

The Auckland Broadband Imperative

Enabling Transformation in the Auckland Region

A White Paper for Broadband in Auckland

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Auckland Regional Broadband Advisory

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Executive Summary

High-speed broadband is a critical driver of productivity and economic growth, and is essential if Auckland is to become globally competitive.

It is one of the five transformational 'pillars for action' of the Metro Project Action Plan, which aims to transform Auckland into a world-class city.

So where is Auckland on the digital highway and what is needed as a future road map?

In 2007, the Auckland Regional Broadband Advisory (ARBA), representing Auckland local government, agreed to work together on a cohesive high-speed broadband plan for the Auckland region which could initiate new projects while drawing on the experience and initiatives developed by individual councils.

There is an expectation that Auckland's current sluggish broadband speed will change with imminent unbundling of the local loop. Telecom has announced a \$1.4 billion plan to roll out ADSL2+ infrastructure while upgrading or installing 3800 nodes/cabinets over the next four years to meet its target of 20Mbit/sec broadband for nearly all New Zealanders by 2011.

While this is encouraging and will deliver speed improvements, ARBA questions whether it is enough to meet Auckland's broadband aspirations, or the government's goal of placing New Zealand in the top half of the OECD for broadband service by 2012. This would need broadband speeds of approximately 50Mbit/sec - more than twice Telecom's target.

Looking further, to 2014, Auckland would need a broadband capacity of more than 100Mbit/sec to stay in the top half of the OECD. This is well beyond the capacity of the ADSL2+ and copper infrastructure proposed by Telecom. Experience offshore shows that video is the next dominant application online. Already, movie downloads contribute the largest traffic flow across the internet. In business, unified communications will increasingly rely on internet video which can help companies drive productivity and reduce their carbon footprint. Councils and central government are large consumers of broadband as are health and education providers. There is no doubt that faster cheaper broadband will drive growth and change in the economy.

How do we get there? ARBA believes significant investment in fibre to the premises (FTTP) infrastructure is necessary to meet the government's target. This infrastructure must be open to all communications service providers to avoid unnecessary duplication and to provide a level playing field. The question is: what is the best way to fund fibre and deploy infrastructure?

Because many of the benefits of high-speed ubiquitous broadband are seen as key to an economic transformation of the Auckland region, and therefore fall outside what can reasonably be expected from a commercial telecommunications operator like Telecom, ARBA believes there could be a case for local government investment.

ARBA has already taken steps towards the goal of fast broadband services for Aucklanders with the following benchmarks:

- Working collaboratively rather than as eight individual councils
- Looking to partner with the private sector in an open access network
- Working to ensure ducting for fibre optic cable is placed in all roading, pavement, and other local authority works
- Working to ease the consent process and ensure regional consistency for deployment of underground, aerial and wireless infrastructure
- Lobbying central government for regulatory change to ensure more competition in the market.

ARBA plans further research, and engagement with the Ministry of Economic Development (MED), to understand the barriers to broadband investment and to build a regional consensus and priority programme.

In addition, the following commitments are considered essential to delivering the vision of Auckland as a world-class, connected, innovative, smart city:

- Auckland local government, and central government, must commit funds and resources to enable a 'fibre future' for broadband delivery based on open-access infrastructure, in partnership with industry where appropriate
- Commercial telecommunications infrastructure companies must develop and integrate shared fibre infrastructure business models.

Introduction

Microsoft founder Bill Gates once said, "The internet is becoming the town square for the global village of tomorrow". He also said, "information technology and business are becoming inextricably interwoven. I don't think anybody can talk meaningfully about one without the talking about the other."

It's not just technology and business that are interwoven, as Communications and Information Technology Minister David Cunliffe acknowledges: "Every aspect of our lives is now impacted by technology in some shape or form. ICT drives economic development and is key to our advancement in many fields."

In 2005, the government released its vision for New Zealand's digital future. It stated: "New Zealand will be a world leader in using information and technology to realise its economic, social, environmental, and cultural goals, to the benefit of all of its people."

What progress have we made along the digital highway since then, and what is needed as we head into the future?

This paper attempts to answer these questions in an Auckland regional context.

Auckland Regional Broadband Vision

In 2006, the Auckland region put its own digital ambitions on the table in the form of the Metro Project Action Plan, which aims to transform Auckland into a world-class city region. The Action Plan has put the development of world-class infrastructure, including broadband, as one of its five transformational 'pillars for action'.

