action Plan, prepared by GDI Consulting).

Actions that can be taken by Council include:

- Prepare policies within Council that support the development of communications precincts in both green and brown field developments to be used to establish/house telecommunications street furniture such as towers, nodes, cable cabinets, etc.
- Establish regulatory controls on property developers to work with telecommunications carriers to identify precincts that are to be used for telecommunications towers and to include these in their preliminary concept plans to be presented to Council prior to any formal applications for development approval. These precincts could then be allocated for the specific purpose of locating telecommunications towers, in a similar way to land within a development, excised for the purpose of some utility i.e. Pumping station, electricity transformer, etc.
- Establish regulatory controls on property developers mandating that they lay ducting (pits and pipes) in all new green field developments suitable for optic fibre cable reticulation with ownership being vested with Council. Some infrastructure providers have advised that their business models show network viability for green field developments of 300 lots or more.
- Establish regulatory controls on property developers mandating that they lay ducting (pits and pipes) in all new urban renewal developments suitable for optic fibre reticulation with ownership being vested with Council.
- Establish policies within Council to develop fibre optic infrastructure to connect its branch offices as part of its own telecommunications consumption requirements.
- Establish policies within Council to facilitate telecommunications ducting (pits and pipes suitable for optic cabling) to be included in all future capital works programs.
- Establish policies to make available volumetric spare capacity of Council own ducting for use by other parties on commercial terms.
- Lobby the Federal Government to impose regulatory controls on Telstra to make available its last mile pits and pipes for use by other telecommunications service providers including lead-in cables.
- Lobby both State and Federal Governments to achieve better coordination of Agency spending on telecommunications in the Tweed region to achieve improved telecommunications infrastructure development.
- Lobby both State and Federal Governments for financial support to assist Council to facilitate the further development of telecommunications infrastructure.
- Prepare a register of Council facilities that Service Providers can access for use to house telecommunications equipment.
- Work with ACMA to educate property developers and planners on building cabling standards such as the *Digital Building Guideline* (http://www.acma.gov.au/WEB/STANDARD/pc=PC_569) along with ACIF's *Building Access Operations and Installation Guideline.* These guidelines are designed to encourage multi-carrier access by providing greater clarity to carriers, carriage service providers and property developers/owners of multi-tenanted, multi-storey buildings of standard procedures across the telecommunications industry, resulting in savings in the administrative costs of all parties involved, as well as providing improved certainty in terms of the timing

for provision of services, access to adequate power supplies, facility documentation requirements and improved security for carrier and property owner facilities.

The above recommendations would provide guidance to infrastructure developers within the Tweed Shire as well as create a direction for telecommunications infrastructure development.

To coordinate and accelerate the development of telecommunications infrastructure development for the region the above actions should be incorporated and undertaken within the context of a Telecommunications Infrastructure Master Plan. This Master Plan would consist of:

- Creating a vision for Tweed Shire that aligns and underpins the economic and social aspirations of the region and sets the objectives, priorities and timelines.
- Identifying areas of demand concentration based on Council's development control plans.
- Identifying backhaul requirements to connect the areas of demand concentration.
- Identify and engage with key stakeholders that are capable of contributing to the development of an open access next generation community telecommunications distribution network.
- In conjunction with the identified key stakeholders, develop a telecommunications Business Case identifying the estimated costs to achieve various stages of development, potential contributions by the stakeholders and the resultant gap to realize a fully integrated, end to end community telecommunications distribution network. This document would form the basis of an application for funding from State and/or Federal governments linked to the National Broadband Network initiative.
- As an outcome of the comprehensive planning as described above, lobby government for financial assistance to meet some of the cost gap in deployment of optical fibre into urban renewal projects.
- Preparation of technical specifications required to support the regulatory controls on property developers needed to achieve effective deployment of telecommunications infrastructure in greenfield and brownfield developments, as well as Council's future capital works program.

The provision of fast, efficient telecommunications infrastructure is one fundamental step in the process of delivering future economic and social sustainability to the Tweed.

Broadband Internet – the New Utility

The internet is changing the way Australians live and work, and those without access are increasingly finding themselves at a socio-economic disadvantage.

It is a mistake to think that the only driver of broadband is faster access to information on the World Wide Web. Australians are discovering that radically cheaper alternatives to traditional telephony can be supported over a broadband connection. They are monitoring their properties by video surveillance and remotely controlling their homes over the internet. The music they buy is downloaded from the internet, and the digital photos they take are sent to a printing service over the network. They are undertaking study courses in their own time and space, underpinned by internet access to course work and other learning resources. They are renting movies on the internet. Grandparents are video-conferencing with distant grandchildren. Many people are working a growing number of hours each week from home. These examples are but the tip of the iceberg, and in the coming year's broadband will permeate even more areas of everyday life.

This has lead to an accelerating demand for broadband connections to overcome the speed limits of dial-up internet access. In mid 2006, around 30 percent of Australian homes had broadband connections and uptake was still growing strongly (OECD). If the uptake levels amongst the worlds broadband leaders are any guide, demand will at least double again before it begins to reach saturation.

Broadband is rapidly becoming the next utility – one of life's essentials, just like electricity, water and gas. Furthermore, the 'need for speed' will continue to grow as users want ever-faster access to increasingly large multimedia resources.

Why Government Gets Involved

Where the private sector has deployed affordable and high-quality services, broadband is not an issue. But in other communities, local and regional governments have found many ways to involve themselves in facilitating access to broadband for their constituents. The most successful have all begun with the same first step: establishing a clear vision, and communicating why broadband access matters. If constituents believe that broadband is just about downloading music or playing online games, they will not provide political support when it is needed.

It is now a growing expectation that new residential developments are capable of being wired for broadband data access. However, many new residential estates have been built with out any adequate provision for the installation and establishment of appropriate broadband infrastructure (pit and pipe) and simply provide copper access. Installation of such infrastructure after an estate has been completed (retrofitting) is often difficult and costly.

This report recommends that Tweed Shire Council consider adjusting the planning regulations to encourage the provision of appropriate broadband facilities in all new estates and building developments, to ensure that the rollout of broadband infrastructure can be performed as a matter of course, as opposed to the current and costly practice of retrofitting.

This regulatory approach would result in developers and infrastructure service providers giving serious consideration to providing value added services to estates beyond simply the accommodation of minimum levels of broadband access to new residences and offices.

It is envisaged that in all future developments, all residents and occupants will be able to regard access to digital broadband services as of right and the only issues to be determined will be choice of provider(s) and the level of choice of broadband services, by residents, industry and commercial operators moving into new residential developments, business parks or master planned estates.

It is the intention of this report not to develop a prescriptive methodology, for the installation of broadband technology, but rather facilitate the development of connected communities and state of the art industrial and commercial developments.

Technology Context - The Fibre Future

Optical Fibre is the 'golden resource' of the telecommunications industry, with a single strand capable of connecting every single person on the planet in a phone discussion with someone else. Because of its capacity, it is the technology of choice for carrying high volume traffic between major nodal points in a telecommunication network. Taking optical fibre closer to the end user is the key to boosting the performance of end user connections, irrespective of the technology that is used for the final link from the end of the fibre to the customer. It follows that fibre to the home (FTTH) or fibre-to-the-premises (FTTP) offer the ultimate performance.

The business case for FTTH in Greenfield estates, while not fully established is a much simpler one than in the Brownfield's context, where there is a legacy of existing infrastructure. In Greenfield sites, the cost of an all-fibre solution is approaching the same cost as conventional copper solution, and the service potential is far greater.

Telstra acknowledges that the time for FTTH as standard in new estates is fast approaching, but is not convinced that it has arrived yet in terms of market demand, comparative costs, and potential impact on other highly profitable services. Accordingly, it continues to deploy copper as its standard solution for all extensions of its residential network, sometimes adding ADSL, which will provide adequate broadband performance for most users for the next few years.

Releasing new land with 'legacy' copper telecommunications infrastructure squanders opportunity in two key areas:

1. For little, if any, extra cost, new homes could be provisioned with virtually unlimited capacity of fibre rather then the strictly limited capacity of copper. There will never be as good an opportunity as when the trenches are open during the initial development stage; and
2. The act of developing copper undermines the business case for upgrading to fibre – so homes built with copper infrastructure today will be amongst the last to get a fibre upgrade when it eventually becomes the norm. Today's new estates risk becoming tomorrow's broadband black-spots.

The Land Development Context

Many property buyers in new areas are dismayed to discover that the broadband services they have previously taken for granted are not available. The reasons vary – in some cases it is due the non-availability of suitable infrastructure, and in other cases the reasons relate more to the lack of competition. Whatever the reason, the resultant anger and frustration is often directed at carriers, politicians, councils, government agencies and developers.

Fortunately a small number of innovative developers throughout Australia are rising to the challenge and opportunity of incorporating FTTH in their new estates.

There is anecdotal evidence that fibre-connected homes can attract a premium from buyers who recognize the value of superior connectivity today. The business case for investment has yet to be solidly proven, but what cannot be denied are they statistics showing the surging uptake of broadband, and growing demand for higher speed connections. The arguments for incorporating FTTH into any estate may be marginal today – but will they still be marginal in a few years from now?

As FTTH becomes the norm, developers who have ignored the trends may be better compelled to sell land at a discount in order to compete with land that is better serviced.

Ownership Models

Broadband connectivity is emerging as the next essential utility service – but some key parallels with other utilities, such as cost recovery, do not exist.

Taking electricity as an example, developers fund the capital cost of electricity supply infrastructure, and this cost is ultimately recovered in the price of serviced land. The infrastructure is effectively gifted to the local utility company, allowing electricity to be supplied at rates that do not include a component to service the capital cost of infrastructure supply. The decision as to whom ownership passes to upon completion is a simple one since electricity distribution is recognised as a natural monopoly. Price caps prevent the local utility from exploiting its monopoly position, and the obligation to carry electricity for other retailers at regulated prices assures competition.

Based on this existing practice, the idea of a developer contributing to the capital costs of broadband infrastructure should not be a foreign one – it can be viewed as just another cost in preparing habitable land for sale. However, this is where the parallel breaks down. Telecommunications is no longer recognised as a natural monopoly – and it is not obvious to whom the infrastructure should be passed to upon completion. Telstra remains the dominant provider in residential local access – but there are competitors, and some of these may be better positioned to offer innovative services at competitive prices in a given area.

Giving the asset to Telstra is obviously an option. However, unlike the electricity industry, the framework to assure other carriers access to optical fibre infrastructure

at regulated prices does not exist, and Telstra has expressed publicly its opposition to facilitating access by other carriers to the network infrastructure in which it invests. Furthermore, under Telstra's current practice of maintaining nationally homogeneous services, the investment in FTTH infrastructure may not flow through to higher performance services.

Giving the asset to any other services providers – especially a small one – carries the risk that the operator may not survive in the long term. Even the largest competitors in the industry still only capture a small fraction of the total profit that is generated in the industry, and despite the relatively short history of deregulation, there may have been a number of notable business failures.

For 'gated communities' (where a body corporate exists), the potential exists to vest ownership of the infrastructure in the body corporate. Such structures are not common in larger developments – but even where they do exist, the vehicle may not be well suited to the obligations that go with ownership (like eventual refurbishment of the network electronics).

For most broad acre estates, the responsible Council is often the first body corporate above the individual landowner. However, few councils have the resources, the specialist expertise or the desire to take responsibility for managing a sophisticated telecommunications asset.

Another option would be for the developer to retain ownership. The developer is typically 'locked in' to an involvement with the estate until all blocks of land have been sold, typically a period of many years for a larger estates. However, telecommunications is foreign to a developer's core business, and few developers would want to be encumbered with obligations that survived long after the sale of the last block of land.

Where To From Here

Where the private sector has deployed affordable and high-quality services, broadband is not an issue. But in other communities, local and regional governments have found many ways to involve themselves in encouraging the provision of broadband infrastructure access to there constituents, with the most successful beginning with the same first step: which is establishing a clear vision, and communicating why broadband access maters.

It is now a growing expectation that new residential developments are capable of being wired for broadband data access. However, many residential estates have been built with out any adequate provision for the installation and establishment of appropriate broadband infrastructure. Installation of such infrastructure after an estate has been completed (retrofitting) is often costly and may in some circumstances comprise or limit the type of infrastructure that can be used to deliver broadband services.

The attached Telecommunications Infrastructure Action Plan presents a number of options to progress Telecommunications within the Tweed. Tweed Shire Council need to consider amending the planning regulations to require the provision of facilities in all new estates and building developments to ensure that the rollout of broadband infrastructure can be performed as a matter of course as opposed to the current costly process of retrofitting.

This type of adjustment would encourage more thought and consideration by developers and infrastructure providers alike, to consider value added services to estates beyond simply the accommodation of minimum levels of broadband access to new residents and offices.

It is envisaged that in all the future developments, all residents and occupants will be able to regard access to digital broadband services as of right and the only issues to be determined will be choice of provider(s) and the level of choice of broadband service. Similarly and more importantly, an as of right access to digital broadband services by industry and commercial operators moving into the business parks or master planned estates.

In the case of the Tweed Shire, there is a requirement to improve the telecommunications capacity across the region as it is currently underserviced by choice of telecommunications service providers and broadband capacity. The opportunity exists to bring together a number of stakeholders with the potential to develop a blue print for the development of a regional open access broadband network that will greatly enhance economic and social development throughout the region.

Developers can play a significant key stakeholder role in the deployment of telecommunications infrastructure, by including the provision of fibre ducts (pit and pipe) along with all other underground utilities. It is important to educate the development industry on the importance of technologies such as broadband and increase their uptake of this service in the business, property development and community sectors. TEDC accepts it has a significant role to play with Council in the interface with developers in encouraging them to embrace the importance of providing this essential and critical telecommunications infrastructure.

TEDC propose to schedule workshops/events to promote to business the benefits to be had from utilizing the broad range of advanced applications of ICT, particularly those provided via high speed broadband. ICT solutions have a significant role to play in driving efficiency gains in existing operational processes. When implemented, these innovations enable vastly improved on-line services and new applications for the information economy that will improve people's lives, lower cost, diversify the economic base and stimulate economic growth.

Conclusion

As the report suggests broadband telecommunications in its various forms is now recognized as the roads and railways of the 21st century that will generate the next wave of economic expansion. Not only does its future availability have very positive implications for attracting new job generating business investment to the Tweed, which will assist in growing and diversifying the economic base of the Tweed economy, but of equal significance and importance, are the benefits to be had in managing the health and aging issues associated with the extremely high and growing ageing Tweed population demographic.

Economic sustainability, business and investment growth, job generation, growth in home based businesses, managing health and aging, education, national and international competitiveness, commercial office development as part of the development of master planned business parks and master planned communities, and improved technology driven service delivery at the local government level are all benefits to be had by encouraging and embracing advanced telecommunications services.

Governments at all levels are recognizing the importance of embracing the latest broadband technology and pursuing avenues to make it more readily available to all parties involved in the public and private sector as well as the broader residential population.

At the local government level, regions which show the leadership and vision necessary to initiate policies and actions to provide this new and important infrastructure as a matter of urgency, will reap benefits at the economic and social level in terms of developing the capacity to move its community at the broader level to position it at the forefront of economic growth in a global economy which is not only stressed but changing rapidly in response to globalization.

Traditional approaches to managing economic sustainability, job generation and managing population growth are being challenged by external forces which are changing the nature of manufacturing and production, placing a greater reliance on technological advances, innovation, and advanced and diverse skills development, not to mention the desire for people to chose to work in life style regions as opposed to past tendencies to migrate to cities for employment and education purposes.

Local government, and in this case Tweed Shire Council have an important and fundamental role in embracing and endorsing the substance and content of this report, on the basis of their importance and significance in assisting the growth and development of a future visionary, technological leading edge, sustainable and diverse Tweed economy. The adoption of the recommendations and actions contained in the report will provide a positive step forward in addressing the issues associated with the unsustainable 92% serviced driven Tweed economy.

APPENDIX 1

Telecommunications Infrastructure Action Plan

Brief from Tweed Shire Council

Telecommunications Infrastructure Action Plan

Project Appraisal

Background

On 3 June TEDC reported to Council an update on the progress of their 2008 Business Plan. In this Plan the Telecommunications Infrastructure Action Plan was identified as an "ongoing" project of TEDC and Council. Council considers this area of infrastructure to be a critical element in the development and commercial sustainability of business generally.

Given the critical nature of this infrastructure it is considered important that this project be appraised and updated. To facilitate this process Council is willing to collaborate by making available it's wealth of corporate IT experience and knowledge.

The 2007-2008 State of the Regions (SOR) Report, released November 2007, identified a loss of $3.2 billion and some 33,000 jobs to Australian businesses in the preceding 12 months due to inadequate broadband infrastructure.

Prepared by National Economics for the Australian Local Government Association, the SOR report states that in addition **an estimated $40 to $50 billion in savings from e-health and other smart networks over the next 10 years is also being lost.**

The SOR report states that while broadband penetration rates in Australia are growing, broadband speeds and the differential between city and regional access leave much to be desired.

The World Bank says that firms using information and communication technologies (ICT) grow faster, invest more, are more productive and deliver higher profits than firms that do not. So, broadband inadequacies are clearly constraining businesses and job opportunities in the regions.

<u>International Competitiveness</u>

With Australia's levels of connectivity close to that of Japan and the United Kingdom we clearly use and rely on the internet for education, research, business, communication and entertainment at similar levels as competing nations. But it is broadband speeds that set Australia apart from its competitors.

In its 2007 Communications Outlook Report, **the OECD ranked Australia 14th out of the 26 nations it reviewed, but in terms of price and broadband speeds it placed Australia second last, just before Slovakia, out of the 26 countries.**

The SOR report says that high speeds and world's best practice standards in terms of broadband connectivity will make possible new services that will save billions of dollars of tax payers' money and reduce costs, including costs to Local Government. It states that advancements in e-medicine and e-education are examples of services that have the capacity to create enormous benefits in terms of cost savings and improvements in social equality and other opportunities.

Scope

The purpose of this project is to prepare an action plan which will provide direction and advice to Council on how to provide better telecommunications infrastructure for the Tweed.

Tasks / Process

Council is keen to collaborate with TEDC in reappraising the Telecommunications Infrastructure Action Plan within the following areas;

1. Review and recommend essential telecommunications infrastructure requirements for subdivisions and developments and propose methods of using the planning processes to impose these requirements (Consider the requirements in the City of Whittlesea, VIC)/ Smart Wired Communities including in multi storey residential. www.whittlesea.vic.gov.au/ Planning Services on (03) 9217 2236 or email planning.services@whittlesea.vic.gov.au.

Broadband Strategies for Local Government

Broadband is seen to be a key driver of economic growth over the next 20 years and will support information services that will permeate community life and business. Australia's poor record in the availability of price competitive broadband of adequate bandwidth compared to other OECD countries, has impacted on local communities seeking broadband services.

Increasingly local residents and businesses have approached Local Government to assist them access services due to frustration in getting broadband services. While Local Government has not had any responsibility for telecommunications, the City of Whittlesea has developed strategies to assist local communities better access infrastructure and services as well as advocate for better outcomes with other levels of Govenment.

The WIRED Development project uses changes to the Local Planning Scheme to require developers to install a second conduit network in 'greenfield' estates to stimulate carriers to invest in fibre optic infrastructure capable of meeting not only today's broadband service needs but ongoing future needs.

A generic business case for this approach is available in the Related Downloads box.

In existing areas of the municipality demand aggregation of residents and businesses is made possible with the City of Whittlesea Broadband online Demand Register which records those seeking broadband. Public meetings or followup work by the City of Whilttlesea creates aggregated demand which stimulates carriers seeking to gain new customers to respond by putting in new infrastructure and providing services.

The State Government has also developed a website to assist the community understand broadband and strategies to bring it to their local neighbourhoods. The website is accessible at www.mmv.vic.gov.au/broadband .

Contact Manager Organisation Support for further information pH 9217 2127

Council's broadband actions wins awards

The City of Whittlesea has received two awards from the Australian Telecommunications Users Group (ATUG) in recognition of its initiatives and achievements in relation to broadband technology.

The ATUG 'Excellence in Communications Management' award and 'National Award for Effective Use of Broadband' recognised council's leadership role in representing the needs of its community and the local government sector generally.

