WELLINGTON REGION BROADBAND PLAN

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Regional Broadband Objective

The Wellington Region Broadband Plan outlines the rationale for and implementation steps needed to develop a regional broadband network. This is a whole-of-region approach which covers both urban and rural areas. The objective of the plan is:

> to provide open-access[1] passive fibre connectivity to all urban and rural MUSH (municipal authorities, universities, schools and hospitals) entities throughout the region, which include a number of "semi-rural" localities, and provide a platform for additional services particularly services to businesses

This would be subject to cost-benefit analysis of specific remote locations and possible use of alternative technologies.

The region's councils[2] have agreed to a joint process to develop a duct and fibre cable network for the entire Wellington Region. It would serve both urban and rural areas and be managed by a joint venture between councils and the private sector.

Councils have negotiated a provisional partnership with significant existing telecommunications companies. The parties are expected to contribute cash and access to existing assets, and to purchase their telecommunications requirements from the joint venture, but negotiations are still underway between the parties. The tentative name for this joint venture network company is Wellington Region Broadband Limited.

[1] "Open access" refers to the way in which broadband infrastructure can be managed; it does not relate to the choices of technology. Open access management can be applied at any layer. The open access model is different from the traditional vertically integrated telecommunications model, where there is no separation between the infrastructure operator and the retailer of services. (A vertically integrated roading model would see the owner of the road toll all the traffic on it and probably own all the taxi services, bus service and couriers).
[2] Carterton District, Greater Wellington Region, Hutt City, Kapiti District, Masterton District, Porirua City, South Wairarapa District , Upper Hutt City, and Wellington City.

Wellington Region Broadband Limited plans to:

- Build or purchase open access duct and fibre capacity to cover the region, plus a number of rural fibre links
- The network is planned to link approximately 700 MUSH sites across the region
- The network will provide a platform for commercial services and connections to commercial businesses and sites.

Details of the importance of broadband to economic development and the current provision of broadband for the region are outlined in the supporting background document "Broadband Plan Background Report".

1. Contribution of Broadband to the Wellington Regional Strategy

The Wellington Regional Strategy identifies broadband as a key enabler of economic growth and one of seven priorities. Beyond innovation and productivity benefits, high quality broadband infrastructure can transform the delivery of education and health services, and facilitate new forms of community engagement and participation in public life. Potentially significant environmental benefits are also receiving attention, such as reduced road congestion because of telecommuting and reduced air travel through the use of telepresence (very high definition) video conferencing.

The Strategy singles out fast, affordable broadband[3] as a key economic enabler because the region's distance from the rest of the world, and focus on new, creative industries, make first-rate communications technology essential.

The June 2007 Wellington Regional Strategy sets a vision:

> "*By 2017 all of the Wellington region will have affordable access to an interactive, open access, broadband network capable of supporting applications and services using integrated layers of voice, video and data, with sufficient symmetrical capacity to meet the ongoing information and communication needs of the region's residents, businesses and institutions; and*
>
> *That as an interim target by 2010, building on the definition of fast broadband in the Government's digital strategy, the region adopt a target of 5Mbps symmetrical data rate. It is recognised that this will quickly be inadequate to meet the needs of the region, and therefore a more aggressive objective will be required in some areas to remove data transfer speeds and affordability as constraints on the region's ability to maximise the economic and social benefits of broadband. For example in the*