The Auckland Regional Economic Development Forum considers broadband of strategic significance for Auckland. The Auckland Regional Broadband Advisory (ARBA), a group of local and central government officials, has been formed to provide an integrated regional view on the development of broadband in Auckland. In 2007 this group agreed to work collaboratively, sharing the experience and initiatives in train in different councils and aligning this with the Auckland Regional Council developed Metro Plan. The expectation is that the alignment of all initiatives would result in cohesive broadband development in the Auckland region. Auckland councils are united in their vision to deliver enhanced broadband access and speed to the region's residents and businesses because they know that it is a critical driver of productivity, growth and, most importantly, economic transformation.

International-class broadband is not just about driving broadband for business. We know that the benefits go far beyond achieving lower transaction costs and efficiency gains, and the potential to reach larger markets and deploy new business models. Broadband is a key catalyst for stimulating Auckland's economic and social development. For a country like New Zealand, which must overcome the tyranny of distance, broadband is a key enabler for our knowledge economy.

Two bodies of work, from HiGrowth (2005) and the New Zealand Institute (2007), clearly make the case for accelerated broadband diffusion (usage cf availability), and indicate national economic benefits in the range of \$2.7billion to \$4.4billion per year, with further possible upside potential. Additionally, the case for driving productivity improvements as a means of powering a skills-constrained economy is predicated and enabled by world-class broadband provisioning. The government's Digital Strategy V1.0 (currently under revision) targets upper quartile OECD broadband delivery by 2010.

Cities drive economic growth and Auckland is New Zealand's only urban economy that can realistically build scale and capability to be an effective global marketplace competitor. However Auckland's productivity is only marginally higher than the New Zealand average and is over-reliant on domestic-led growth. As a small and physically remote economy, rising oil prices, food miles and carbon obligations represent significant challenges to New Zealand's commodity exports. Auckland therefore has a role and a responsibility to accelerate its productivity and export contribution and this necessitates a transition to a regional economy creating more high value/ low weight products and services, and more exports.

In short Auckland needs to build strategies and allocate resources to drive a more “weightless” and internationally focused regional economy.

Faster, cheaper broadband will present opportunities! Broadband can and will drive growth and change in the economy, and increase public sector effectiveness and social cohesion. Broadband will also compliment and facilitate other drivers of economic growth and international competitiveness.

Broadband is an enabler of e-business and new market opportunities. Broadband can allow firms to increase productivity via improved information exchange, shared networks and increased ability to operate nationally and internationally. Broadband can facilitate innovation through improved information flows between research and tertiary institutes, businesses and government. World-class broadband could increase Auckland’s ability to attract globally competitive business.

Efficiencies and increased quality of public services could be achieved through faster online services and information and through shared applications and networks across agencies. New applications could extend the reach of public services, including remote medical diagnostics and remote education. Auckland’s congestion and carbon footprint may be reduced through remote access to services and workplaces.

For rural communities, broadband could be an enabler for economic and social inclusion. However, geography poses challenges in extending affordable broadband to all communities.

A Supply Side Perspective

In the last year there has been a wave of expectation that the impending unbundling of the local loop would facilitate a more competitive market, and a telecommunications investment environment that would encourage a ubiquitous high-speed broadband network to come closer to fruition.

More recently we have Telecom's announcement of a \$1.4 billion investment plan that would see ADSL2+ infrastructure rolled out and 3800 nodes/cabinets upgraded or installed over the next four years. This latest announcement is a welcome shift towards greater information accessibility and openness regarding Telecom's plans for a broadband services network, and the expressed target of 20Mbit/sec broadband by 2011 for nearly all New Zealanders is an encouraging move in the right direction. The question is; will this be enough to deliver on the region's aspirations for broadband access and put New Zealand in the top half of the OECD for fast broadband access?

ARBA questions whether Telecom's investment delivers on Auckland's broadband aspirations. Or is it simply business as usual – incremental investment steps that ultimately reinforce the current models of operation and our relatively poor standing in the OECD broadband tables?

The concerns of ARBA about the Telecom 'cabinetisation' programme are not just with the scale of investment, but also with the technology strategy. Telecom plans to roll out ADSL2+ and lift residential broadband access to 20Mbit/sec by 2011. However, this target does not come close to achieving the government's goal of placing New Zealand in the top half of the OECD for broadband services by 2012.

If we use 2011 as the medium-term reference point, then the broadband target speed we are aiming for – relative to the OECD - is approximately 32Mbit/sec. Based on the same calculations, the 2012 target in the government's sights would be approximately 50mbit/sec – that's more than double the 20Mbit/sec being proposed by Telecom.