The City of Whittlesea was the only municipality to win at the ATUG awards. Since being introduced in 1984 the National Award for Excellence has usually been won by telecommunications carrier companies. The second award is a new category this year sponsored by the Federal Government.

Whittlesea Mayor, Councillor Kris Pavlidis said it was pleasing for council to gain such high recognition for its leadership that resulted in housing developers actively seeking high speed broadband solutions being incorporated into their estates.

Cr Pavlidis said, "One of those is the State Government's land developing arm, VicUrban that has installed a fibre to the home solution in their Epping North 8000 lot Aurora subdivision. Other developers are looking to follow suit."

"Council also formed a Growth Council WIRED Development consortium, (Whittlesea, Casey, Wyndham, Melton and Cardinia), with assistance from the Municipal Association Victoria (MAV) to encourage fibre optic provision in other development areas," she said.

More than 1500 local residents have benefited from council's assistance through its broadband register advocacy process, Cr Pavlidis said, that demonstrated to telecommunications providers the demand for broadband.

She said, "Businesses have also been encouraged to connect to broadband and assisted by council to access broadband when it has not been available.

"This has included training on how to maximise commercial benefit out of broadband technology with more than 200 businesses receiving direct assistance."

Council itself has progressively developed electronic services to provide better service to local businesses and the community, said the Mayor.

Media Inquiries: Jim Linton, Communications Officer 9217 2219

2. Review of primary Internet Service Providers operating within the Tweed and establish a strategy to lobby for increase coverage. This will include discussions with Dr Eric Hyde, CEO Cirrus Communications 02 43362000 who have recently requested Council support and assistance for the expansion of their wireless network within the Tweed region www.cirruscomms.com.au . It will also include discussions with Council's Telstra Country Wide account representative Mr Howard Melder
180 Molesworth Street, Lismore, NSW 2480 - Ph : 02 6625 9088 Mob : 0429 996 427 Fax : 02 6626 5202 E-Mail : Howard.Melder@team.telstra.com

3. Investigate the revised Federal Government's Australian Broadband Guarantee program and its implications for Tweed business http://www.dbcde.gov.au/communications_for_business/news_and_events/australian_broadband_guarantee

4. Investigate and propose initiatives for regional telecommunications partnerships.

Final Outcome

The final report will need to be of a professional standard suitable to accept as a scoping study.

Responsibilities and Control

A working group will be established between relevant Council officers and TEDC staff who will guide the course of this project. Guidance and advice will be provided by Council in the preparation of this Study but the final publication will express the position and views of TEDC.

Timeframe

The final report should be completed for presentation to Council at its final meeting of 2008.

Funding

This project will be conducted by TEDC within the annual funding commitment with Council.

Confidentiality / Probity

The parties to this project will adopt / implement appropriate probity and confidentiality protocols as and when the need arises.

Broadband network soon to be obsolete

http://www.australianit.news.com.au/story/0,24897,23496663-16123,00.html

By Ryan Emery April 07, 2008 03:44am

BY the time Australia upgrades its broadband, the network could be obsolete - thanks to a high-speed internet developed in Geneva.

The new network, called "the grid", is more than 10,000 times faster than a typical broadband connection.

It is a system of fibre-optic cables and modern routing centres that mean movies and entire music catalogues can be downloaded in seconds, not hours.

The grid, devised by scientists at Cern, the European Organisation for Nuclear Research, and home of the internet, to handle massive amounts of data from their Large Hadron Collider, a particle accelerator, could also transmit holographic images and provide high-definition video telephony for the price of a local call.

Physics professor David Britton from Glasgow University, a leading figure on the grid, told *The Times* that it **"could revolutionise society".**

"With this kind of computing power, future generations will have the ability to collaborate and communicate in ways older people like me cannot even imagine," he said.

Already more than 55,000 servers have been installed across the world and another 200,000 are expected within the next two years. Ian Bird, project leader for the grid, said people would be able to store gigabytes of information on the internet.

APPENDIX 2

Telecommunications Infrastructure Action Plan

Prepared By

GDI Consulting

TWEED TELECOMMUNICATIONS INFRASTRUCTURE ACTION PLAN

Prepared for:

Tweed Economic Development Corporation Ltd

March 2009

GDI
Ground Floor, 201 Wickham Terrace
PO Box 782 Spring Hill, Qld 4004.
Telephone: +61(7) 3832 1222
Facsimile: +61(7) 3832 1212
Email: info@gdinnovation.com

Contents

1. Background

Due to technological innovations such as Internet Protocol (IP), there has been a transformation in the delivery of telecommunication services. When implemented, these innovations enable vastly improved services and new applications for the information economy that will improve people's lives, diversify the economic base and stimulate economic growth.

Broadband telecommunications, in its various forms (ie. wireless and wireline), is now recognised as the roads and railways of the 21st century that will generate the next wave of economic expansion. Just as transport opened up new economic horizons in the last century, advanced telecommunication networks will pave the way to open up new markets and achieve productivity gains across global economies. Consequently, regions that lack affordable access to broadband telecommunications infrastructure will become increasingly disadvantaged.

This action plan has been prepared for the Tweed Economic Development Corporation (TEDC), on behalf of Tweed Shire Council, to develop a telecommunications infrastructure action plan for the Tweed region.

It sets out to define broadband telecommunications from a global perspective and reviews approaches being undertaken to develop broadband infrastructure both internationally and domestically.

As mentioned above, Broadband can be delivered in two ways:

- Wireless, which despite some limitations which will be discussed later in this report, is aimed primarily at mobility, allowing people to stay in contact anywhere, at any time; and
- Wireline, which lacks the mobility due to its fixed location, is best suited to bandwidth hungry, simultaneous use of multiple applications, which again will be discussed later in this report.

In most countries, broadband telecommunications infrastructure is delivered by private sector companies on a commercial basis and in most cases the private sector has not demonstrated a willingness to invest in regional areas without some strategic involvement by government.

Increasingly a view is being formed that broadband telecommunications infrastructure is a utility and strategic government involvement in its development is necessary.

This report has identified a number of common attributes across a broad spectrum of telecommunications infrastructure development projects both in Australia and overseas.

These are summarised below:

- the identified need for strategic planning for telecommunications infrastructure to meet the future needs of business and residents;
- government, and in many cases local government, has taken a leading role in facilitating the development of broadband infrastructure;
- in most cases the development of broadband infrastructure has been a partnership between key stakeholders from both the supply and demand side of the market;

- in all cases the focus of development of the broadband infrastructure is on the economic and social benefits derived from it;

- the proponents have taken a long-term horizon view on the development of broadband, similar to other utility infrastructures such as roads, electricity, sewerage and water.

The report concludes a number of actions that the Tweed Shire Council could take to facilitate the development of this critical infrastructure in conjunction with private and government sector partners.

2. Introduction to Telecommunications

2.1 Types of Technology and Limitations

2.1.1. Wireless Telecommunications

Wireless telecommunications covers a broad range of delivery technologies which include:

- **Radio** - is the transmission of signals, by modulation of electromagnetic waves with frequencies below those of visible light. Electromagnetic radiation travels by means of oscillating electromagnetic fields that pass through the air and the vacuum of space. Information is carried by systematically changing (modulating) some property of the radiated waves, such as amplitude, frequency, or phase.

  When radio waves pass an electrical conductor, the oscillating fields induce an alternating current in the conductor. This can be detected and transformed into sound or other signals that carry information. All radio communications systems utilise EMF in the radiofrequency (RF) part of the electromagnetic spectrum. Typical systems include TV, AM & FM radio broadcasting, mobile phones and their base stations, wireless broadband, paging services, cordless phones, baby monitors, emergency services (police, fire, and ambulance) and rural / country communications.

- **Microwave** - before the advent of fiber optic transmission, most long distance telephone calls were carried via microwave point-to-point links. Starting in the early 1950s, frequency division multiplex was used to send up to 5,400 telephone channels on each microwave radio channel, with as many as ten radio channels combined into one antenna for the hop to the next site, up to 70 km away.

  Microwave radio is used in broadcasting and telecommunication transmissions because, due to their short wavelength, highly directive antennas are smaller and therefore more practical than they would be at longer wavelengths (lower frequencies). There is also more bandwidth in the microwave spectrum than in the rest of the radio spectrum; however, much of it is not used for data communications, especially at the high-end, due to water absorption.

- **WiMAX** - is a telecommunications technology that provides wireless transmission of data using a variety of transmission modes, from point-to-multipoint links to portable and fully mobile internet access. WiMAX[1] technology offers relatively low cost wireless broadband delivery platforms, and provides an alternative last mile access technology to broadband cables and digital subscriber lines (or DSL). As such the technology is a useful last mile delivery technology which may be competitive in parts of Australia where wireline services are not yet available and where there is low population density. It operates in both licensed and unlicensed radio spectrums and has a theoretical speed of 70Mbps synchronous. However as with all wireless distribution technologies, the available data transmission (bandwidth) capability is shared by all users on the distribution network and therefore the more end users connected to the network the less bandwidth available to each individual user.

  The barriers to investment for wireless ISPs are the high cost of backhaul capacity to wholesale internet access, and the relatively high cost of CPE[2] – the WiMAX wireless modems. WiMAX networks have been developed in regional Australia primarily through Federal Government funding programs, such as HIBIS and Broadband Connect.

Wi-Fi - is short for Wireless Fidelity, is the term used to describe wireless connection over short distances between mobile computing devices such as laptops and the internet. Wi-Fi is increasingly used for communication between consumer electronic devices such as in home networks, mobile phones, video games, and other devices that require wireless networking. Wi-Fi is supported by most personal computer operating systems, many game consoles, laptops, smartphones, printers, and other peripherals. In addition to restricted use in homes and offices, Wi-Fi can make access publicly available at Wi-Fi hotspots provided either free of charge or to subscribers to various providers. Organizations and businesses such as airports, hotels and restaurants often provide free hotspots to attract or assist clients. It has a theoretical speed of 54Mbps, uses unlicensed radio spectrum and has limited distance range.

- **Mobile telephony -** Mobile phones work by sending and receiving low power radio signals. The signals are sent to and received from antennas that are attached to radio transmitters and receivers, commonly referred to as mobile phone base stations. The base stations are linked to the rest of the mobile and fixed phone networks and pass the signal/call on into those networks.

  To provide a good quality mobile service, base stations need to be located where people use their mobile phones. A mobile network is typically designed on a "cell grid" basis covering a geographic area. Base stations are located either in each cell or on the corner of a group of cells. The number of base stations required for a given area will depend on the terrain and number of people using mobile phones.

[1] WiMAX is an emerging standard (IEEE 802.16) for long range wireless delivery of broadband services
[2] Customer Premises Equipment

Mobile networks have a finite capacity which means the ability to cater for simultaneous phone calls. The more people using mobile phones, the more capacity is required and this usually means more base stations closer together. Mobile networks must be designed according to the local population and number of people using the network.

3G networks have potential transfer speeds of up to 3 Mbps. For comparison, the fastest 2G phones can achieve up to 144Kbps. As such, its capacity to provide much more than voice calls and SMS (text messaging) is limited. The 2G networks, while still operating, are rapidly becoming superseded.

On the other hand, 3G's high data rates are ideal for downloading information from the Internet and sending and receiving large, multimedia files. 3G phones are like mini-laptops and can accommodate broadband applications like video conferencing, receiving streaming video from the Web, sending and receiving faxes and instantly downloading e-mail messages with attachments.

- **Satellite** - Satellite systems are a radio broadcast technology in the Giga hertz band which covers the last mile (the last 200m) by sending signals 35,768km to the satellite and back again. Because of the long distance, expensive receivers are used to compensate for the weak signals and propagation delays of 250msec are introduced.
  Because a satellite is launched with a fixed number of transponders, the total bandwidth is limited. For this reason satellites are suitable for broadcasting a fixed number of programs but quickly run into limitations when each customer needs an individual service such as video on demand or high speed data.

By 2007, all the major mobile operators were well underway with faster 3G network upgrades. In October 2006 Telstra launched its new-generation 3G network called Next G (3GSM 850MHz). It was the first step in a three-year plan designed to replace the existing CDMA (analogue) network (closed 28 April 2008) and the GSM network (by 2010).

By the end of 2007 Optus' 3G HSPA network reached 60% of the Australian population. Optus' HSPA network upgrade saw new services available in early 2008, bringing its mobile network coverage to over 97 percent of the NSW population and stretching across 217,000 square kilometres. As of December 2008, some 4000 base stations have been upgraded to 3G technology. The network build completion is scheduled for 2010. By December 2007 Vodafone Australia had completed its HSPA major upgrade to its 3G network to most major cities. Also in December 2007 Vodafone Australia announced plans to roll out a national 3G HSPA upgraded mobile broadband network in joint venture with Optus, aimed at providing high-speed coverage to 95% of the Australian population before the end of 2008.[3] Due to delays apparently, the project is now planned for completion by mid 2009.

3 http://www.totel.com.au/australian-telecommunications-research.asp?cid=AU&toc=3739

The findings of a recent survey undertaken by GDI of the wireless industry in Queensland indicate:

- Wireless technology is changing quickly with the main driver being enhancing mobility for data communications on national mobile networks. Other wireless technologies offer niche development applications and include RFID[4], Bluetooth[5] and mesh Wi-Fi[6].
- The development of the current 3G[7] and the coming 4G[8] mobile networks offers speed of up to 10Mbps for voice and data connections as well as powerful on board computing power in the new 'smart phones'. Smart phones are beginning to emerge with open source operating systems[9] that allow third party applications to be developed for potentially millions of smart phone users, along with the added benefit of mobility.

These networks are now capable of competing with existing copper based wireline systems for broadband delivery, and can act as user terminals to access enterprise applications, in addition to providing telephony services.
Opportunities range from mobile workforce automation and spatial, social and messaging applications directed at national and global markets.

Wireless broadband delivery is likely to be dominated by national service providers, although in regional and rural areas there is an opportunity for existing ISPs to extend coverage where wireline service delivery is inadequate.

2.1.2. Wireline Telecommunications

Wireline telecommunications also covers a number of media. Such as:

- **Twisted Pair Copper cable** has been deployed for over 100 years and was originally used to provide telephony services into homes and premises. In more recent times technologies have been developed to enable the copper cable to carry data. xDSL relates to Digital Subscriber Lines is a technology that enables a broadband service to be run over existing copper infrastructure. These DSL services are typically asymmetric meaning that upload and download speeds are not the same.

  The physical properties of copper cable severely impact the speed and quality of the broadband service over distance. For instance, the cable length limit for an ADSL service is 5,460 metres, though for speed and quality of service reasons many ADSL providers place a lower limit on the distances for the service. At the extremes of the distance limits, ADSL customers may see speeds far below the promised maximums, while customers nearer the central office equipment have faster connections.

4 Radio Frequency Identification
5 A short range high speed wireless technology that allows electronic devices to exchange data.
6 A mature Local Area Network (LAN) wireless technology that can be used to provide meshed networks to interconnect many sites at low cost
7 3rd Generation mobile network technology, enabling high speed data connection to mobile devices, in addition to voice communications.
8 As for 3G networks, but with greater data transmission capacity
9 Google Android, Apple App Store, Linux

Versions of ADSL technology are ADSL 1, ADSL 2 and ADSL2+. Where the copper cable is in very good condition, typically ADSL 1 will provide up to 1.5Mbps download speed at 3.5Kms cable length from the central office equipment, ADSL 2 will provide up to 12 Mbps download speed at 1km cable length from the central office equipment and ADSL 2+ will provide 24Mbps download speed at 0.5Kms cable length from the central office equipment. Due to the asynchronous nature of the technology the upload speeds are significantly lower.

- **Hybrid fibre-coaxial (HFC)** cable uses optic fibre to the neighbourhood and coaxial copper cable from an outdoor housing to the premises. HFC has a larger diameter and can carry higher speeds with less interference than twisted pair copper cable.

Only one cable is used to serve all the premises in the neighbourhood and so the available bandwidth is shared amongst all users. HFC is suitable for broadcasting the same information to many subscribers and as such is useful for Pay TV type services where the same television services are broadcast to all subscribers at the same time. However, when each customer requires an individual broadband service, speeds are limited to approximately 2Mbps.

As with ADSL, the return channel has a much lower data speed and even though the network is currently being digitised to improve quality, it will still be bandwidth limited.

- **Fibre optic cable** uses light to transmit bits of data. A laser at one end of the cable switches on and off to send each bit of information. Modern fibre systems with a single laser can transmit billions of bits per second and the laser can turn on and off several billions of times per second.

The newest systems use multiple lasers with different colours to fit multiple signals into the same fibre. Optical fibre has enormous bandwidth capacity and, as the light is contained within the cladding layer of each fibre, the light spectrum is fully dedicated. Fibre point to point connections are capable of transmitting data for many kilometres without repeaters and with no interference.

Globally, telecommunications networks use optical fibre technology for long haul (backbone) infrastructure.

This technology is established and well proven, and is currently being deployed as a “last mile” customer access network technology to millions of homes globally. Optical fibre cable has a physical life of beyond 20 years, with a corresponding economic life. The electronics are relatively inexpensive, and new generations of devices can be economically phased in beside existing electronics, as future services require it.

The following diagram shows the relative broadband bandwidth speed for the different ‘last mile’ distribution technologies and their evolution over time – optical fibre, copper and wireless.

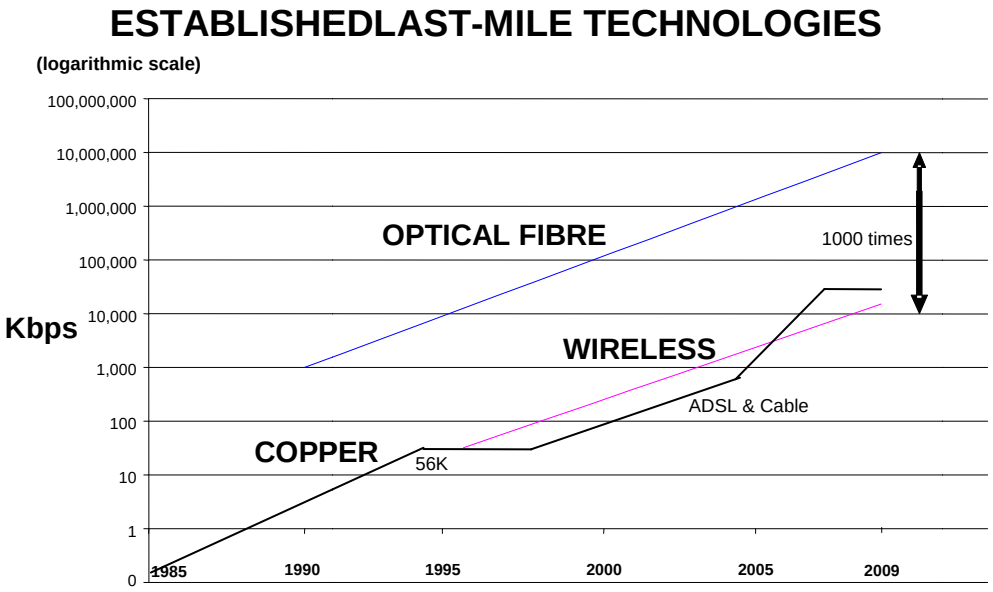


Figure 1 – Established Last Mile Technologies

2.2 Technology Convergence through IP Platforms

The Information and Communications Technology (ICT) industry is undergoing significant change as the digital revolution alters the economics and service options for telecommunications services. With the advent of the Internet Protocol (IP), most of the old networks used for the separate delivery of voice, video and data services are collapsing in to the more cost effective IP networks, as shown in Figure 2.

The significant economies of scale that arise from IP networks that can deliver any telecommunications service are forcing telecommunications and cable TV providers into very large reinvestment programs.

A large part of the reinvestment needed lies in the connections to end user premises – business and residential. This is because of the growing demand for greater connection speed with broadband services, used to deliver video services, telephony, data and internet services.