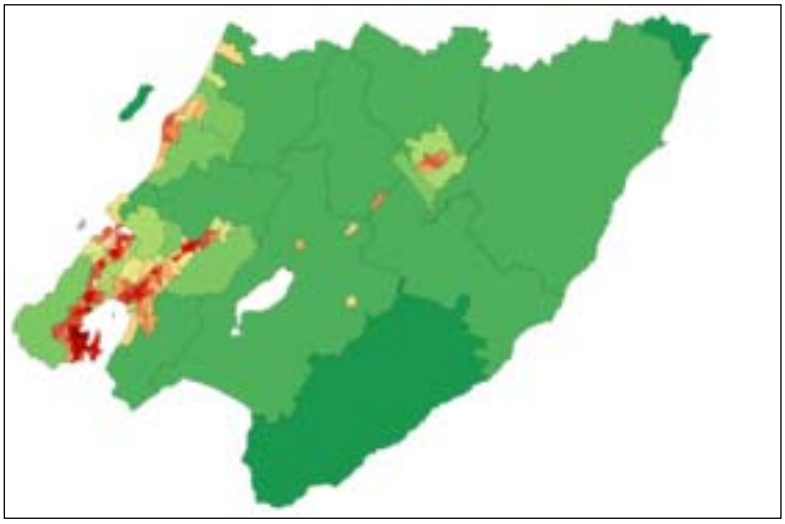
[3] see **Appendix 1** for definition of key terms

Wellington CBD and Miramar (both centres of digital content creation) this will mean facilitating affordable access to 10Gbps services as soon as possible."

The WRS goal of 5Mbps was taken from the Government's Digital Strategy (2004), which has since been superseded by the "Digital Strategy 2.0 (2008)" which has a goal of 10Mbps open access symmetrical provision[4]. The revised goal of 10Mbps open access symmetrical provision will therefore also be used as a reference point.

Grow Wellington is focussing on "demand" aspects, such as ensuring Wellington regional businesses realise the potential for broadband to enhance their businesses. Councils are addressing the "supply" side issues, in particular ensuring open access base level infrastructure to provide high speed connectivity.

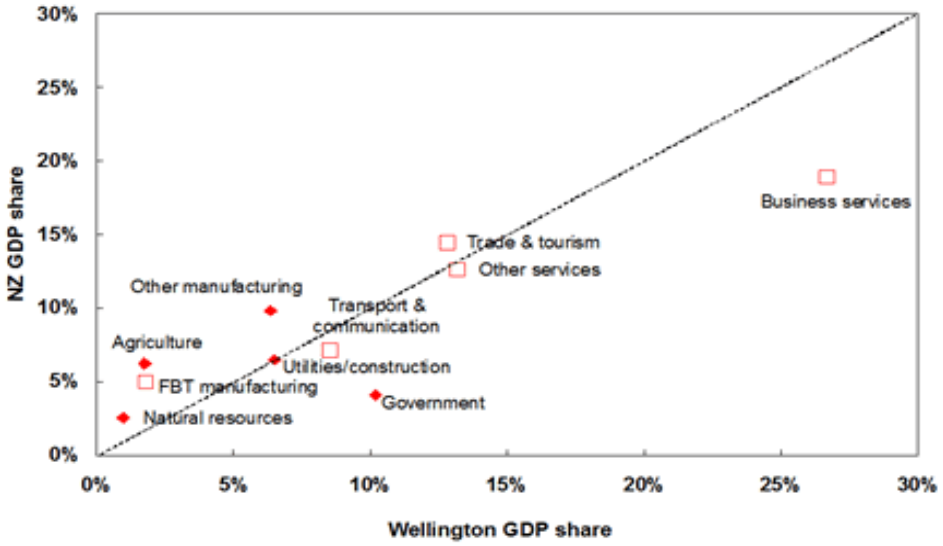
In 2006 the population of the Wellington region was 464,700 people, accounting for 11.2% of New Zealand's population. The map shows the extent of the region and the centres of population from the 2006 census. The Wellington regional economy produces approximately 13% of the nation's gross domestic product