These calculations are outlined in the following table, which is provided as a reference point for assessing the 2011/12 broadband targets and is predicated on two key assumptions:

1. That the OECD average broadband service is currently 4Mbit/sec (there is no clear data on delivered broadband service, but the OECD median advertised service is 8Mbit/sec and for this exercise it is assumed that through plan constraints and service contention, that 4Mbit/sec is the delivered median).
2. That demand (and supply technology) is doubling every 18 months (from a technology perspective this is consistent with Moore's Law of computational capacity).

Also assumed is that advanced users require double the average service and that innovators (particularly software developers, creative sector and scientific/engineering users) require double the advance user capacity.

OECD Average	Average users Mbits/sec	Advanced users Mbits/sec	Innovators Mbits/sec
Jun2007	4	8	16
Dec2008	8	16	32
Jun2010	16	32	64
Dec2011	32	64	128
Jun 2013	64	128	256
Dec2014	128	256	512

Source: Based on OECD June 2007 ICT Report median advertised broadband service, and Moore's law of computational capacity.

From this table it is clear that 20Mbit/sec, which is approaching the limits of ADSL2+ technology, will not secure New Zealand's place in the top half of the OECD by 2011. Nor will it come close to the longer-term outlook to 2014, which shows a requirement for capacity in excess of 100Mbit/sec – well beyond the capabilities of ADSL2+ and copper, and well beyond the investment proposed by Telecom.

It is also worth noting that speeds of 20Mbit/sec are only achievable with an ADSL2+ service (as a minimum). However, we know that Telecom tests in Pakuranga in east Auckland indicate that only 7 per cent of ADSL2+ users were achieving something close to this level of service. The remaining 93 per cent of customers in this area were not able to maximise the ADSL2+ service because of poor copper line quality, poor modem hardware (restricted to ADSL1 modem speed) or poor house wiring, or a combination of these. In addition, it has been suggested that parts of the Telecom copper network, and some switches, will experience high operational failures from 2008 onward and catastrophic failures from 2015, if not upgraded.

ARBA is optimistic and believes that the 2014 target of more than 100Mbit/sec, bringing us closer to OECD levels, is achievable. But, while ADSL/VDSL copper-based technologies may deliver service close to these levels, it is clear that the long-term, strategic infrastructure investment must be in fibre to the premises (FTTP).

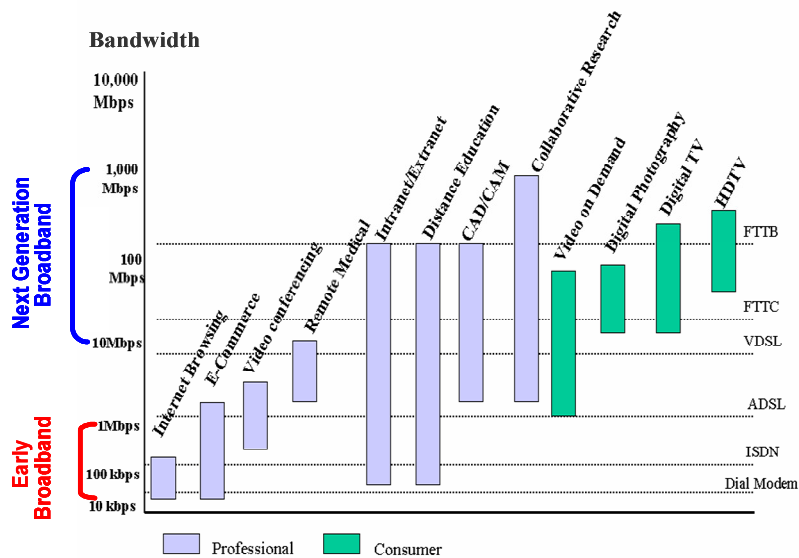
A Demand Side Perspective

Where is broadband demand heading? Most pundits believe video and movies are the next dominant applications online. In the United States, for example, an estimated 81 million people, or 63 per cent of the 129 million people who access the Internet over broadband watch broadband video at home or at work, according to Nielsen research. And research by the Pew Foundation found that more than 57 per cent of online video viewers share links with others.

YouTube clearly demonstrates the phenomenon. The Internet site, which allows users to upload their own videos onto the site, and watch content uploaded by others, was launched in February 2005. Within two years it was streaming 100 million videos a day.