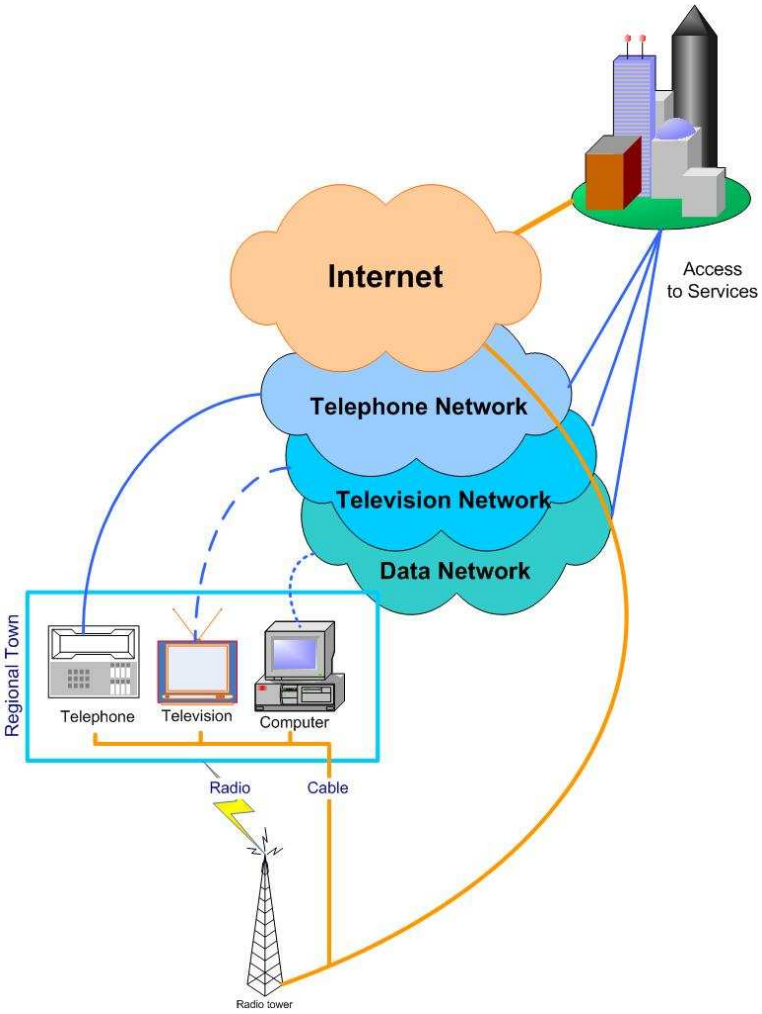


Figure 2 Converging Networks

These connections are still largely made to premises via the traditional twisted pair copper cables used over many decades first for telephony, then for data services[10] and the internet[11].

While the copper cables were never designed for this variety of service delivery, the very large cost of new cable installation has forced the development of innovative technologies that can extend the life of this asset and these are illustrated by the ADSL and VDSL technologies that bring many Mbps of capacity over cables that were intended to deliver only a few equivalent Kbps capacity for voice traffic almost 100 years ago.

[10] ISDN, Frame Relay etc
[11] ADSL, ADSL2+

2.3 Future Direction

2.3.1. IP Networks

The need for increasing connection speed by business and residential customers is forecast in Figure 3 below. The ability for IP platforms to deliver any communications service is accelerating demand for greater connection speeds.

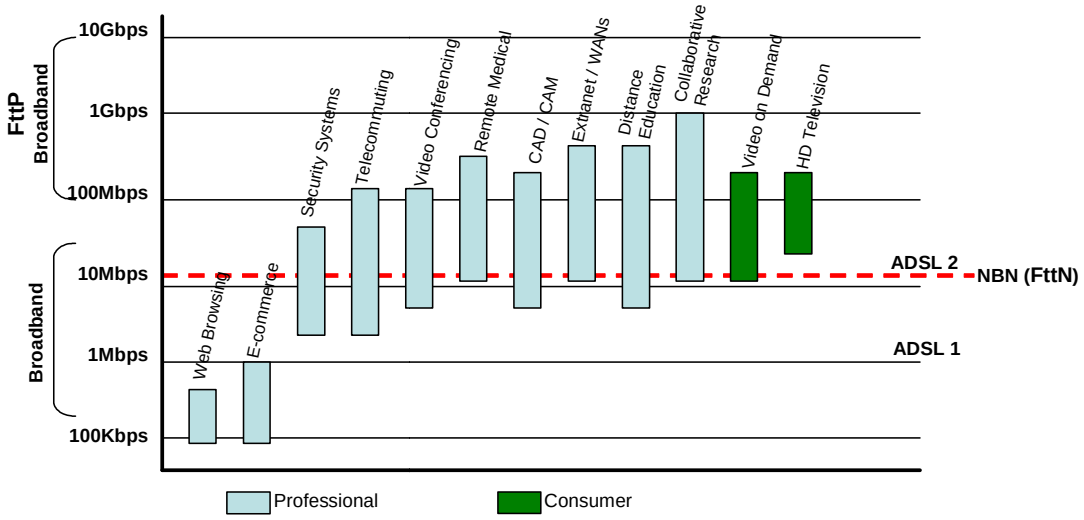


Figure 3 Connection Speeds - Broadband Services

For example, the recent announcement of IPTV[12] services in Australia will add yet another level of demand on the already straining ADSL networks.

The need for increased connection speed, and the limited ability of existing copper lines to meet these needs, signals different connection solutions for the future to meet these demands. However, as can be seen in Figure 2, with the growing number of user applications made possible by broadband, future infrastructure will need to be able to support the simultaneous use of multiple applications. This will require greater bandwidth than can be delivered by today's copper wire and wireless technologies.

The options for the delivery of next generation broadband connection speeds (in excess of 10Mbps) are as follows:

i) Bring ADSL equipment closer to the end user. The delivery of high speeds connections over copper cable requires that transmission electronics are placed closer to end user premises because the effective range of transmission is about 1km now for ADSL2+, providing speeds of up to 20Mbps (distance limited).

[12] http://www.australianit.news.com.au/story/0,27574,24627716-15306,00.html

This means the equipment can no longer be placed at the central office (telephone exchanges) as many premises are further away from the exchange than 1km in cable length. Under this scenario the equipment will now be housed in roadside cabinets feeding copper cables over the last kilometre, with the cabinets being fed by high capacity fibre optic cables from the exchange.

Due to the requirement to house distribution equipment, these new cabinets will be much larger in size than existing cable pillars – refer diagram below. The equipment housed inside the new cabinet will include electronic devices that require cooling via a fan which will emit a small amount of noise. As such, these new cabinets pose a potential impost on streetscapes.

Figure 2: Telecommunications equipment cabinets in the road reserve

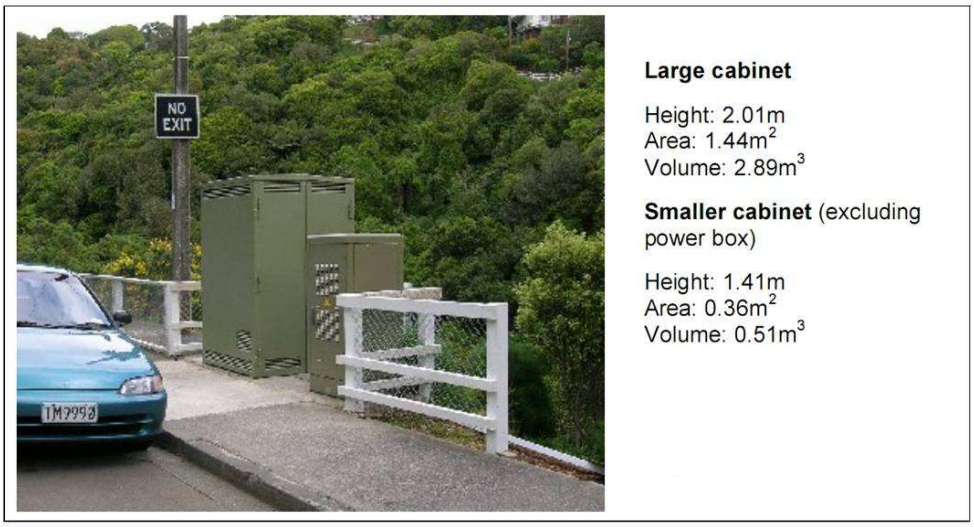


Figure 4 - Telecommunications Cabinet

This technology step has limited value in regional areas where there are lower density populations and long distances between properties. In these cases the economies of scale fall away quickly for ADSL2+. Hence, wireless delivery of broadband services has potential growth opportunities in regional Australia.

ii) Fibre to the Premises (FttP). This is the ideal solution, where every home or business is connected to the considerable capacity of fibre optic cables currently providing synchronous speeds of 100Mbps to 1Gbps. However, this is the most expensive option of all and only currently has economies of scale where existing infrastructures and/or trenching works can be leveraged. For example, in new developments where other services (water, power etc) have to be installed and telecommunications pits and pipes are installed in a common trench with other utility infrastructure, or where the local council is undertaking road or trenchwork and in existing infrastructures such as water pipes and/or electricity poles, either of which making fibre installation a marginal cost. Over time, the ADSL2+ rollout discussed above does bring fibre closer to premises, and can be considered a step towards FttP. We note the evolving Passive Optical Network (PON) technologies offer very high capacity connection for multiple connections over a single fibre, bringing some reduction in cost for fibre distribution networks.

iii) Wireless Delivery. The radio frequency spectrum is a finite asset and is controlled by the Australian Communications and Media Authority (ACMA). Changing uses for wireless technologies are causing ACMA to review how the spectrum is used and managed[13]. A matter of considerable interest is how the new WiMAX broadband wireless standard can be accommodated in the spectrum plan, and whether it will become a significant delivery mechanism for the delivery of broadband services. In regional and rural areas, with large low density population areas, wireless delivery in a number of forms is likely to be an important technology that is more cost effective than the two previous options.

Wireless technologies offering much promise for both voice and broadband connection are principally from the family of 3G and 4G mobile telephony platforms used by all the mobile phone companies. These platforms are able to deliver speeds of up to 10Mbps (technology dependant) over large areas.

There are strong prospects that all the 3G – 4G platforms will offer next generation (10+Mb/s download) connection speeds. However, wireless uses shared spectrum and therefore performance and the amount of bandwidth available to individual users impacted upon be the number of simultaneous users on the network at any point in time.

These platforms are intrinsically more expensive than WiMAX systems, but they already have millions of customers, generate considerable voice and other revenues[14] and most likely can compete on price for broadband delivery with other wireless technologies such as WiMAX. These same networks are now supporting wireless broadband modems that connect lap top computers directly to the internet and email.

At one time, WiMAX was seen as a transformational technology that would connect millions of customers, and Intel announced they would equip all lap top computers with a WiMAX chip set, as they do now with a Wi-Fi[15] wireless connection[16] chip set.

This has not yet happened, and now the LTE (Long Term Evolution) standard being developed for broadband access over 3G – 4G networks looks to become a serious competitor to the as yet unrealised promise held for the widespread deployment of WiMAX. Some of the larger manufacturers are now predicting that LTE will dominate, with WiMAX holding perhaps 10 – 20% of the wireless broadband market.

LTE, coming from established mobile service providers who equip their expensive networks in this way, will limit competition with this technology to these large service providers. We may therefore assume that WiMAX will have a more sustainable role in areas where mobile coverage is poor, or the mobile carriers decide that there is insufficient return on LTE investment in sparsely populated areas. A recent announcement on the delivery of LTE chipsets in mobile devices indicates commercial delivery in 2011[17].

[13] http://www.acma.gov.au/webwr/_assets/main/lib310474/ntnl_spect_planning_overview.pdf
[14] TV, web browsing, email
[15] Wi-Fi (IEEE 802.11x) offers wireless connectivity normally over a few tens of meters and is designed for indoor home or office connectivity, is widely used, low cost and an example of a mature, non proprietary wireless connection standard.
[16] The difference is that WiMAX has a 20km+ range and Wi-Fi a matter of 50 – 100m
[17] http://www.totaltele.com/View.aspx?ID=103767&t=2&en=1

2.3.2. High Speed Broadband

With the growing demand for 'triple play' (voice, data and video), broadband networks need to be capable of providing very high speed to support the simultaneous use of a wide range of services as seen in Table 2 below. However, the delivery of these services is limited by current bandwidth technologies.

The true potential of very high speed broadband is the ability to do several of these things simultaneously with no loss of speed or quality, for example:

- in a residential environment - have someone on an internet connection downloading or interacting with a university lecture or tutorial while someone else is watching Pay TV, and a third person is playing online games
- in a business environment – one person can be videoconferencing with three other locations while a second person is researching on the internet and a third is sending large graphic design files to a manufacturer overseas.

As has been demonstrated earlier, xDSL, with its limitations due to the copper wire physical constraints of both distance and symmetry, and wireless, with its limitations due to the shared nature of its radio spectrum, will not meet the requirements of the next generation applications that require high speed symmetrical (upload as well as download) capability.

The only medium capable of providing faster speeds that are both symmetrical and capable of supporting simultaneous use of multiple applications, such as the ones listed below, is optical fibre.

Content/application	***Description***
1. Voice telephony	*Voice over Internet Protocol (VOIP) is a technology that enables voice calls over the internet at no or minimal cost (i.e. the cost of a local call). VOIP can deliver local, national and international calls, however it requires dedicated bandwidth to maintain quality of the service. This is achievable with broadband.*
2. Video telephony	*Video telephone includes high definition person to person video calls and videoconferencing from numerous locations. Current bandwidth constraints limit the quality (and therefore the functionality) of existing video conferencing. In addition, video telephony is currently not available to residents and small businesses, however with high speed broadband it would become available to everyone.* *(Higher definition requiring higher broadband speed)*
3. Internet browsing	*High speed broadband users can browse the world wide web, use online banking and shopping, upload and download large files (e.g. high definition TV programs), and view video recordings (e.g. breaking news). The ability to access the full range of services on the internet, especially those including downloading video is only achievable with high speed broadband.*

Content/application	***Description***
4. E-mail	*High speed broadband will enable advanced text based communications, with the ability to send and receive attachments of significant size (10Mb and greater), such as photo and video files for personal use or data spreadsheets for businesses. Current technology does not allow this quantity of data transfer.*
5. Pay-TV	*Subscription based broadcast television, (e.g. Foxtel, Optus Vision) will be available to all end users with high speed broadband. In the future this service will be interactive, with users able to participate in competitions, quizzes, auctions, voting, and games. Programmers will also be able to target marketing for individual users.* *Higher video definition requires higher broadband speed*
6. Video on demand	*Pay per view video programming such as movies and special interest content (education, adult entertainment) will be available to users. This content will be available for a specified time after downloading so that consumers can view it at their convenience. The range and flexibility of this service is not possible with current technology Higher video definition requires higher broadband speed*
7. Online gaming	*High speed broadband will make possible network based interactive games, typically involving multiple players around the globe either on a peer to peer basis or via a centralised server. These games will be conducted in real time as high speed broadband will support the necessary communications.* *Higher video definition requires higher broadband speed*
8. Real time Collaboration	*High speed broadband will make possible network based interactive business collaboration, potentially involving multiple team members around the globe sharing documents and designs interactively in real time, in virtual rooms on line.* *Higher video definition requires higher broadband speed*
9. Interactive online services in Health and Education	*High speed broadband will enable greater functionality for content related to online education, online health, online government and community based services. High speed broadband will support devices to improve health care and monitoring, such as wrist watches to monitor the heart, cell phones that prick the finger of a diabetic patient and send the information to a doctor. As well as at home patient care, off-site medicine will also be supported, for example - an intensive care patient could be assessed by a specialist residing in a different location, or a junior health worker could be supported in the diagnosis and treatment of patients, by experienced practitioners from other areas. These innovations all require high speed broadband capacity.* *Higher video definition requires higher broadband speed*

Content/application	***Description***
10. File transfer (on net)	*High speed broadband will allow file transfer via peer-to-peer or ftp applications, which are primarily used for business purposes, including Do-It-Yourself (DIY) service providers. Currently small businesses have limited access to these services which, when they are available, are charged at a premium. High speed broadband would allow all businesses – especially small and medium enterprises – affordable access to on net capabilities.*
11. Teleworking	*High speed broadband will enable efficient remote access to corporate network environments or wide are networking (WAN) - effectively extending the facilities of the corporate local area network (LAN) to the home. Currently remote access to business networks is limited by the broadband service available to individual residents. Typically these services only provide slower speeds, limiting the effectiveness of off-site work. High speed broadband would resolve this issue by providing improved communication richness through higher speed access to business applications and information as well as video conferencing. Higher video definition requires higher broadband speed*
11. Corporate data networking	*High speed broadband supports inter-office data communications linking offices of the same organisation and/or offices of different organisations in order to support core business processes such as Customer Relationship Management (CRM), document management and business to business e-commerce. Current services of this type are targeted at large businesses, however high speed broadband will make these services available to all small and medium businesses, significantly improving business processes and efficiency. .*

Table 1: Key Broadband Content and Application Opportunities

2.3.3. The Growing Importance of Broadband Telecommunications

Access to high quality, affordable telecommunications services is more important than ever if the Tweed region is to keep pace with other regions of Australia, as well as overseas.

Telecommunications, and especially broadband communications, is a key enabling technology that successful countries will utilise more and more to allow their business and industry to gain a competitive advantage, to attract new investment in new product and industry development, to fully participate in international trade and secure economic growth. It will also greatly enrich community life by allowing access to a wider range of information and services delivered with unprecedented convenience and flexibility.

Broadband allows user's access to fast, 'always on' online access to digital content, applications and a range of services, some or all of which can occur simultaneously. It has the capacity to transmit and receive large amounts of data, images and video, as well as traditional telephony and Internet at significantly greater speed and allow users to take full advantage of new communications tools and advanced information and communication technology (ICT) applications.

Broadband telecommunications will be an important driver of national, state and local economic growth through its impact on innovation and improving the productive capacity of human capital.

The report of the Commonwealth Government's Broadband Advisory Group concluded that "harnessed effectively, broadband connectivity will be a key driver of Australia's Gross Domestic Product (GDP), jobs and wages growth. Broadband technologies will be the roads and railways of the 21st century, generating the next wave of economic expansion. Just as transport opened up new economic horizons in the last century, advanced communication networks will pave the way for productivity gains across global economies in the new century."

2.3.4 Statement from Paul Budde – Telecommunications Research (Australia)

"Broadband is seen as being vital to both the economy and the community. We estimate that by 2015, it will add over $20 billion to the Australian economy – by organisations that will use broadband as a critical element in their business model; in the distribution of their services to their customers; and as a communication, electronic marketing and electronic production tool.

It is also an important lifestyle-enhancer, providing the general population with easy access to information and services. New business models and partnerships need to be developed in order to profit from these economic opportunities.

As the demand for broadband shifts to more sophisticated digital content and applications, higher speed broadband will be required."