Movie downloads by volume now contribute the biggest traffic flow across the Internet. This is despite the fact that these movies are highly compressed for fast transmission. Before these movies are finished and packaged for public distribution they undergo extensive manipulation in a digital form. The original file sizes of the raw content that comprises these movies are many times larger. For example a DVD is approximately 5 - 9GBs in size for a one to two hour movie. By comparison one hour of HDTV is 500GBs and at full film resolution it is much bigger still. Lord of the Rings required 100 terabytes of storage, and used a 10 gigabit internal network with an international connection peaking at 200Mbits.

As the screen industry, as one example of power broadband usage, moves toward total digitisation it is becoming a prerequisite for the survival of New Zealand's industry to have access to competitively priced, very fast broadband. Fast broadband is also a prerequisite to extend current broadband applications and to enable new applications and services, as shown in the graph below.



Innovative and practical uses of broadband services for business could include VoIP, VPNs, conferencing, remote server backup, and remote server and application locations. For companies like software company Right Hemisphere, which has R&D facilities in Auckland and offices in California, broadband is essential in sending large amounts of data instantly between their offices, yet they are currently disadvantaged by New Zealand's slow broadband.

Unified communication packages for businesses include video conferencing, which can help companies reduce their carbon footprint and make far more efficient use of time by reducing the need for arduous air travel and face-to-face meetings.

Faster broadband is important in education, and medicine. The University of Auckland is a member of an international alliance, which uses the Internet to link doctors in developing countries with a panel of more than 200 specialists. The global university group, Universitas 21, has joined forces with telemedicine pioneers the Swinfen Charitable Trust to expand a service which already links 69 hospitals in 23 countries and typically uses email to send images of a sick patient - who may be a child living on the slopes of the Himalayas or a seaman in the middle of the Pacific - to medical specialists for advice.

There is significant demand for broadband-enabled services and many new applications are on offer to address current market needs and even more applications are under development to drive the business and social models of the future. ARBA believes that by assisting the community to optimise benefits through awareness and training activities we can accelerate the demand for, and the benefits of, broadband. Wider broadband awareness can be stimulated by futuristic showcases such as the 'Connected Home', 'Connected Classroom', 'Connected Clinic' or 'Smart Town' concepts.

However, at present all users, but particularly advanced users and innovators, are significantly impaired in their use of, and development of, new applications due to poor broadband services.

The New Zealand Institute has estimated average broadband download speeds for Aucklanders at 3Mbit/sec. At these speeds, innovative uses of broadband for businesses are not being enabled and the economic benefits of a more weightless economy cannot be realized.

Councils and government are large consumers of broadband, and aggregated, they provide a significant revenue stream for broadband providers who can enable them to benefit from 'best of breed' business and specialist applications in fields such as health, education and customer services. Like the rest of the population, they are reliant on the infrastructure to benefit from these applications.

The Case for Fibre

Numerous studies here and internationally assert the multiple benefits of high-speed, ubiquitous broadband, especially in the health, media and logistics sectors, and for driving economic and social development and growth.

Beyond the performance constraints of copper-based ADSL, there are other limitations including the fact that it does not support the download/upload symmetry required for businesses engaging in the knowledge economy applications such as videoconferencing. These constraints and limitations reinforce the need for a fibre to the premises (FTTP) solution if we are to have internationally competitive telecommunications in Auckland.

Local loop unbundling is on its way, and provides an opportunity to develop additional competitive services in the market. However, these services will be exchange-based and risk becoming stranded as Telecom 'fibre to the node' rolls out. Commercial returns will therefore need to be made within the two-year upgrade window advised by Telecom. But this is unlikely to assist the development of competition and will not drive more affordable services. The sustainable solution is significant investment in fibre infrastructure.

Furthermore this investment should be focused at the passive infrastructure level (ducting and fibre) and based on 'open access' principles to ensure a level playing field for all communications service providers. As with other networks like roads and water there is seldom any broad economic benefit from duplication of passive network infrastructure and an 'open access' approach facilitates competition on infrastructure rather than in infrastructure.

Internationally the drive to fibre is well established. Japan, Hong Kong and Singapore are looking to achieve 100Mbit/sec in the very near future and Europe is also rapidly developing its fibre assets. Put simply – New Zealand is lagging behind. Significantly.

While there is a strong consensus on why we need international-standard broadband, Telecom contends that demand for accelerating broadband provision is limited. With 97 per cent availability and 37 per cent uptake there is clearly work to do on driving demand. However there are a number of market characteristics that may play a role as inhibitors of broadband uptake:

1. Broadband resellers buying from telecommunications infrastructure resellers have little or no margin with which to drive demand generation and provide further services.
2. New Zealand is the most capacity capped nation in the OECD with entry level plans offering little more than dial-up speeds with heavy caps.
3. Pricing in New Zealand appears to be at the upper end of the OECD scale, while performance, starting at 256kb is at the lower end of the OECD scale.

4. Fast, predictable access to overseas websites (especially the US as the main source of content and applications) appears to be a further performance constraint and additional international capacity and/or competition may be required.
5. Free local calling has reduced the incentive and margin to develop VOIP offerings.

ARBA questions how much Telecom can contribute to achieving national broadband goals as part of the government's broader economic transformation agenda. Given that many of the economic (and social and sustainability) benefits fall outside the remit of commercial telecommunication operators, it is apparent that what central and local government seek as 'transformational' outcomes, and what commercial telecommunications can reasonably be expected to deliver, creates a partnership opportunity to bridge the difference.

ARBA is committed to ensuring that by 2011 the majority of Aucklanders will enjoy broadband access and speed that is on par with the top half of the OECD. In this regard ARBA proposes to examine additional avenues where local government investment might accelerate deployment.

ARBA Programme of Work

We have already made some steps to get there. Firstly, we are working collaboratively rather than as seven individual councils. We are looking to partner with the private sector in an open access network and leverage government funding to deploy and extend existing networks. We are working to ensure ducting for fibre optic cable is placed in all roading, pavement and other local authority works. We are working to ease the consent process and ensuring regional consistency for deployment of underground, aerial and wireless infrastructure. And we are lobbying central government for change in the regulatory environment to increase competition in the market.

ARBA is committed to researching and communicating a better understanding of the barriers to broadband investment, and to report its learnings in this area as its programme progresses. ARBA intend to review the proposed action points below to build a regional consensus and priority programme including:

1. Engage with the Ministry of Economic Development (MED) to understand the government's positioning on upper quartile/half delivery of broadband in the period 2010-2012.
2. Engage with the OECD to understand the current price and performance and capacity growth rates in order to forecast the upper quartile and mid-points of OECD broadband delivery in the period 2010 - 2012.
3. Complete the MED funded research into demand and economic benefits of broadband rollout and develop a shared view of the implications this has on the role and initiatives required from ARBA, central government, councils and industry.
4. Engage with Telecom and dark infrastructure vendors to confirm either their 2011 20Mbit/sec aspiration or other alternative initiatives, particularly with regard to the Auckland region.
5. Assess partnership opportunities with MED regarding the bridging between what the telcos will offer on a commercial basis and what is 'required' to deliver on central/local government penetration and usage rates in Auckland.
6. In conjunction with MED, engage with telcos and other investors to develop and deploy the Auckland Broadband Acceleration Plan
7. Commitment to all new connections (green fields and brown fields redevelopment) to be ducted and carry fibre including clarity on ownership.
8. Review a proposed common code of practice for possible fibre to the kerb (FTTK) and examine trials for this methodology.

The Auckland Broadband Imperative

Despite being one of the highest Internet users in the world, New Zealand ranks 20 out of 30 OECD countries on broadband adoption. It is easy to equate this ranking with our slow speeds, high prices and heavy data caps. Access, capability and cost are all affecting our ability to use and develop the new applications, services and business models that characterise a knowledge economy.

If Auckland is to truly compete globally, and offer a business environment and quality of life that is of an international standard, we simply must have widespread, high-speed broadband deployment and uptake across the whole region – not just in the areas that appeal to commercial telecommunication operators. Only when broadband is considered essential infrastructure will the Auckland region be on its way to a level of broadband capability that is on par with other leading cities around the Pacific region and around the world.

ARBA sees the following commitments as essential to the delivery of its vision:

- Auckland local government committing funds and resources to enable a 'fibre future' for broadband delivery based on open-access infrastructure, in partnership with central government and industry as appropriate
- Central government committing funds and resources to enable a 'fibre future' for broadband delivery based on open-access infrastructure for all urban New Zealanders, with alternative technologies to deliver high speed broadband to rural users
- Commercial telecommunications infrastructure companies to develop and integrate shared fibre infrastructure business models

ARBA believes these key commitments, supported by a comprehensive strategic plan and delivery capability will be the catalyst for a smarter, more productive, more connected, more informed Auckland.

With significantly enhanced broadband performance and increased services and applications competition, we will see the private and public sector, and residents, maximizing the opportunities that broadband offers, including rich real-time multi location video conferencing, teleworking, online high definition television, super fast search agents, telemedicine and life-long education applications, smart online support agents, fixed wireless enablement for mobility, and 'follow me' technology scenarios.

And that's just a start.