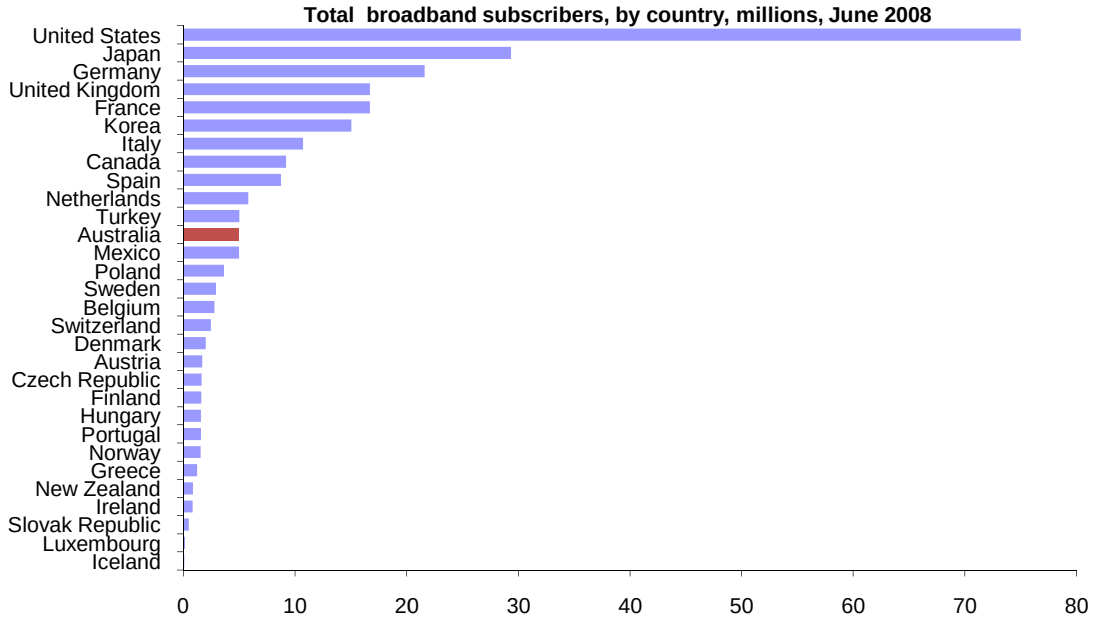
Time frame	User Development	BB speeds	Key Reasons
Today	Enthusiast	300-500 Kb/s	Always-on Internet access
+ 2 yrs	Seasoned user	2 Mb/s	Internet plus photos, music
+ 2 yrs	Broadband part of life	6-10 Mb/s	Triple-play/video entertainment
+ 5yrs	Fully-integrated Broadband	25-45 Mb/s	Work from Home/Telework, education, healthcare, hobby, entertainment

Table 2: Adapted from Paul Budde Communications

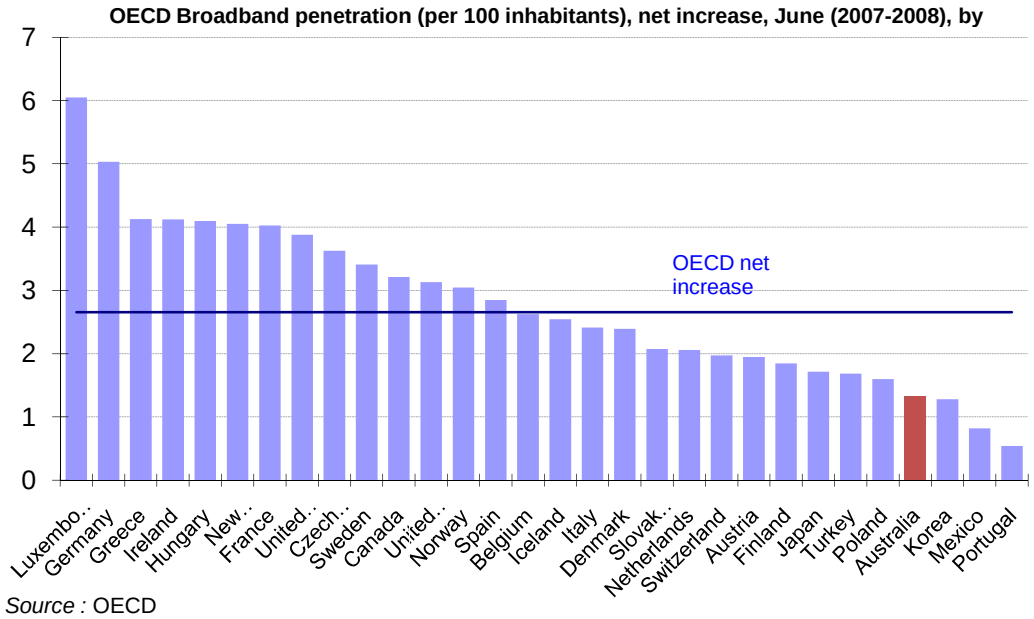
2.3.5 Where Australia Sits by Way of Comparison to other Developed Countries

The following series of graphs provide a view of where Australia sits by way of comparison to other developed countries with regard to telecommunications. These graphs are the result of research undertaken by the Organisation for Economic Co-operation and Development (OECD) which groups 30 member countries and investigates the progress of the development of a number of key factors associated with economic development. The following series of graphs relate to telecommunications services in OECD countries.

Graph 1 highlights that as at June 2008 Australia was ranked 12th in the OECD member countries for broadband uptake.

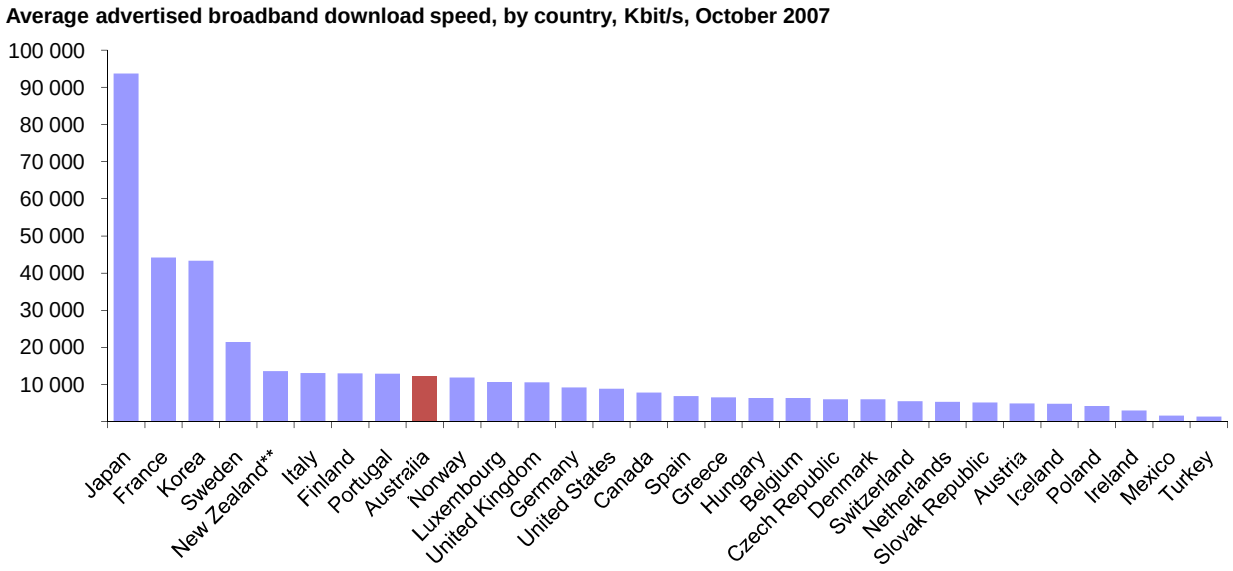


Graph 2 compares the annual growth of broadband uptake by OECD member countries.



Source : OECD

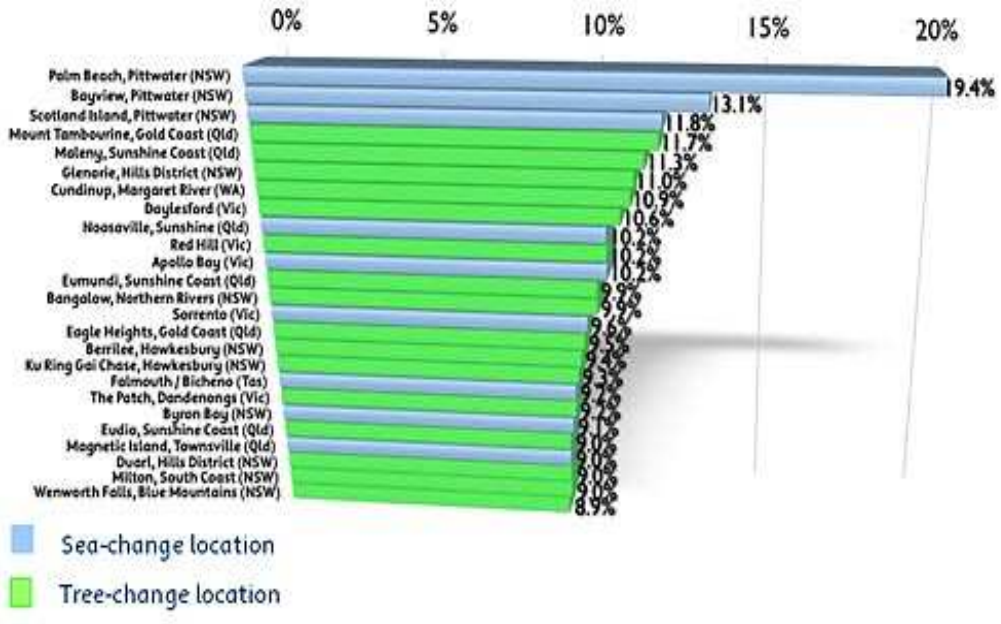
Graph 3 shows the relative position of Australia as compared to the other OECD countries in relation to their average broadband speeds.



By 2010, it is projected that 50 per cent of Australian's will undertake some form of teleworking.[18]

The freedom and flexibility of the new technology is also driving the sea and tree change revolution. The following table [Table 3] of the top teleworking locations demonstrates the growing shift in Australia.

Table 2: **Top Teleworking Locations – Percentage of employed people working at home**



[18] Excludes those in agriculture, forestry, fishing & mining industries
Source, KPMG, Census, AFR 130406

3. Tweed Region

3.1 Existing ISPs/Carriers, Services and Intentions

GDI has interviewed a number of Internet Service Providers (ISPs), carriers and Carriage Service Providers (CSPs) that deliver services in or near the Tweed region and who have telecommunications infrastructure. The following represents the feedback from discussions with these ISPs and CSPs.

3.1.1 Cirrus Communications

Dr Erik Heyde, Managing Director Cirrus, advised that through the acquisition of two wireless networks, Chariot and Unisky (previously WBS), Cirrus can provide coverage to most of the Tweed region. However, the quality of the acquired networks is not to the standard that Cirrus aspires and they are looking to upgrade the infrastructure. As such they have applied for funding through the Australian Broadband Guarantee and are hopeful that will allow them to undertake the upgrades in the first quarter 2009.

Cirrus offers a fixed wireless network, based on WiMAX, offering speeds of 256k/64k to 2Mbps/512K for home plans and 1Mbps to 8Mbps for business plans.

Cirrus currently has 150-200 customers in the Tweed region, primarily in the areas of Murwillumbah, Bilambil Heights and Pottsville. Cirrus have wireless backhaul capability from Brisbane and Sydney and an interconnect point with Optus at Robina on the Gold Coast.

As mentioned, Cirrus' only has wireless infrastructure and is not looking to deploy fibre at any time in the future.

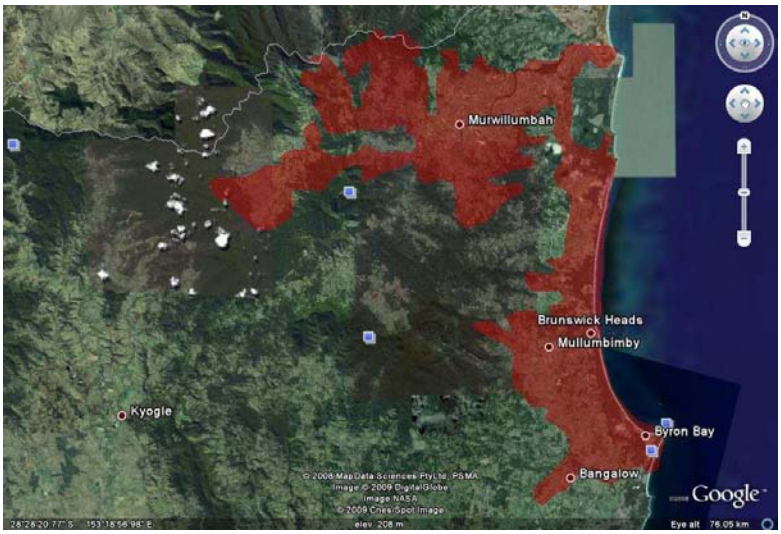


Figure 5 Cirrus Communications Network Coverage

3.1.2 Soul

Discussions were held with Stuart McCullough, General Manager Sales and Paul Young, Business Development Manager.

For the last 5 years Soul has been deploying high speed broadband infrastructure for the NSW Government under the NCF27 Bandwidth to the Bush program, where they have been contracted to provide telecommunications (with competitive backhaul) to some 24 regional towns and 26 Government Network Access Points (GNAP) mostly in relation to education and health facilities. None of these facilities are located within the Tweed region.

Soul's merger with TPG in mid 2008 resulted in a Soul/TPG national network of 303 DSLAMs of which none are located in the Tweed region. However this is sizeable compared with the 315 owned by Optus, 299 operated by AAPT/PowerTel/iiNet and 95 for NEC/Nextep. They currently offer a range of broadband connection options from business grade IP services based on ADSL2 technology with speeds of 256k/64k - 8Mbps, consumer broadband with speeds of 64k/64k - 256k/256k and resell voice and data mobile communications with data speeds of GSM at 20k – 40k (up to 50 K) and #G/HSDPA at 512k – 1.5 Mbps (up to 3Mbps). Soul also has an extensive infrastructure footprint across Australia resulting from their regional TV network.

While they have worked with Country Energy to provide optic fibre to 18 regional towns throughout NSW, Figure 4 below, as provided by Soul, indicates that apart from a small amount of optic fibre at Tweed Heads Soul has very little infrastructure throughout the Tweed region with the exception of some microwave backhaul. Soul has indicated that its preferred model with for regional telecommunications infrastructure development is to partner with high demand customers and establish a network access point (NAP) for example located at a hospital, from where optical fibre could be radiated out for example the Council Office and to Telstra telephone exchanges where Soul would install its DSLAM equipment to service identified local broadband demand using Telstra's local distribution copper cables to premises. Soul have advised it has a NAP at the Murwillumbah Hospital in Ewing Street but currently have no DSLAMs installed in the Tweed region.

Soul have indicated that it has no current plans to expand their infrastructure in the Tweed region and that further infrastructure development would need to be underpinned by a positive business case which would include economies of scale that could be achieved particularly in relation to cost of entry and certainty of demand.

Figure 6 - Soul's Network Capacity in Tweed Shire

3.1.3 Pivit

Pivit is a small niche carrier with its core business being FttP networks providing symmetrical broadband connectivity offering speeds of 10 Mbps to 100 Mbps, particularly to closed estates in Queensland and New South Wales. Included in these closed estates are; Brisbane Airport, Kelvin Grove Urban Village, Coomera Waters and Sanctuary Cove. All of which enjoy high speed broadband services, such as:

- Advanced telephony services
- Internet access services
- Television services including free-to-air (analogue and digital) and pay TV.

While they currently do not have any telecommunications infrastructure in the Tweed Shire and have no immediate plans to build, Peter Geale, Pivit's Marketing Manager, has indicated a high interest in the opportunity work with Tweed Shire Council and property developers to replicate their existing broadband models of fibre to the premises (FttP) in new developments and leveraging their existing wireless network linking Brisbane and the Gold Coast.

3.1.4 Macquarie Telecom

Michelle Lambert, Account & Alliance Manager advised that currently MT provides mobile services to Tweed Shire Council over a mix of Telstra and Optus infrastructure, using 3G and 2G.

Macquarie Telecom's core business is primarily providing telecommunications services to corporations and government. Its broadband is based on ADSL2+ with speeds of 512k to 24 Mbps. It also offers a premium package based on SDSL which provides symmetrical connectivity supporting both VoIP and VPN.

Macquarie Telecom has no current plans to develop infrastructure in the Tweed region.

3.1.5 Optus

Optus is a full service carrier providing both business and consumer services. Such as:

- Business – Remote access (IP VPN), broadband internet, ethernet, data, voice (PSTN & VoIP), mobile and satellite communications, security, as well as a range of network and hosting services;
- Consumer – Home telephone, mobile, broadband internet and cable/digital TV (FOXTEL)

In discussions with Simon Tyndale-Biscoe, Account Manager Optus Business and Rory Brown, General Manager Corporate Strategy, it appears that Optus has established relationships with some 30 Local Councils throughout New South Wales such as, Kempsey, Port Macquarie and Gosford, as well as Gold Coast and Logan.

Optus advised that:

- Similar to other telecommunications carriage providers, Optus' preferred delivery model for fixed line services is to run an Optus optical fibre to a local Telstra telephone exchange where it installs its own DSLAM equipment to service identified local broadband demand using Telstra's local distribution copper cables to premises.

- Due to the high cost of developing infrastructure in the last mile, Optus will only provide fixed-line services over rented Telstra copper cable in Brownfield areas. Where there is no access to rentable infrastructure, Optus do not provide fixed-line services;
- On 19 December 2008, Optus completed the national roll-out of its 3G (marketed as Yes G) network, involving some 4,000 base stations. They are yet to clarify the number and locations of their base stations within Tweed Shire;
- There are no Optus DSLAMs within the Tweed region. Until the outcome of the NBN has been determined, most infrastructure development is on hold;
- they would be interested in the possible pre-planning of towers, but as yet we have not been able to undertake that dialogue with decision makers;
- Any future infrastructure build will need to be underpinned by a positive business case and will be demand driven.

3.1.6 Telstra

As Australia's incumbent carrier, Telstra delivers a full range of services to both businesses and consumers. Such as:

- Business – Remote access (IP VPN), broadband internet, ethernet, data, voice (PSTN & VoIP), mobile and satellite communications, security, as well as a range of network and hosting services;
- Consumer – Home telephone, mobile, broadband internet and digital TV (FOXTEL)

Unfortunately, due to its position at the time regarding the National Broadband Network (NBN) tender, Telstra was not in a position to comment on any specifics of its broadband infrastructure apart from sending a letter detailing its position with regards to the NBN.

(Refer Appendix 4 - National Broadband Network - Telstra Proposal)

We now know that Telstra was unsuccessful with its non-compliant bid for the NBN. Telstra currently provides both XDSL (including ADSL2+ to some areas) broadband and 2G and 3G (marketed as Next G) mobile networks throughout the Tweed Shire. The following table shows the locations of ADSL enabled exchanges (ADSL2+ enabled) throughout Tweed Shire:

Banora Point	Kingscliff (ADSL2+)	Stokers Siding	Tyalgum
Bilambil Heights (ADSL2+)	Kunghur	Terranora Lodge (ADSL2+)	Uki (ADSL2+)
Chillingham	Lillian rock	Tumbulgum (ADSL2+)	
Duranbah	Mooball	Tweed Heads	
Hastings Point (ADSL2+)	Murwillumbah	Tweed Heads West	

Consistent with other regional areas, it is likely that Telstra will rely on its Next G network to provide basic broadband services to many parts of the Tweed Region as an alternative to wire line services.

Discussions with Telstra's wireless operations department indicate a willingness to participate in preplanning mobile communications towers in new developments with Council and Property Developers.

Telstra also has a Smart Community program (Velocity) that provides fibre to the premises to select new residential developments delivering Telstra communication and entertainment services aimed at new home owners. The services offered include:

- high speed broadband
- multiple fixed line services
- digital Free To Air TV services
- FOXTEL
- access to Telstra's future broadband products and services as they become available.

If a Property Developer wishes to have Telstra deploy a Velocity network throughout its development, they will need to deal directly with Telstra. The resultant infrastructure will be owned and operated by Telstra.

3.1.7 Allegro Networks

David Waldie, Managing Director of Allegro, advised that Allegro's target market includes both business and consumer providing access to high speed, fixed wireless broadband based on their WiMAX network that delivers symmetrical broadband at speeds up to 40 Mbps. Allegro's coverage allows them to provide services such as internet, remote networks (Ethernet & VPN) and VoIP, to places that ADSL cannot; throughout Brisbane, the Sunshine Coast, the Gold Coast, and surrounding areas of South East Queensland . (Refer Figure 5 below)

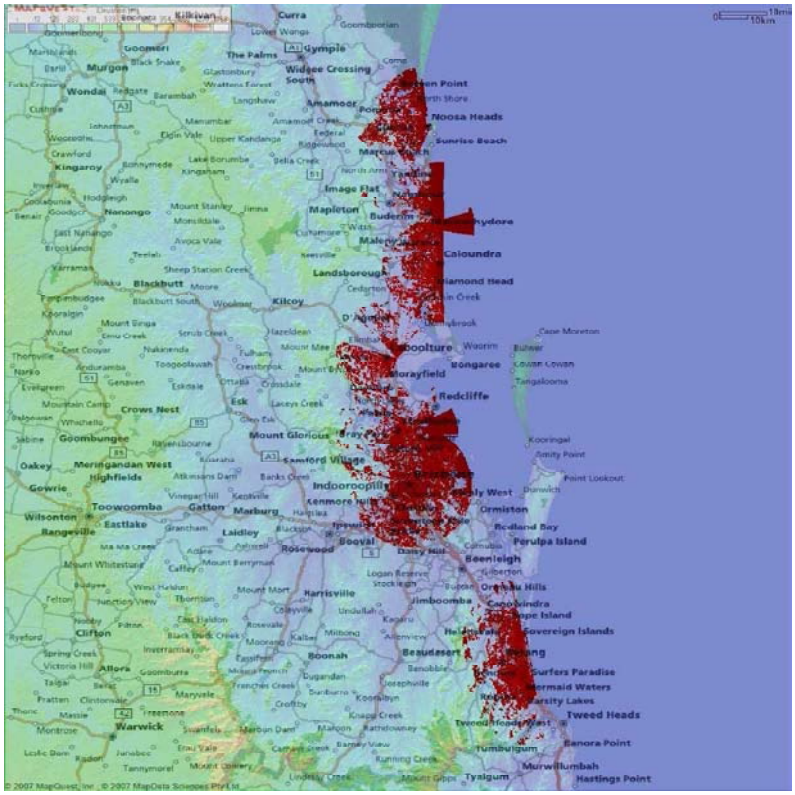


Figure 7 - Allegro's Regional Telecommunications Network

Allegro's core business involves providing community based solutions in partnership with the Local Council. Their model, which has proved most successful for the Sunshine Coast Region and involves working in partnership with both the local council and other telecommunications infrastructure and service providers to deliver business grade services.

While they don't currently have any infrastructure within Tweed Shire, Allegro have indicated a high interest in participating in the development of future telecommunications infrastructure for the region providing there is sufficient commitment from Council and other stakeholders.

3.1.8 Fujitsu Australia Ltd

Fujitsu is a multi-national company that, amongst many lines of business, delivers a range of end-to-end ICT solutions to property developers, body corporates and Councils by managing their technology assets such as telecommunications networks.

Reuben Bennett, Business Development Manager for Fujitsu's Telecommunication & Networks Infrastructure Solutions Group, advised that Fujitsu has significant experience internationally in the provision of fibre to the premises (FttP) networks. He advised that from the work they have recently undertaken in developing the Sunshine Coast open access broadband network, it was vital that Council maintained a strong involvement as it plays a significant role in facilitating and catalysing a successful end to end business model from telecommunications carriage through to developer and last mile operator engagement.

Key areas of consideration include attracting competitive backhaul to the region and developing a suite of policies that support broadband infrastructure development such as mandating telecommunication pits and pipes for all green field developments, as well as urban renewal (brown field) development. In this way, developers would have to include fibre ducting along with all other utilities, which would be ultimately vested with Council.

Another area that he highlighted was the need for developers to work together with a view to establishing a common model for shared infrastructure, enabling cost-efficiencies in a number of areas such as:

- Sharing of a common "head end"; and
- Keeping the overall network build cost as low as possible so as to encourage the larger retail providers to carry their services over the network.

Fujitsu currently have no infrastructure in the Tweed Shire, but have indicated that they are in discussion with property developers that have current interest in the Shire.

3.1.9 NEC

Similar to Fujitsu, NEC is another Japanese multi-national company that has invested heavily in Australia, including major Network Operating Centres (NOCs) and Data Centres, located primarily in Melbourne. In relation to broadband, NEC intends to roll-out FttP via a Gigabit Passive Optical Network (GPON) for residential greenfield sites and review other delivery methods for current brownfield developments.

An example of this is the Springfield development west of Brisbane where NEC has been working with the Springfield Land Corporation to provide open access to all service providers from a common Head End at a wholesale rate, attracting usage by such areas as the medical precinct and the CBD.

3.1.10 NextGen

NextGen is a well established backhaul provider with an optical fibre network extending some 8,500 kms from Brisbane to Perth via Sydney, Melbourne and Adelaide, making it the third largest fibre network in Australia. (Refer Figure 6 – NextGen's Network Infrastructure)

NextGen is AARNet's carrier of first choice. AARNet provides high-capacity, cost-effective Internet services to the education and research communities and their research partners. It has a focus on collaboration, teaching, learning and research by connecting people to Internet resources anywhere, any time. As such AARNet has an extensive network connecting University Campus' nationally and internationally.

NextGen has a high interest in providing networks where there is a strong focus on community based innovation and links the businesses and industry to the educational institutions.

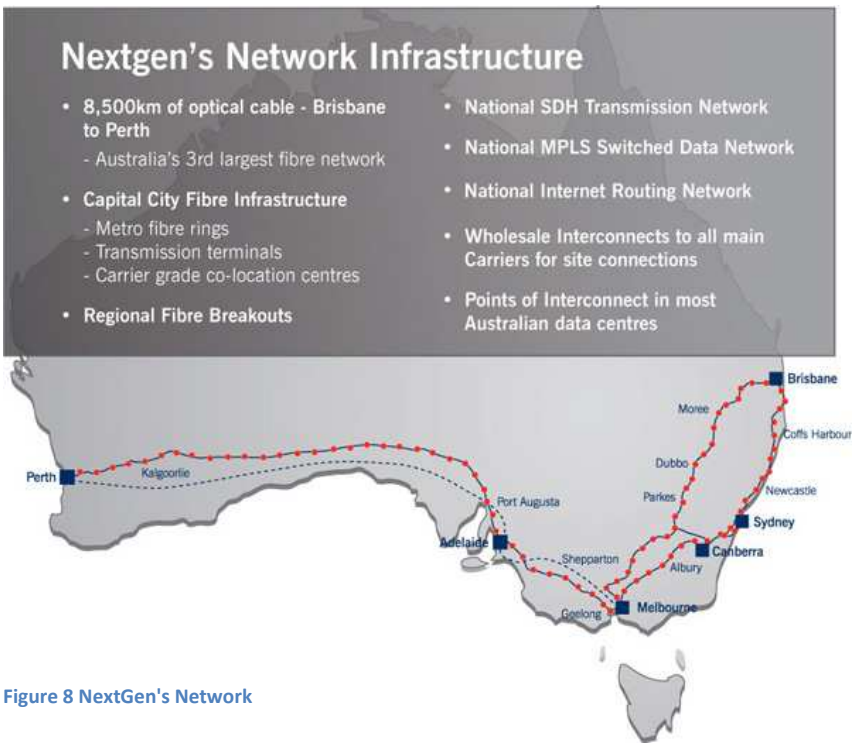


Figure 8 NextGen's Network

3.1.11 Vodafone

Vodafone Australia has recently joined forces with Ericsson, their primary hardware and software support for its national mobile broadband rollout, based on High-Speed Packet Access (HSPA) technology, which while initially being fast-tracked for completion in December 2008, will now extend into the first half of 2009.

Vodafone and Ericsson will deploy network engineering teams in all states and territories simultaneously to ensure more Vodafone customers in regional and rural Australia can enjoy the benefits of HSPA mobile broadband coverage this year.

In addition to upgrading all Vodafone 2G sites to 3.5G (HSPA), a significant proportion of high-demand sites in metropolitan areas covered by the Vodafone and Optus joint venture HSPA network sharing agreement will be upgraded to provide higher specification mobile data transmission.

Vodafone is upgrading its 900MHz and 2100MHz mobile network in regional and rural Australia with Ericsson's latest hardware and software, which is rated to the 14.4Mbps maximum theoretical downlink, which in reality should receive average download speeds of 600kbps to 1.5Mbps and average upload speeds of 200kbps to 1.4Mbps.

The national network upgrade will expand Vodafone's mobile broadband coverage to reach 95 per cent of the areas where Australians live and work.

Vodafone advise that they have some existing Current 3G 2100 HSDPA mobile coverage over the northern area of Tweed Shire and are undergoing a network upgrade program as mention above. However, they are unable to provide details at this time.

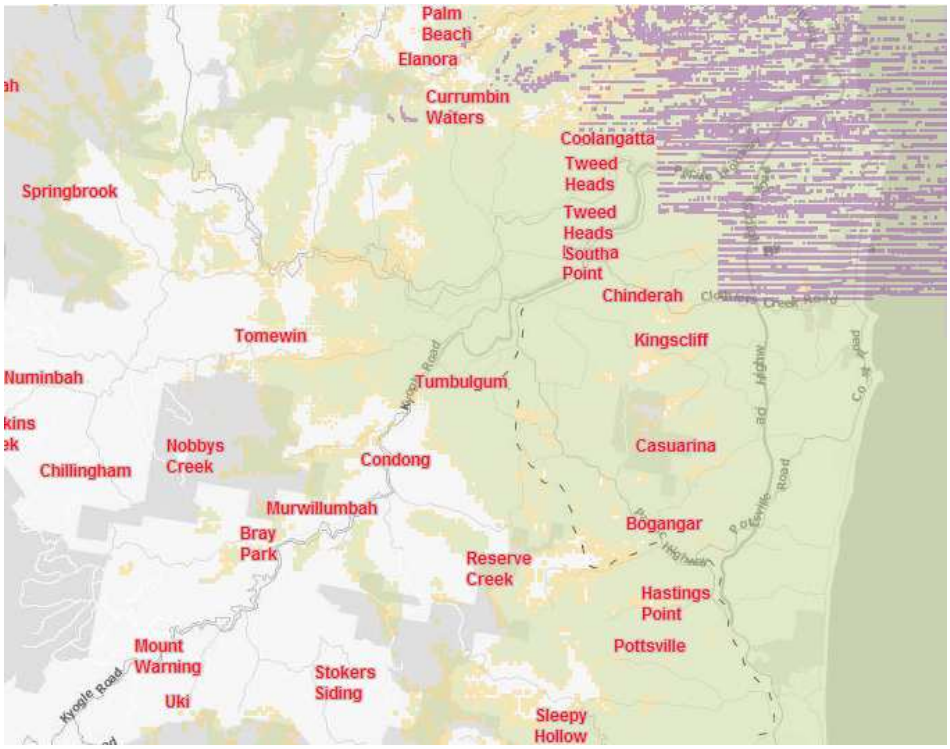


Figure 9 - Vodafone Coverage Map (Purple shaded area denotes 3G coverage)

3.1.12 Country Energy

Sav Aristides, General Manager Business Development, External Relations Division of Country Energy, advised that CE has an optical fibre network of approximately 25 kms from Tweed Heads to Terranora, for its own requirements that has significant unused capacity. He has indicated that the spare capacity is accessible for community based telecommunications projects and that CE would be very interested in becoming involved in such a project.

(Refer Appendix 4 – Country Energy Network Maps)

3.1.13 Supply Side Infrastructure

The table below shows the current level of telecommunications infrastructure as advised during interviews with the supply side.

	Radio/ Microwave	WiMAX	2G/3G	FttP	ADSL	Dark Fibre	Backhaul	Satellite
Cirrus Communications		✓					✓	
Soul	✓		✓		✓		✓	
Pivit #	✓			✓		✓	✓	
Macquarie Telecom Ø				✓				
Optus	✓	✓	✓		✓		✓	✓
Telstra	✓		✓	✓	✓		✓	✓
Allegro Networks #		✓					✓	
Fujitsu Australia #				✓				
NextGen							✓	
Country Energy						✓	✓	
Vodafone			✓					

\# No infrastructure currently in Tweed Shire

Ø Only to large corporate clients in metropolitan areas

3.2 The Challenge for Australia and Tweed Shire

The main challenge facing Australia and subsequently, Tweed Shire, is that most of the fixed line infrastructure in Australia is owned by Telstra. As has been the case with many other countries, telecommunications development has been impaired by the market dominance of the incumbent carrier when it provides both wholesale and retail services.

Looking to other developments across the world, experience shows that the only way to diminish this control is by developing 'open access' networks where telecommunications infrastructure is offered to any number of carriers and service providers on equivalent terms, and thus ultimately providing choice based on service, price and quality to the consumer.

As with other incumbents, Telstra will look to maintain its control of the market along with its revenue stream and isn't going to offer up its infrastructure to its competitors. As a result, alternate infrastructure will need to be built and the best way to achieve that, as has proven in many parts of the world, is, by consortia of stakeholders, Public Private Partnerships (PPPs), or joint ventures, typically involving both the supply and demand side, along with the central, state and local governments.

The Australian Government has announced the intent to develop a National Broadband Network and is currently evaluating responses to its tender. Telstra have chosen a non-compliant position to the tender due their position that it is not commercially sustainable under the Government's terms and conditions. There remain five further respondents; however three of these have interest in specific regions which do not include Tweed Shire.

The Australian Government's stated direction is to develop a fibre to the node (FttN) network that will deliver 12 Mbps to 98% of the population of Australia. Whilst the definition of a Node is yet to be determined, it is conceivable that the telecommunications cabinet (copper cable aggregation point) at the street corner is likely to be included as a node.

If this is the case, this could potentially create some issues for Tweed Shire Council from the perspective of having additional active street furniture imposed. That is, the existing telecommunications cabinets are passive aggregation points and, under the above scenario, in the future, will need to house electronics and therefore have power and cooling mechanisms (fans) built into the structure.

To address this, and wireless towers, some local governments are considering establishing / designating specific areas as broadband (or communications) precincts which will house the street furniture, towers and other associated equipment. In this way there is local control over the planning and establishing of telecommunications infrastructure.

In the case of the Tweed Shire, there is a requirement to improve the telecommunications capacity across the region as it is currently underserved by choice of telecommunications service providers and broadband capacity. The opportunity therefore exists to bring together a number of stakeholders with the potential to develop a blue print for the development of a regional open access broadband network that will greatly enhance economic and social development throughout the region.

3.3 Growth Predictions

There are two main drivers that impact on Tweed Shire Council's need for advanced telecommunications. They are demographics and economic development.

a) Demographics

The two most significant demographic aspects affecting the Tweed region are growth and age. As can be seen from Figure 7 below, Tweed's current and projected growth is substantially higher than both the broader Northern Rivers Region and the State.

This is expected to be further exacerbated by the opening of the Tugun Bypass and the reduced level of development proposed for the Gold Coast by the recently elected Council. Consequentially this will cause ever increasing pressure on the region's telecommunications capacity in relation to the expectations of the availability of affordable high speed broadband services by those who relocate to the Tweed region by both businesses and residents.

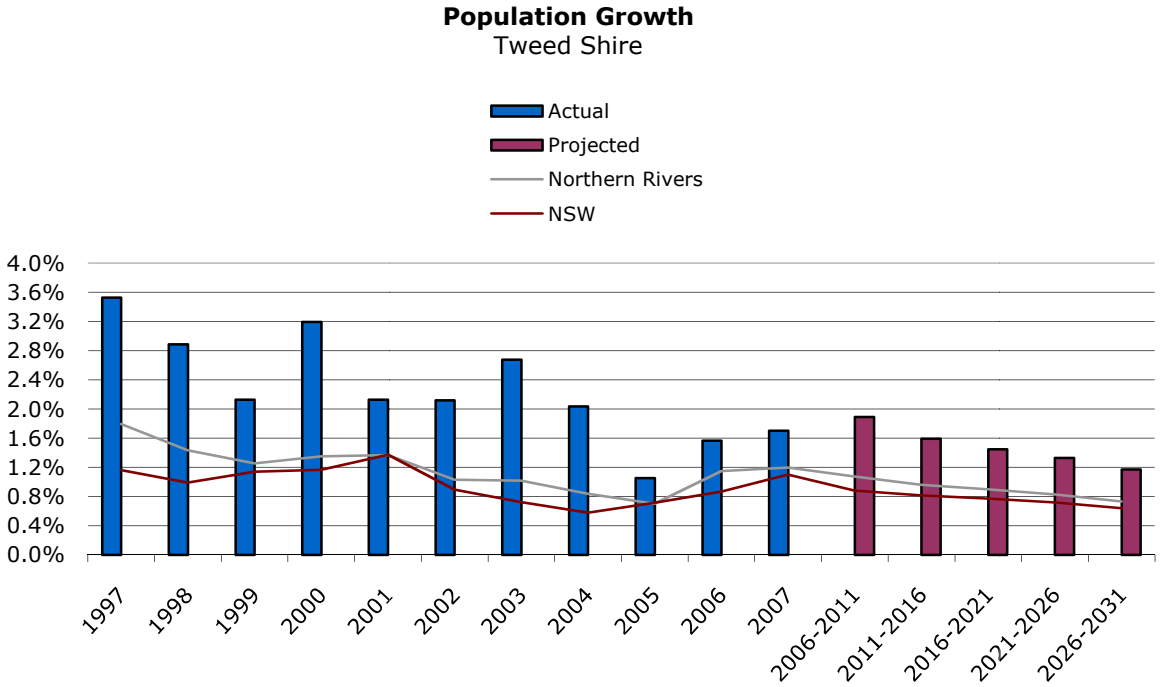


Figure 7 – Tweed Shire Population Growth Projections provided by TEDC

The aging population is an area that affordable high speed broadband can transform a potential problem to an opportunity the provision of eHealth services. eHealth has proven internationally to be a major beneficiary of broadband, as a result of an array of products and services enabling the aged and infirm to remain at home much longer and with a substantially improved quality of life. This will become a critical issue given that in 10 years the citizens in the region that are over 65 years are expected to number around 40,000.

b) Economic development / Self containment

A key detractor to the economic growth of Tweed Shire is the current level of self containment within the Shire. Of the current population of some 84,000 (2007 figures as provided by TEDC), around 31,000 are employed. That relates to a work participation rate of only 42%, as compared with the Hunter Valley, with a participation rate of 59%.

However, given the population growth projections, if Tweed could achieve even a 50% participation rate, it will need to provide an additional 25,000 jobs over the next 20 years.

Of further significance due to the potential economic leakage, is the fact that of those people who are currently employed, only 19,000 are actually employed within the Shire, meaning that approximately 12,000 leave the Shire daily to go to work.

However, given the capacity of broadband as an enabler of business development, improved broadband infrastructure would be the catalyst to significantly increase the number of jobs within the region, greatly reducing the number of employees commuting out of the Shire daily and provide the opportunity to increase the number of employees commuting to the Tweed Shire.

3.4 Funding Opportunities

Historically, funding for telecommunications infrastructure in Australia has been provided on an ad-hoc basis, focused on individual projects. Even though the current Australian Broadband Guarantee (refer below) is a national funding initiative, it is focussed on 'black spots' where basic broadband is not available and therefore will only minimally assist in providing funds for the upgrade of Tweed's telecommunications infrastructure

However, we believe that a truly strategic regional approach to the development of next generation broadband infrastructure will be of high interest to both the Federal and State governments if it complements the national broadband network direction. Such an approach would identify and bring together a range of committed stakeholders, representing both supply side and demand side, in a coordinated and collaborative approach with a defined ICT master plan for the region that is integrated with Council's planning scheme and capable of demonstrating a commercially viable business case, albeit with potentially an identifiable 'gap'.

We believe that both the Federal and State governments would be considerate to bridging such a gap if the ICT master plan provided a demonstrable step change in current broadband capability in the region and assisted in addressing the economic and social challenges of the region into the future.

Another opportunity lies in aligning with other regional stakeholders that already have access to funding to further develop their broadband capabilities (ie. health, education).

3.4.1 Australian Broadband Guarantee

The Australian Broadband Guarantee (ABG) has been established to provide all Australian residential and small business premises with access to broadband services that reasonably compare to broadband services available in metropolitan areas (metro-comparable). This metro-comparable broadband service is defined as any service that offers a minimum 512kbps download and 128kbps upload data speed, 3GB per month data usage at a total cost of $2,500 (GST inclusive) over three years (including installation and connection fees).

The program offers financial assistance in the form of incentive payments to registered internet service providers to supply metro-comparable broadband services to residential and small business premises where such services would not otherwise be available.

The Australian Government has allocated $270.7 million over the next four years to fund the ABG.

The ABG complements the National Broadband Network that aims to provide high-speed broadband services to 98 per cent of Australian premises.

In relation to the master plan scenario mentioned above, it may be possible that some of the supply side service providers may be able to gain some funding from the ABG to assist in delivering into some areas of the Shire not currently able to access a broadband connection.

3.5 Developers

During discussions with a range of developers with projects in Tweed region, they outlined their current position in relation to broadband, along with their future direction. The following provides a record of these discussions.

Developer	Project Details	View on Broadband
Heritage Pacific	Pottsville Employment Land 50ha Service industry / Logistics / distribution / technology	Planning fibre to the premises. Planning open access Smart metering for power
Leda	Cobaki Lakes (5,500 lots) Kings Forest (4,500 lots)	Project manager is keen on fibre to the lot. Believe Council should have a fibre policy
Steve Macrae Developments	Pacific Heights (2100 lot equivalent) 184 ha Master Planned Community	Planned as community title offering fully integrated water cycle management and FttP telecommunications network
Peter Mitchell	Industry Central	Infrastructure for stages 1&2 already completed (30 lots) using Telstra's copper. However, interested in reviewing latest technology before stage 3 in late 2009
Metricon	Riva View Murwillumbah Seabreeze Pottsville Area E, Benora (900+lots)	Riva View and Seabreeze have Telstra copper deployed, there is interest in other opportunities for Area E.
Seaside City Developments	Seaside City	Several contact attempts unsuccessful
Zimmer Land P/L	Nightcap Village, 2954 Kyogle Road, Kunghur	Several contact attempts unsuccessful

Developers can play a significant key stakeholder role in the deployment of telecommunications infrastructure by including the provision of fibre ducts along with all other underground utilities such as water, power, sewerage, etc. within their developments.

This is particularly so given the latest development trends towards mixed-use developments and master planned communities. These forms of development bring together both residential and a diverse range of retail and commercial operations and institutions such as education within the same precinct. These precincts can provide an excellent environment not only for telecommunications, but a broad range of broadband enabled content.

3.6 The Gap

In this instance, the Gap relates to the difference between current telecommunications capacity and where it should be in order to meet the communications services requirements for residents, businesses and governments, now and into the future.

We have previously highlighted the capacity requirements in terms of services and applications. The following section identifies where gaps occur from an infrastructure and delivery perspective.

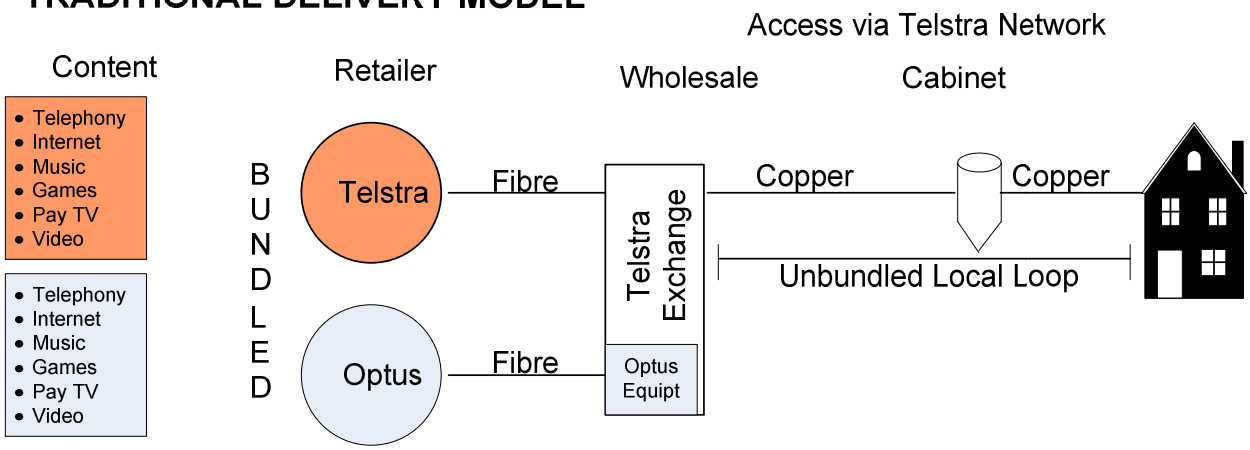
The traditional telecommunications business model supports a closed delivery model where a Service Provider provides all services to a customer over a network infrastructure that they own and operate. However, to effectively introduce competition into the market place, either the traditional business model needs to change to allow competition to access customers on an equivalent basis, or have other Service Providers build and operate their own networks.

Outside of capital city central business districts, duplication of infrastructure cannot be sustained. It inflates pricing for services which ultimately makes Australian businesses and industry uncompetitive in the global market.

In Australia there has been stepped approach to deregulating the market and more recently in trying to open up Telstra's infrastructure for use by its competitors.

The following diagram provides a simple diagram that shows the traditional telecommunications business model and current situation in Australia using Telstra and Optus as examples.

TRADITIONAL DELIVERY MODEL



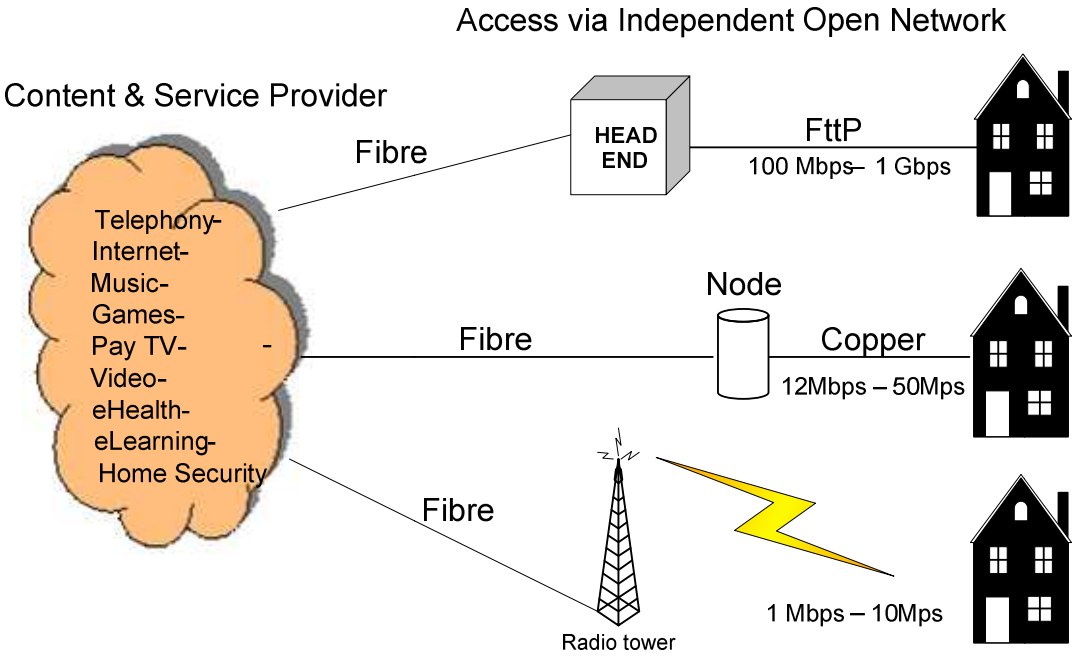
The diagram highlights that the local loop, ie the copper pairs from the Telstra exchange to the premise, has been unbundled from the Telstra network and attracts a regulated price for access by other Services Providers. Optus can install infrastructure such as a DSLAM to provide xDSL services over the copper cable. Both Optus and Telstra are “content and Service” aggregators, meaning that they bundle or package services to retail to their customers.

In the traditional business model where a network operator is also in competition at the retail level with its network customers there are many points of potential conflict and control that retards growth in capability and capacity.

To reflect the evolution of the convergence between telecommunications and digital media, as well as the impact of the openness of Internet, many countries are moving to business models that support the “opening up” of the delivery model to allow multiple Content and Service Providers to deal direct with consumers over an “open access” independently operated network.

Such a delivery model ensures that there is no conflict between network operator delivering retail services in competition to its wholesale customers which is the case in the traditional business model.

FUTURE DELIVERY MODEL



The delivery model improves consumer choice especially price and quality of content and services, as well as ensures future development of the network as the only revenue available to the network operator is carriage of content and services.

In many cases these countries are taking the opportunity to develop new distribution networks using optical fibre to ensure future capability.

In Australia there are a number of examples where local governments are implementing initiatives for fibre to the premises (FttP) in Green Field situations. Many regional communities have current initiatives focussed on wireless broadband. The Australian Government through the National Broadband Networks is investigating the fibre to the node (FttN) option.

Recent media has mentioned 3G mobile telecommunications quoting speeds of up to 24Mbps. However it is important to remember that these are theoretical speeds. In practical application these speeds are adversely affected by such things as volume of access and distance.

Refer to an earlier quote from Vodafone relating to theoretical Vs practical speed, “speed is rated to the 14.4Mbps maximum theoretical downlink, which in reality should receive average download speeds of 600Kbps to 1.5 Mbps and average upload speeds of 200Kbps to 1.4Mbps”.

As we move toward the need, and therefore the development of higher speed broadband communications, a key issue is not only those areas that do not have access currently but also many areas that currently have the first generation of broadband may not be able to access later generation broadband speeds due to existing network and equipment limitations – eg copper cable and wireless.

A strategic and coordinated planned approach to the development of telecommunications infrastructure is imperative to ensure that a comprehensive coverage of a geographic area occurs including green field estates, brown field areas, low population areas and commercial, industrial and academic precincts.

This should be performed in conjunction with demand management strategies for other utility infrastructures such as energy and water.

To address this Gap the following items should be considered:

- In order to meet future telecommunications demand there is a need for a robust high-speed broadband network that can provide symmetrical communications involving simultaneous use of multiple applications, not affected by distance from the exchange (hub), or the number of people connected.
- Telecommunications infrastructure must be treated as any other utility such as power, water and gas
- Broadband networks providing Open Access to FttP are ultimately the most affective. However, there are a number of issues to be overcome. Such as:
  - Cost of fibre deployment
  - Cost of backhaul
  - Need for demand aggregation sufficient to encourage the supply side to invest in new infrastructure
  - Cost of entry (ie. facilities, equipment etc.)

  These issues can best be overcome through collaboration with both demand and supply sides.
- Greenfield development offers the best opportunity for deployment of optical fibre (or at least ducting), along with roadwork construction and installation of the other utilities.
- Brownfield development is somewhat more challenging, given that retrofitting is always more expensive than starting with a clean slate. However, there are some possibilities to overcome the major issues:
  - Sharing existing telecommunications ducts (ie. Telstra)
  - Open access to a range of carriers and service providers to share cost of new infrastructure
  - Use existing power infrastructure (ie. Country Energy's fibre (lit and dark) and ducts
  - Council deploying infrastructure whenever it is undertaking capital works (ie. roads, paths, water, etc).

4. How Gaps are being Addressed Elsewhere

4.1 Internationally

4.1.1 Tokyo

Fibre-to-the-home (FTTH) services in Japan quietly marked a major milestone in February 2004 when the millionth subscriber was connected. USEN Corp launched the country's first commercial FTTH service in March 2001 with FTTH taking off in April 2003 when the number of new FTTH subscribers each month surpassed 50,000. It took just over six months to go from 500,000 to 1 million and in early 2005 Japan had reached 2 million FTTH subscribers growing at 90,000 per month.

4.1.2 Wellington, New Zealand

CityLink operates a fibre network in Wellington as part of the Council's 25-year strategy for Wellington City. It currently provides dedicated circuits through 50 kilometres of fibre optic cable within the central business district of Wellington with more than 300 buildings connected. Broadband products commence at 10Mbps at very competitive rates.

4.1.3 Singapore

Singapore has developed an advanced and reliable telecommunications infrastructure, and its government is strongly committed to making Singapore one of the most connected cities in the world. Singapore's ONE project involved the development of a broadband network launched in June 1998 using fibre backbones and a combination of fibre, DSL and cable for last mile access. With full market liberalisation resulting in greater competition, Singaporeans have experienced higher broadband speeds and more competitively priced services, resulting in greater uptake.

4.1.4 Bay of Plenty, New Zealand

The Bay of Plenty region is made up of six Councils that have established the Bay of Plenty Local Area Shared Services. The aim is to develop a 340km duct network connecting Rotarua, Tauranga and Whakatone with a backhaul to Wellington and Auckland. The councils will share applications and bandwidth and the duct network will be the first stage of infrastructure for a community owned asset that will provide open access, lowering the cost of entry for broadband service providers.

The District Councils have submitted a business case to the Minister of Economic Development for partial funding and all indications are that it will be positively received.

Other users of the network will be:

- Vodafone
- Telecom New Zealand
- Telstra Clear
- Kordia
- Local ISPs

4.1.5 Alberta SuperNet, Canada

The province of Alberta has a 13 000 km open-access wireless and fibre optic network, dubbed the SuperNet,38 which provides high-speed connectivity to 429 communities. All of the province's more than 4200 learning facilities, health centres, libraries and government locations are connected. The network is owned through a public-private partnership between the Government of Alberta, Axia NetMedia and Bell Canada.

The project was initiated by the provincial government, whilst Bell was responsible for construction, and Axia designed, helped build and operates the network. Residential Internet access utilising the SuperNet is also provided to over 86% of Alberta's population through more than 30 ISPs.

4.1.6 City of Pau, France

Some municipalities in France have taken a leading role in providing FTTH services. For example, in 2005, the City of Pau launched an open-access fibre network intended to connect the city with the main backhaul. The network is owned by the City of Pau, with the project being both publicly and privately funded. The ownership model is a *délégations de service public* (DSP), similar to a PPP. A budget of EUR35 million (AUD67 million) was proposed for the first three phases of the network build.

Each of these phases took one year and covered about 12 000 households per year. The project aims to connect 55 000 households in Pau in total. By December 2007, 5000 customers had subscribed to the FTTH services.

4.1.7 FastWeb, Italy

Italy has the second highest take-up of FTTH services in Europe, exceeded only by Sweden, driven largely by the alternative operator FastWeb. FastWeb was established in 1999, as a joint venture between e.Biscom and AEM, the largest regional utility in Italy, held by the city of Milan.

The group included Metroweb, which was responsible for rolling out the optical fibre network, whilst FastWeb provided triple play services over the network. In 2001, FastWeb bought a network of cable TV ducts, known as Socrate, from the incumbent operator Telecom Italia following an antitrust ruling. In 2003, FastWeb divested from Metroweb. Since then FastWeb has continued deployment of its fibre optic network.

From company launch to March 2006, FastWeb had invested over EUR3.5 billion (AUD6.7 billion) in its fibre network, covering 23,000km and 45% of the population. From 2007 FastWeb's network was further expanded by another 1000km, to reach 50% of the Italian population and covering all main Italian cities. As of 2007 FastWeb had yet to make a profit, with its 2006 net loss amounting to EUR123.6 milllion (AUD237 million).

4.1.8 CityNet, the Netherlands

In 2006, a large FTTH project was initiated by the City of Amsterdam, the CityNet, which is aiming to reach 420,000 homes and business by 2013 at a cost of EUR300 million (AUD575 million). The network will be built by Glasvezelnet Amsterdam BV (GNA), which is one-third owned by the Amsterdam City Council, ING Real Estate Investment Management, and five large Amsterdam housing corporations.

The network will be operated on an open-access basis by BBned, a subsidiary of Telecom Italia, with over 75 service providers providing services to homes and small businesses. The business plan for CityNet was based on achieving a return on equity of at least 8-10%. The minimum level of take-up and revenue required for GNA to cover its cost of capital would be 40% subscriber take-up, with monthly wholesale revenue of EUR25 (AUD48) per connection.

Similar projects are now occurring throughout The Netherlands, each being led by the respective local government.

4.1.9 UTOPIA, Utah USA

Utah Telecommunication Open Infrastructure Agency (UTOPIA) is an inter-local governmental agency formed by 18 Utah cities in 2002, with the purpose of building, maintaining and operating an open-access FTTP network throughout the region. Utah legislation mandates that municipal networks may offer wholesale but not retail services, to prevent direct competition with private companies.

UTOPIA is funded through the fees charged to private service providers using the network, used to repay the USD85 million (AUD127 million) in municipal bonds used to build the system. Several private contractors were utilised to construct various aspects of the network, selected through a competitive tender process. The inter-local agreement is a commitment which allows the reduction of overall cost per subscriber by sharing the costs for facilities such as the Network Operations Centre among all the cities.

The revenues per subscriber for less profitable regions can also be increased and balanced by sharing the profits from more financially viable regions.

4.1.10 Stokab, Sweden

Stokab was founded in 1994 and is owned by the company group Stockholm's Stadshus AB, which is owned by the City of Stockholm. Stokab is an operator-neutral network owner. The company's business concept has two parts:

- On commercial terms, provide IT infrastructure for all, especially the City of Stockholm, contributing to growth in the Stockholm and Mälar region;
- On assignment of the City of Stockholm, administer and develop the City's communications network, including for schools, child care services, leisure and culture.

Stokab's mandate from the City of Stockholm is to provide "public service on commercial terms", based on the Swedish parliament's decision to create "an information society for all".

The Stokab network comprises 5600 kilometres of cable and 1.2 million kilometres of fibre. Customers are leased connections to the network, obtaining the exclusive right to use a line or entire network structure.

4.1.11. Greece

Greece's government has revealed details on an ambitious plan to deploy FttX networks surpassing 2 million homes by 2016. A tender is expected to commence later in the year with construction to commence in 2010. Its goal is to attract 650,000 end users in Athens, Thessaloniki and 50 other cities and towns.

While the plan endorses no single technology, it does stipulate access speeds of at least 100Mb/s. The network will be operated by an entity separate from the service providers offering retail broadband access and convergence services over the network such as IPTV and VoIP.

Funding for the project will be mostly sourced from the private sector, with the government planning to provide Euro 700 million in funding for the project's estimated Euro 2.1 billion price tag. Given the current financial crisis, private funding may prove challenging although potential investors may be attracted by Greece's relatively low broadband penetration but high GDP per capita relative to other EU nations. Another potential source of funding is the EU's recently unveiled economic recovery plan, which earmarks Euro 1 billion to ensure broadband accessibility by all EU citizens by 2010.

To cut red tape and overcome regulatory hurdles, the government plans to introduce legislation covering the shared use of ducts and in-building networking capabilities, as well as the network construction process.

4.2 Nationally

The following is a review of the current position of a range of Local and Regional Governments as they pertain to broadband.

4.2.1 Victoria

The VicUrban, the Victorian Government urban development agency project is an example of where Local Governments are pursuing the need for active developer support in a fibre to the home (FTTH) solution for the Aurora Estate, recognising that a positive outcome is likely to "raise the standard" for all new developments.

In the Aurora Fibre-to-the-Home (FTTH) Project, the City of Whittlesea partnered with VicUrban to deliver next generation broadband infrastructure to the 8,000 residents. The project will provide 10megabits per second speed (scalable to 100mbps), which will allow residents enjoy such things as internet based telephony (VOIP), data and video services such as both pay and free-to-air TV, as well as video on demand.

Whittlesea has a definitive planning instrument "Planning Guidelines for Conduits for Optical Fibre Services, 2001" which was updated in 2006 to "Telecommunications Conduit Policy". In it Council recognises the benefits of optical fibre over copper infrastructure and have mandated that appropriate conduits be provided by the developer in all new subdivisions and developments and the ownership vested in Council.

As well as its growing population, Whittlesea has been able to substantially increase its industry base by attracting a number of high calibre industry leaders such as 3M Automotive, Howe Leather and Johnson Controls in the automotive industry, Inghams Poultry, Stambo's Fine Foods, Chiquita Mushrooms, The Original Juice Co. and Jalna Dairy Products in the food industry and Global Customer Solutions, being one of a number of major call centres. A strong factor in their decisions to locate to Whittlesea has been its leading edge telecommunications infrastructure.

(Refer Appendix 1 – Telecommunications Conduit Policy)

4.2.2 NSW Government

The State Government has policy and strategies relating to broadband infrastructure development across the State. Examples of these include the partnering with Soul Telecommunications to establish alternative high speed broadband access points to 24 regional towns across the State with Country Energy providing last mile reticulation via optical fibre strung on existing powerlines, and more recently the Connected Schools initiative where the Government is intending to partner with infrastructure providers to establish high speed broadband access to all schools in the State.

4.2.3 Coffs Harbour City Council

Coffs Harbour City Council has been developing its own optical fibre network over the last 7 years as opportunities for ground openings have occurred. To date they have deployed some 35kms of optical fibre as well as laying a further 50 klms of ducting. Both of which continue to grow as opportunities arise.

While the Coffs Harbour network differs from what is being proposed for Tweed Shire, being primarily focused on Council requirements as opposed to a broader community network, it does provide some valuable lessons:

- Because deployment of the optical fibre has not been achieved on a linear basis, but more as segments of a jig-saw puzzle, it has been important to start with a clear plan of the whole desired network. This has enabled individual segments to be developed in line with the capital works program, which will ultimately link up to form the planned network;
- While the network has been designed primarily for Council use, they have been able to gain a revenue stream from hiring its unused fibre capacity to AARNet which in turn provides connectivity to two universities within the region;
- Capital costs of the current network which connects 20 odd Council sites has already paid for itself by way of telecommunications cost savings.

(Refer Appendix 2 – Coffs Harbour Optical Fibre Network Plan)

4.2.3 Albury - Wodonga

The twin cities of Albury and Wodonga, on the NSW, Victoria border, form the hub of the activities of the Murray Regional Development Board, a not for profit economic development organisation similar to TEDC, except that it covers 17 NSW and Victorian Local Government Authorities.

In August 2002 the ICT Committee under the auspice of the Murray Regional Development Board formed the Murray River Regional Telecommunications Company (MRRTC) which trades as CountryTELL.

CountryTELL is a telecommunications service provider and carrier which is the implementation entity of the ICT Committee's endeavours.

CountryTell is a not for profit company limited by guarantee which owns infrastructure and community assets on behalf of the communities which it serves.

Its structure as a community owned and managed operation gives it a mandate to provide a broad and flexible range of value added services. These services are delivered by independent service providers, under strict service level agreements, over CountryTell's owned or contracted infrastructure.

The CountryTell business model is best represented as a collaborative organisation of stakeholders contributing grants, services, skills, supplies and in-kind contributions to the self-sustaining not for profit body. It negotiates and manages the tangible and non-tangible assets required to in-fill the group's missing requirements – including infrastructure, services, and intellectual property.

The on-going revenue stream to this entity comes from license fees from the commercial entities amongst those stakeholders, and other licensees, which on-sell the assets with value added services to end-users, amongst which are many of the collaborating partners.

Government and industry body stakeholders may be direct users of the commercial services or indirect beneficiaries through the flow-on effects of regional and sectoral economic development. The services provided by CountryTell support a broad range of government policies, from natural resource management to regional economic development and from coordinated healthcare delivery to improved infrastructure security.

4.2.4 Canberra

TransAct (originally created by the Local Government and the Local Energy Company) is building and managing an advanced telecommunications network across Canberra and surrounding regions. TransACT provides telephone, cable television and broadband internet access to homes, businesses and government departments. Over 95,000 homes and businesses are able to connect to TransACT's next generation network

4.2.5 Brisbane City Council

BCC has a strong focus on expanding not only its fibre network, but to facilitate a broader roll-out of fibre infrastructure to enable enhanced broadband access to industry and community. Despite Project Vista (a State Government/BCC initiative to bring FTTP throughout Brisbane) being put on hold by the State Government pending the outcome of the National Broadband Network (NBN) tender process, Brisbane has several excellent examples of business and/or residential precincts serviced with high speed broadband via a fibre network. Examples of these are:

a) **Brisbane Airport** has extensive fibre infrastructure providing high speed connectivity to over 150 businesses, including such diverse organisations as DFO, CASA and Aviation Australia;

b) **TradeCoast Australia** is a major industrial development adjacent to the Brisbane Airport. FTTP is being installed into all buildings as they are being developed. In fact, along with the obvious proximity to airport and port, the broadband infrastructure is being recognised as a major selling point in attracting national and international organisations to the development;

c) **Kelvin Grove Urban Village** (KGUV) is Brisbane's the most integrated development outside of the CBD. Based on a major campus of the Queensland University of Technology (QUT), KGUV provides medium to high density living, highly focused on student accommodation, as well as a significant commercial centre providing a diverse range of office and retail facilities. All of which have access to high speed broadband and a broad array of applications as previously described.

4.2.6 Moreton Bay Regional Council

MBRC is currently involved in a Smart Regions Broadband Project which aims to stimulate the deployment of open access broadband infrastructure in residential developments and major construction projects within the region.

The availability of open access broadband infrastructure will provide the following:

a) *For Development*
- Provide a competitive edge to the marketing of the development
- Increasingly influence property values
- Enhance the lifestyle of residents
- Provide residents and businesses with a choice of supplier

b) *For Residents*
- Competition and choice of supplier
- Cheaper local and international telephone calls (VOIP)
- Free-to-air, digital and Pay TV (antenna free dwellings)
- Video On demand
- High speed internet
- Nurse-call and other ehealth solutions
- Home security and automation services

c) *For Business*
- Home based business solutions
- E-commerce
- Tele-working
- Skills attraction
- Business systems backup
- Seamlessly integrated voice, data and high definition video conferencing
- Supply chain optimisation
- Surveillance and control

Council is anticipating a draft plan by Mar/Apr 2009 and a final plan by June 2009.

4.2.7 Sunshine Coast Regional Council

SCRC is well advanced in the Maroochy Clever Networks Project. The project received a $2.9 million injection from the Australian Government as part of a Public-Private Partnership (PPP) involving Council along with the University of the Sunshine Coast and Allegro Networks.

The aim is to roll-out a competitively priced, high speed broadband network capable of reaching over half of the Sunshine Coast population and potentially 33,000 businesses, including a large number of home-based businesses.

While the planning instrument has been completed, there are some legislative aspects that need to be completed before Council can provide details. However, it is more than willing to do so when all matters have been finalised.

4.2.8 Fraser Coast Regional Council

While FCRC hasn't yet enacted policy requiring developers to lay conduit into new developments, it has been laying conduits of its own wherever it has undertaken roadworks or similar corridor based infrastructure.

In partnership with specialist service provider IP Systems, FCRC has established a community based carrier, Widelinx. The Widelinx network, offering both fixed wireless and ADSL2+, provides local businesses with new telecommunication services previously only available to Australia's largest corporations.

At the same time, residents have access to innovative telephone, broadband and entertainment services – with new powerful features, high performance and cost savings. For instance, all telephone calls between Widelinx network participants will be free, and calls to Brisbane will be charged at untimed local call rates.

A key aspect of the Widelinx network is the Fraser Coast Managed Health Network, a private network providing bank grade security that can connect:

• General Practices	• Hospitals
• Divisions of general practice	• Specialist practices
• Radiology	• Pathology
• Medical centres	• Allied Health services
• GP homes	• Senior medical staff homes
• Specialist homes	• Retirement villages
• (Potentially) pharmacies and other health sites in the Fraser coast region.	

4.2.9 Springfield

Springfield is a master planned community that will include 40,000 residential blocks, a CBD similar in size to Parramatta NSW and various vertically aligned precincts, most notably medical and education.

Utilising NEC and its network model as described earlier, the intent is to provide all services from a common head end and a data centre has been proposed. It will accommodate service providers to the respective sub-developments and a data warehousing facility for subscribed tenants.

Springfield's intent as a community body is to also provide public services such as public kiosks and security camera services to public areas.

4.2.10 Northern Rivers Regional Organisation of Councils Inc.

In March 2008 NOROC made submission to the State Government's newly formed Standing Committee on Broadband in Rural and regional Communities. In it NOROC stated the importance of broadband in the economic, social and environmental development of the region, referring to telecommunications as a "Modern form of 'transport'". Given this stance, we would see NOROC as being very supportive of any broadband initiative by Tweed Shire Council and a valuable lobbying partner.

5. Key Issues

Of the key issues being faced worldwide in relation to the move to digital telecommunications and in particular, the rollout of high speed broadband, the following are most relevant to Australia:

0.1. The Incumbent Carrier

Globally, incumbent carriers have found themselves needing to protect the viability of of their copper-based networks for as long as possible to enable them to transition from traditional voice based products to create new revenue streams based on digital media content and services. As a consequence deployment fibre-based distribution networks are only developed at a rate to suit their specific business strategies or when forced to by competition.

Governments, around the world have found themselves needing to enact new telecommunications regulations to open up access to existing networks and develop new future proof networks. The result of which consumers have a choice of service and content providers, resulting in competitive pricing and greater flexibility in how people live their lives and conduct their businesses.

5.2 National Broadband Network

The Australian Government propose the development of a national broadband network (NBN) that seeks to provide an open access network. The Government have indicated that the network will be developed using fibre to the node (FttN) technology and therefore only capable of delivering 12 Mbps of broadband for those connected – the expected coverage is 98% of the population. FttN uses optical fibre technology to connect to a node (which is yet to be defined), and then connects into the existing Telstra copper cables that connect to homes and businesses. The terms and conditions of accessing Telstra's copper cabling from the node is yet understood. It appears that there is still much to be done and issues to overcome before any clear picture of the details of the NBN will be available. In the meantime, Australia continues to lag behind many of its trading partners.

5.3. Adhoc Build

The current regulatory environment and level industry maturity in Australia, promotes adhoc development of telecommunications infrastructure. Due to the lack of cooperation between infrastructure owners and developers, telecommunications infrastructure is usually developed for the specific needs of a particular telecommunications Service Provider based on the demand that they are a ware of. This is more true in fixed networks than mobile telephony networks where infrastructure competition has been more geographically prevalent for a number of years.

In addition, there are a number of non private or government owned companies that build telecommunications infrastructure for their own internal use as it is more cost effective than purchasing services from a telecommunications carrier. Again, these are developed in isolation of any greater community requirement. Duplication of infrastructure is costly and falsely inflates the price of services to the consumer.

5.4. Strategic coordination and planning- Blueprint

A major stumbling block in the achievement of a comprehensive telecommunications network that satisfies the community's requirements now and into the future is the lack of a recognised strategic plan for telecommunications infrastructure development. From the various interviews conducted during the course of this project, one issue that stood out above all others was the apparent current lack of cooperation and coordination of any planning by the network builders. In part the reason for this is the current level of maturity of the industry as outlined above, but also it relates to the lack of visibility of the business opportunity within a specific geographic region. In many cases the Supply-Side of the market have little knowledge of either the current or growth opportunities of the region and usually view the cost of entry high compared to the likely return.

5.5 Establishing an End to End Business Model

Many property developers are being required as part of the Local Council's development application to install pit and pipe suitable for telecommunications infrastructure in new estates that can be used for telecommunications distribution network to service businesses and residences. Although the cost of deploying the telecommunications infrastructure (pits and pipes) is marginal if installed at the same time as other utility infrastructures, without an obvious telecommunications Service Provider to use the infrastructure, it is difficult for the property developer to justify the cost of deployment.

From the telecommunications Service Provider perspective, they have little visibility of current and future requirements for geographic areas where they have no presence and therefore are unlikely to respond to such initiatives as described above.

Unfortunately, in these circumstances it is up to the local community to 'sell' the opportunity to the Supply-Side of the market. To attract interest of new Service Providers to the region requires providing a view of demand certainty and opportunities to lower the cost of entry into a region.

Our work with local community initiatives highlights critical areas that create barriers of entry for telecommunications Service Providers:

- the cost of establishing a point of presence (PoP) in the region;
- the cost of connecting to areas of demand concentration;
- the cost connecting to and servicing new customers.

The following diagram provides an overview of the key areas of focus and how some local governments are working with other parties to establish an end to end business model to demonstrate the viability of the opportunity within their region.

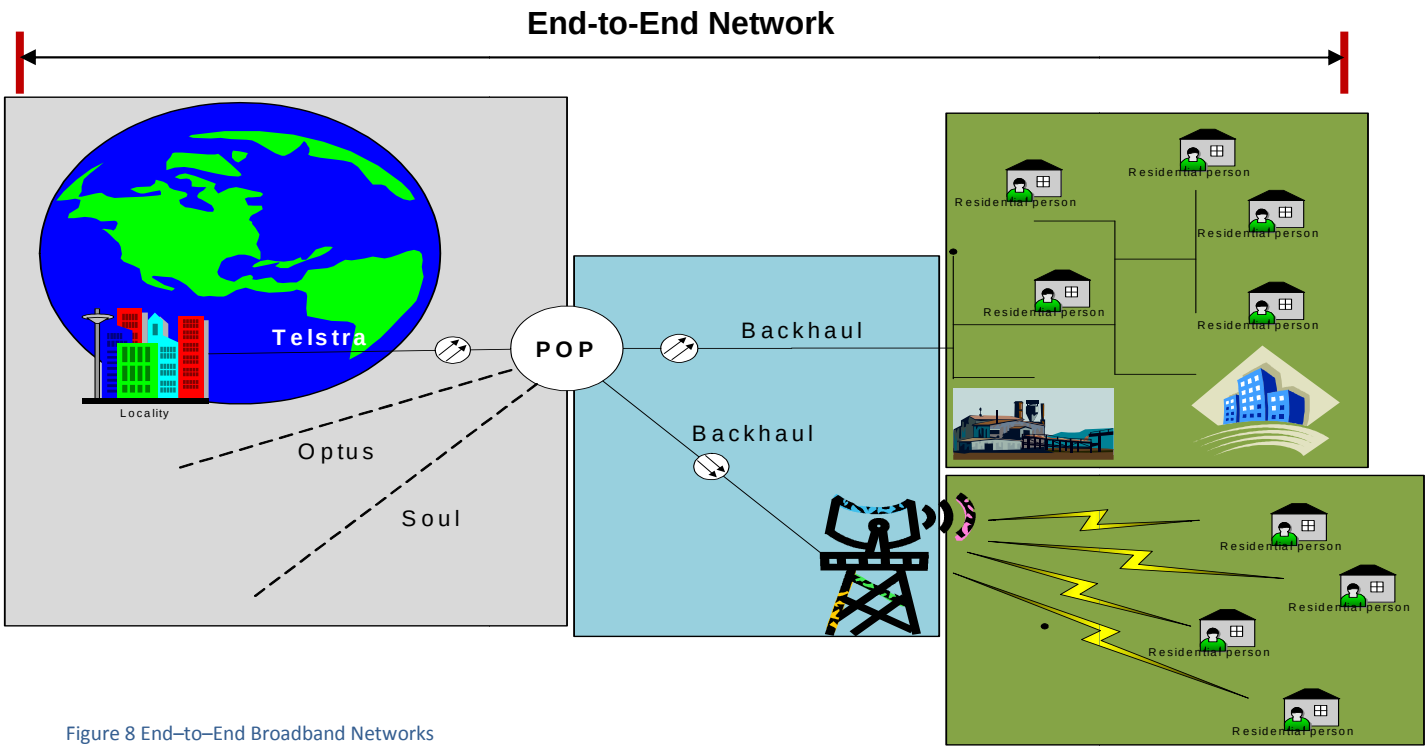


Figure 8 End–to–End Broadband Networks

Whether the opportunity relates to green field or brown field locations, the barriers remain similar. The telecommunications Service Provider needs to understand how they will deliver services to the end consumer and what the associated costs will be to service them. Many Service Providers are not infrastructure builders and therefore are reliant on distribution network infrastructure to be available to deliver content and services.

The diagram above shows how the three critical elements that Service Provider's focus up on can be addressed.

1. To encourage a new Service Provider to establish a point of presence (PoP) in the region requires a sufficient base level of demand to justify the network extension from the Service Providers telecommunications network to a location in the region.
2. To connect to areas of demand concentration such as green field or brown field locations, requires establishing a local backhaul telecommunications link with sufficient capacity to carry the aggregated traffic to and from the location;
3. To service end customers, the Service Provider requires access to distribution networks that are reliable and perform to the Service Provider's performance specifications and present the customer in such a way that mirrors the Service Provider's existing cost structures, processes and procedures especially remote testing.

Examples of addressing each of the items highlighted above could include:

1. The Tweed Council provide a term commitment for consumption of its telecommunications spend to the Service Provider in return for them establishing a PoP in the region;
2. Country Energy make available its optical fibre spare capacity for use by the Service Provider to reach areas of demand concentration and/or where Council are undertaking trench work lay pits and pipes suitable for telecommunications cabling;
3. Property Developers under development approval requirements by Council and in conjunction with a last mile equipment provider, install pit and pipe in green field locations suitable for optic fibre reticulation and/or wireless solution.
4. In the case of brown field, or urban renewal development, optical fibre will generally have to be retrofitted, which can tend to be more expensive than in the case of green field development. However, much of this cost can be mitigated by carriers co-locating in existing facilities, sharing ducts etc and Council to systematically lay optical fibre along with its capital works. Alternatively wireless technology could be used in such locations. There is also the possibility, through new emergent technologies, to deploy optical fibre via existing utilities.

Introducing competition into the region provides competitive tension with the incumbent provider which in turn delivers better outcomes and choice for end customers. Providing an attractive environment to encourage new service providers into the region is critical to achieve competitive supply.

Other areas where Council can assist in reducing the cost of entry include provision of facilities to house network resources (ie. buildings, towers, ducting, etc), Council policies that support telecommunications infrastructure development and assistance in promoting the new entrant to large users of telecommunications and thus further reducing the cost of entry.

However, and importantly, the above scenario requires strategic coordination of the key areas of focus to ensure an end to end business model is established. A key role that Council can take is to facilitate an overarching framework that supports this model and that key stakeholders work towards.

In the absence of an end to end business model that demonstrates value to each of the parties involved, it is difficult to attract commitment and investment from the key stakeholders, who themselves understand the importance of developing advanced telecommunications networks but on their own are unlikely to develop a full end to end capability..

6. Options

If Tweed Shire Council wishes to play a role in influencing the development of telecommunications infrastructure throughout the Tweed Shire, there are a number of options available to it. We have categorised these options in the table below and included a comment on the likely outcomes of the option along with the likely implications if the respective actions associated with the option is not undertaken.

OPTION	COMMENT	RISK	IMPACT
Do nothing	- Adhoc telecommunications build continues with little control or influence	- Lack of development control	High
	- Many carriers and service providers will not see the opportunities and therefore not establish a presence in the region	- Lack of services available / lack of choice / potentially higher priced services	Moderate
	- Community dissatisfaction	- Political backlash	High
	- Retarded economic growth	- negative impact on Council revenue	High
	- Possible mobile tower overbuild	- Community dissatisfaction	Moderate
Wait for NBN	- Delays on infrastructure development could extend to years	- Retarded regional development	High
	- Tweed Shire may not be seen as a priority area	- Fall behind other LGAs	High
	- NBN's proposed solution may not suit high end users in the region	- Community and business frustration	High
	- Imposts on streetscape from 'node' cabinets	- Community dissatisfaction	Moderate
Regulatory Controls	- Mandate for inclusion of pit and pipe deployment for all new greenfield development with ownership being vested to Council	- Missed opportunity to develop cost effective, open access networks, however may not be used unless an end to end business model can be demonstrated	High
	- Mandate that property developers work with Mobile Communications companies to allocate designated space for future communications towers or equipment precincts	- Lost opportunities in urban renewal to make new and refurbished buildings network ready	High
	- Mandate optical fibre backbones for all multi-storey buildings	- Telstra may not make their ducts available	High

	- In the case of brownfield development, mandate for pit and pipe installation with ownership being vested to Council	- Missed opportunities for cost-effective infrastructure roll-out	High
	- Control the number and locations of new mobile towers to meet growing / changing needs	- Unsightly towers built close to residents / affecting property values / substandard reception	High
	- Develop specifications for new telecom's cabinets (under the NBN) so that they do not become obtrusive – could become communications precinct	- Homes and work places impacted by unsightly, noisy cabinets	Moderate
Passive involvement	- Provide a list of Council facilities that can be used by service providers	- Service providers not coming into the region due to the high cost of entry	High
Telecommunications Master Plan	- An overarching plan or framework for telecommunications infrastructure build	- Adhoc development / inconsistent broadband capability	Moderate
	- Ability to demonstrate a workable business model for end to end delivery of a community distribution access network for telecommunications	- Missed opportunities for government funding	High
	- Creates opportunities for investment attraction	- Business locating / relocating in other LGAs	High
	- Provides a platform to support lobbying	- Seen as unprepared / risky funds recipient	High
Lobbying	- Opening up of Telstra's last mile pits and pipes for use by other telecommunications service providers including lead-in cables	- Additional costs for duplication of ducts	High
	- Improved government coordination with a focus using aggregate telecommunication spend to develop regional focussed advanced network infrastructure	- Lack of ability to provide infrastructure into rural areas	High
	- Provide funding for the development of brown field open access networks	- Brown field development held back due to high cost of retrofitting ducts	High
	- Allow the use of existing last mile infrastructures such as overhead power poles, water and sewerage pipes and existing ducts	- Cost of infrastructure build prohibitive, particularly in low density areas	High
	- Provision of funding for Backhaul networks	- Cost of backhaul can be prohibitive	High
	- Communicate telecommunications master plan and its requirements	- Missed opportunities to leverage government funding and stakeholder collaboration	High

7. Actions That Can be Taken by Council

- Prepare policies within Council that support the development of communications precincts in both green and brown field developments to be used to establish/house telecommunications street furniture such as towers, nodes, cable cabinets, etc.
- Establish regulatory controls on developers to work with mobile telecommunications carriers to identify precincts that are to be used for telecommunications towers and to include these in their preliminary concept plans to be presented to Council prior to any formal applications for development approval. These precincts could then be allocated for the specific purpose of locating telecommunications towers, in a similar way to land within a development, excised for the purpose of some utility ie. pumping station, electricity transformer, etc.
- Establish regulatory controls on property developers mandating that they lay ducting (pits and pipes) in all new green field developments suitable for optic fibre cable reticulation with ownership being vested with Council. The infrastructure providers, as noted earlier in this document (ie. Fujitsu, Pivit etc), advised that their business models show network viability for green field developments of 300 lots or more.
- Establish regulatory controls on property developers mandating that they lay ducting (pits and pipes) in all new urban renewal developments suitable for optic fibre cable reticulation with ownership being vested with Council.
- Establish policies within Council to develop fibre optic infrastructure to connect its branch offices as part of its own telecommunications consumption requirements.
- Establish policies within Council to facilitate telecommunications ducting (pits and pipes suitable for optic fibre cabling) to be included in all future capital works programs.
- Establish policies to make available volumetric spare capacity of Council own ducting for use by other parties on commercial terms.
- Lobby the Federal Government to impose regulatory controls on Telstra to make available its last mile pits and pipes for use by other telecommunications service providers including lead-in cables.
- Lobby both State and Federal Governments to achieve better coordination of Agency spending on telecommunications in the Tweed region to achieve improved telecommunications infrastructure development.
- Lobby both State and Federal Governments for financial support to assist Council to facilitate the further development of telecommunications infrastructure.
- Prepare a register of Council facilities that Service Providers can access for use to house telecommunications equipment.

- Work with ACMA to educate property developers and planners on building cabling standards such as the *Digital Building Guideline*[19] along with ACIF's *Building Access Operations and Installation Guideline*[20]. These guidelines are designed to encourage multi-carrier access by providing greater clarity to carriers, carriage service providers and property developers/owners of multi-tenanted, multi-storey buildings of standard procedures across the telecommunications industry, resulting in savings in the administrative costs of all parties involved, as well as providing improved certainty in terms of the timing for provision of services, access to adequate power supplies, facility documentation requirements and improved security for carrier and property owner facilities.

This education should include both fixed-line and mobile communications in-building coverage.

The above actions will provide guidance to infrastructure developers within the Tweed Shire as well as create a direction for telecommunications infrastructure development.

However, in the absence of an overarching Master Plan for telecommunications infrastructure development for the region, such development is likely to be adhoc and relatively uncoordinated.

To coordinate and accelerate the development of telecommunications infrastructure throughout the Tweed Shire, we recommend that the above actions be undertaken within the context of a Telecommunications Infrastructure Master Plan for the region. This would consist of:

- Creating a vision for Tweed Shire that aligns and underpins the economic and social aspirations of the region and sets the objectives, priorities and timelines.
- Identifying areas of demand concentration based on Council's development control plans.
- Identifying backhaul requirements to connect the areas of demand concentration.
- Identify and engage with key stakeholders that are capable of contributing to the development of an open access next generation community telecommunications distribution access network.
- In conjunction with the identified key stakeholders, develop a telecommunications Business Case identifying the estimated costs to achieve various stages of development, potential contributions by the stakeholders and the resultant gap to realise a fully integrated, end to end community telecommunications distribution network. This document would form the basis of an application for funding from State and/or Federal governments linked to the National Broadband Network initiative.
- As an outcome of the comprehensive planning as described above, lobby government for financial assistance to meet some of the cost gap in deployment of optical fibre into urban renewal projects.

[19] http://www.acma.gov.au/WEB/STANDARD/pc=PC_569
[20] ACIF G571: 2002, reconfirmed in 2004 and due for next review July 200

- Preparation of technical specifications required to support the regulatory controls on property developers needed to achieve effective deployment of telecommunications infrastructure in greenfield and brownfield developments, as well as Council's future capital works programs.

APPENDIX 1 – TELECOMMUNICATIONS CONDUIT POLICY

22.13 TELECOMMUNICATIONS CONDUIT POLICY

19/01/2006
VC37

This Policy applies wherever a permit is required for subdivision or to construct a dwelling or other buildings or works in the municipality.

Policy Basis

Demand for telecommunications services, especially broadband services, is rapidly increasing, by businesses and households (for digital video delivery, telecommuting and other roles). There are several options for delivery of these services, including satellite, copper wire cable and optical fibre cable.

Optical fibre has major advantages, as its data carrying capacity is significantly higher than offered by copper infrastructure, but its installation is restrained outside central city areas by the high cost of retrofitting cables, which need to be in conduits, normally underground.

Whittlesea has particular needs for services which support business and industrial activity, including home-based employment. The City also needs enhanced access to information and services for its diverse, developing outer metropolitan community.

The municipality also offers lead-in advantages, as it remains an active urban growth area, where major savings can be achieved in infrastructure development by installation of service capacity at the development stage.

Objective

To ensure provision of conduits for optical fibre cabling, to facilitate future installation of advanced telecommunications services.

Policy

It is policy that:

- Provision for optical fibre telecommunications services will be pursued as a means to support business and industry in the City, assist economic and employment growth, improve residents' access to information and services, and do so in a manner which respects the City's visual quality.
- New subdivision and development provide conduits to enable delivery of such services at the earliest practical time, by providing the conduits at the development stage.
- All subdivisions and developments provide conduits in accordance with a Conduit Network Concept Plan, unless concessions are warranted by factors such as remoteness, very low densities, or the minor nature of development or extensions.
- Provision is made in the form of conduits, laid in accordance with the Planning Guidelines for Conduits for Optical Fibre Services, unless Council accepts cash in lieu of such works in special cases.
- Construction of conduits may be required to extend beyond the length of adjacent road frontages or other agreed alignments, to link with conduits laid or to be laid by others. To maintain an equitable balance between such contributions:
  - cost sharing arrangements may be agreed where there are shared benefits in links beyond immediate frontages;
  - contributors will not normally be required to contribute to links across other private properties in urban use or with urban development potential, and

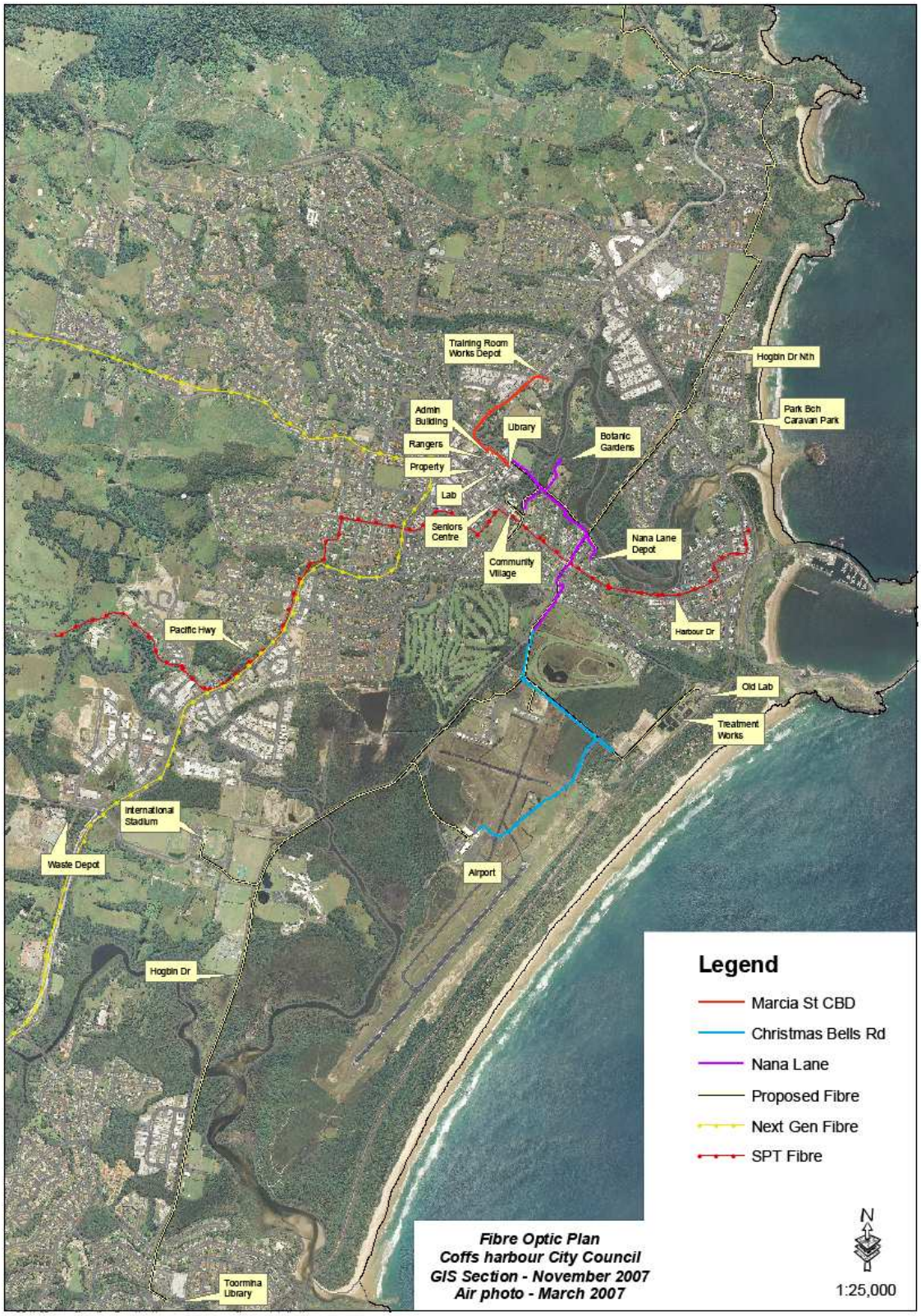
- the extent of links beyond immediate frontages may be limited to the greater of 20 metres or 20% more than the contributor's combined length of conduits on-site and along roads adjacent to the contributor's land.

- Relevant permits include conditions requiring conduits to be protected from damage.
- Ownership of the conduits will vest in Council, on the basis that they may be transferred to a telecommunications carrier or similar agency at a later date.
- Where conduits cross private land, easements may be required.

Policy Reference

Planning Guidelines for Conduits for Optical Fibre Services, 2001.

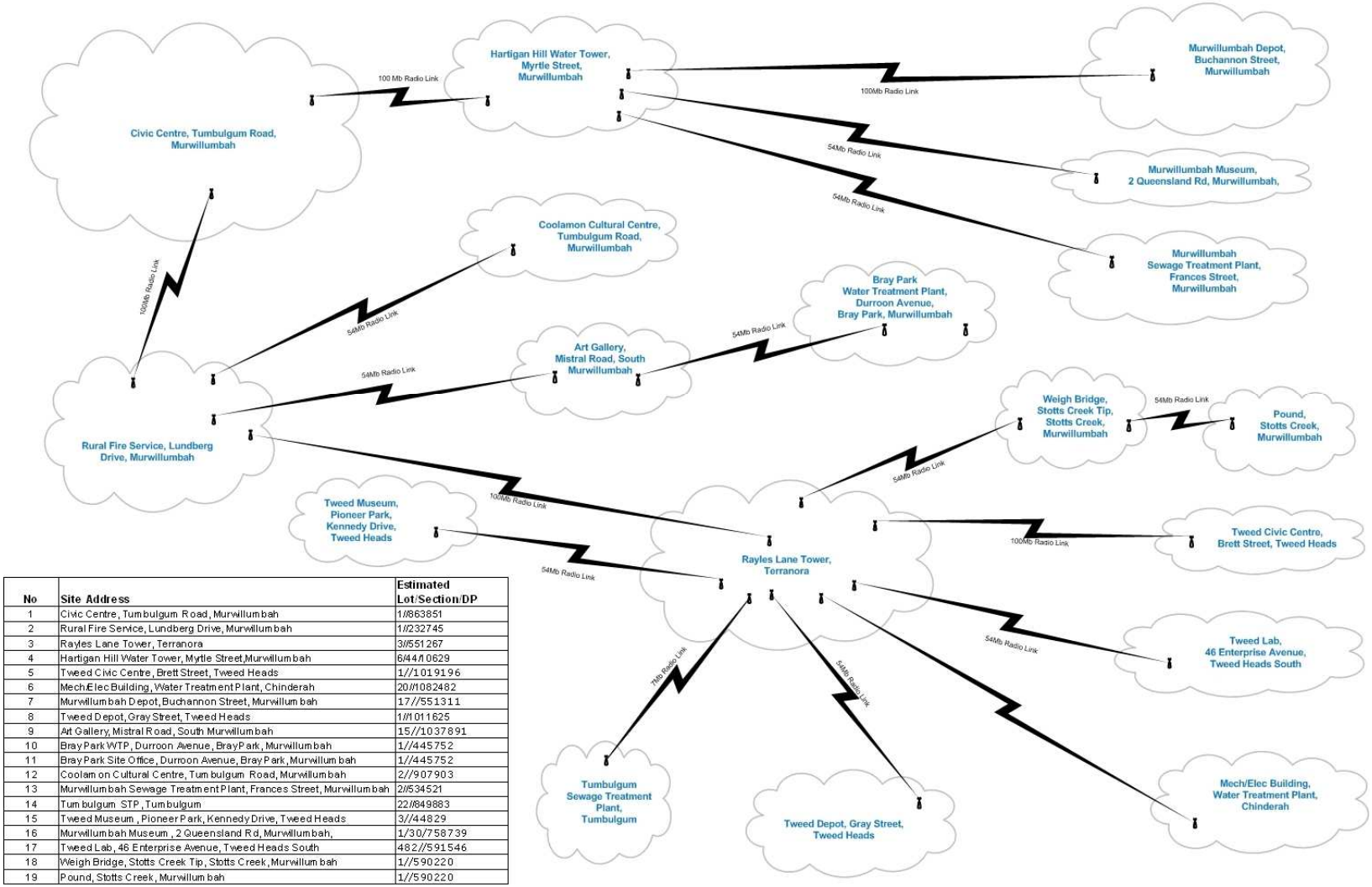
APPENDIX 2 – COFFS HARBOUR OPTIC FIBRE NETWORK


Training Room
Works Depot
Hogbin Dr Nth
Admin
Building
Library
Park Bch
Caravan Park
Rangers
Botanic
Gardens
Property
Lab
Seniors
Centre
Nana Lane
Depot
Community
Village
Pacific Hwy
Harbour Dr
Old Lab
Treatment
Works
International
Stadium
Waste Depot
Airport
Hogbin Dr
Toormina
Library
Legend
Marcia St CBD
Christmas Bells Rd
Nana Lane
Proposed Fibre
Next Gen Fibre
SPT Fibre
N
1:25,000
Fibre Optic Plan
Coffs harbour City Council
GIS Section - November 2007
Air photo - March 2007

APPENDIX 3 – TWEED RADIO INFRASTRUCTURE

TWEED SHIRE COUNCIL
INFORMATION SYSTEMS providing professional IT services

Radio Infrastructure @ November 2008



No	Site Address	Estimated Lot/Section/DP
1	Civic Centre, Tumbulgum Road, Murwillumbah	1//863851
2	Rural Fire Service, Lundberg Drive, Murwillumbah	1//232745
3	Rayles Lane Tower, Terranora	3//551267
4	Hartigan Hill Water Tower, Myrtle Street,Murwillumbah	6/44/10629
5	Tweed Civic Centre, Brett Street, Tweed Heads	1//1019196
6	Mech/Elec Building, Water Treatment Plant, Chinderah	20/1082482
7	Murwillumbah Depot, Buchannon Street, Murwillumbah	17//551311
8	Tweed Depot, Gray Street, Tweed Heads	1//1011625
9	Art Gallery, Mistral Road, South Murwillumbah	15//1037891
10	Bray Park WTP, Durroon Avenue, Bray Park, Murwillumbah	1//445752
11	Bray Park Site Office, Durroon Avenue, Bray Park, Murwillumbah	1//445752
12	Coolamon Cultural Centre, Tumbulgum Road, Murwillumbah	2//907903
13	Murwillumbah Sewage Treatment Plant, Frances Street, Murwillumbah	2//534521
14	Tumbulgum STP, Tumbulgum	22//849883
15	Tweed Museum , Pioneer Park, Kennedy Drive, Tweed Heads	3//44829
16	Murwillumbah Museum , 2 Queensland Rd, Murwillumbah,	1/30/758739
17	Tweed Lab, 46 Enterprise Avenue, Tweed Heads South	482//591546
18	Weigh Bridge, Stotts Creek Tip, Stotts Creek, Murwillumbah	1//590220
19	Pound, Stotts Creek, Murwillumbah	1//590220

APPENDIX 4 – NATIONAL BROADBAND NETWORK – TELSTRA PROPOSAL

28 November 2008

Mr Max Boyd
Administrator
Tweed Shire Council
PO Box 816
MURWILLUMBAH NSW 2484

NATIONAL BROADBAND NETWORK – TELSTRA PROPOSAL

Dear Mr Boyd,

We are writing to inform you that Telstra yesterday submitted a proposal to the Federal Government to build a world class, open access national broadband network (NBN). We all care about Australia's future, its productivity, its international competitiveness and the important infrastructure investments to be made. We believe that high-speed broadband is a critical technology that will enable substantial benefits for business, health, education and other government services, carbon emissions reduction and the wider Australian community.

Telstra's proposal outlines that we would spend up to $5 billion of shareholders' money on an NBN capable of delivering high-speed broadband to up to 90 per cent of Australians. Telstra's proposal is pro-competition with legislated access rules for wholesale customers. Building the NBN would be a Fibre-to-the-Node (FTTN) upgrade to Telstra's existing fixed network, a core asset in the business for which Telstra shareholders paid $45 billion to the government in T1, T2 and T3.

In the past three years Telstra has delivered world leading capabilities to Australians through the integrated Next G™ and Next IP™ networks. We believe our proven track record in the scale and speed of delivery of these two networks, plus our financial capacity and the real capital commitment in our NBN proposal, are unmatched by any NBN competitor. Further, Telstra is the only company that indicated yesterday it had the financing behind its response.

The economic stimulus, job creation and Telstra's ability to start the NBN project quickly are all very real. The NBN would employ 4,000 skilled staff during construction and create many more jobs indirectly. Each month's delay sees Australia missing out on an estimated $200 million boost to GDP. All of us are aware of the impact of the recent fall in the Australian Dollar - in the case of the NBN, it is a billion dollar impact on buying essential imported equipment.

Telstra is serious in our proposal to build the NBN. We can only do this if there are no business model changes which destroy the economic incentives or our capabilities, such as further separation or fracturing of our network - a network which is critical in providing end-to-end services for customers and for the nation's security. Obviously, our shareholders expect competitive returns, especially in the light of an investment that could represent more than 10 per cent of Telstra's market capitalisation.

The Minister, Senator Conroy, indicated yesterday that the government accepted Telstra's proposal for consideration under its NBN Request for Proposal process.

Again, this issue will be one of the most critical to be decided in the next several years regarding Australia's future infrastructure needs. Therefore, we will keep you informed as the process unfolds.

Yours sincerely

Solomon D. Trujillo
Chief Executive Officer
Telstra Corporation

Donald McGauchie
Chairman
Telstra Corporation

APPENDIX 5 – COUNTRY ENERGY NETWORK MAPS


Tweed Heads
Tweed Heads NSW, Australia
Tweed Heads South
© 2008 MapData Sciences Pty Ltd, PSMA
©2007 Google
Pointer 28°11'49.76" S 153°31'04.17" E elev 3 m
Streaming 100%
Eye alt 4.63 km


South Tweed Zone
Tweed Heads South
Minjumbul Drive
Fingal Head
Banora Point
Banora Zone
© 2008 MapData Sciences Pty Ltd, PSMA
Google™
Pointer 28°12'27.01" S 153°32'53.07" E elev 3 m
Streaming 100%
Eye alt 4.63 km


Banora Zone
Terranora Zone
Chinderah
Kingscliff
Cudgen
Cudgen Zone
© 2008 MapData Sciences PtyLtd, PSMA
Google
Pointer 28°13'38.85" S 153°30'47.78" E elev 13 m
Streaming 100%
Eye alt 7.23 km