Map 1 Population of the Wellington region (2006). Source: NZ Census

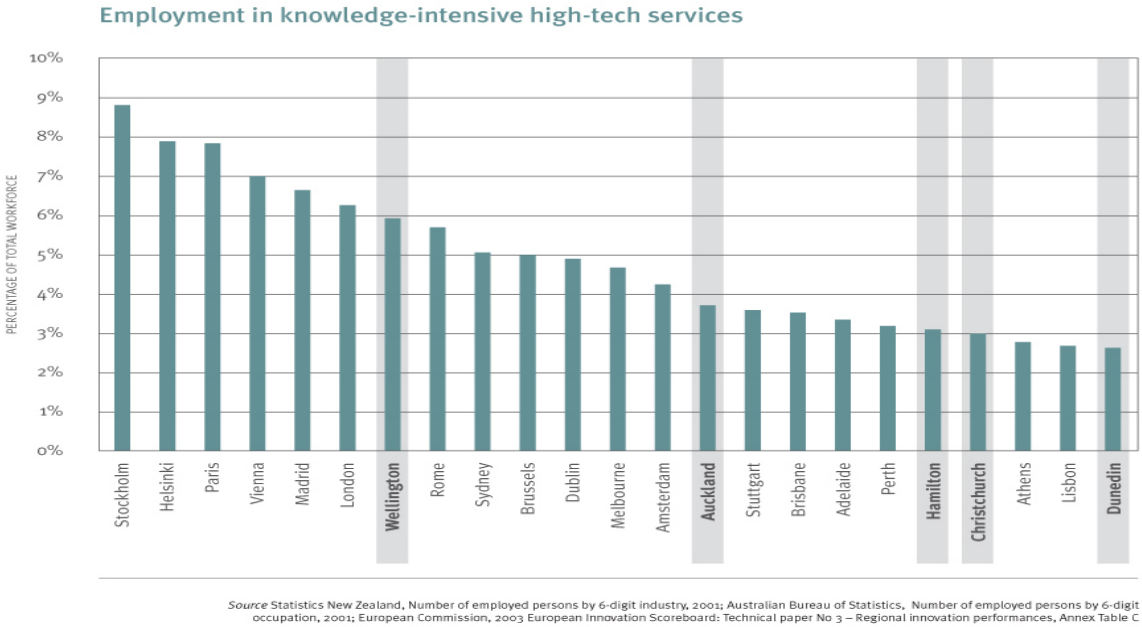
[4] see **Appendix 1** for definition of key terms

In Graph 1 below, items to the right of the diagonal line show sectors that Wellington has a higher share of the national GDP than the national average. Two sectors that are very high are government and businesses services.



Graph 1 Wellington GDP share v's NZ GDP share averaged across March years 2000-2004 Source: NZIER

The Ministry of Economic Development's (MED) Regional Highlights report (November 2005) notes that the region's enterprise creation rate is very high relative to other regions in New Zealand. The MED's "Economic Development Indicators 2007" shows that Wellington is high in employment in knowledge intensive high-tech services. This sector has a significant need for quality broadband services.



Graph 2 Employment in knowledge-intensive high-tech services. Source Statistics NZ

In 2004 the film and creative sector employed 9,509 people or 5.2% of the total workforce in the Wellington region. Wellington City has promoted itself as the “Creative Capital” to reflect the importance of the film industry to the regional economy. Alongside Peter Jackson’s production companies, there are 2,150 film and creative companies in the Wellington region. Their need for world class broadband has driven fibre provision to suburbs in Wellington city and the Hutt Valley where these firms are clustered. Other creative industry clusters in the region still have limited broadband.

Wairarapa's GDP is approximately 6 percent of the Wellington Region. The principal industries are sheep and beef, followed by retailing, dairying and horticulture (mainly wine).

2. Urban Plan

The urban areas in the region are:

- the built-up area of the four cities
- the ten discrete urban areas of Pukerua Bay, Paekakariki, Paraparaumu, Waikanae, Otaki, Featherston, Greytown, Carterton, Martinborough, and Masterton
- a number of “semi-rural” localities on the boundaries of these urban areas that do not qualify under the rural criteria.

The geographic area of coverage will be the entire Wellington region.

The network capability is expected to include linkages to other networks such as KAREN and GSN, backhaul between major centres in New Zealand and possibly overseas connections.

The planned network would have open access provisions at the ethernet, dark fibre, and duct layers. Access to this infrastructure will be provided in an unbundled manner and allow different permutations of infrastructure services, bearer services and application services to be delivered by service providers.

The priority MUSH entities for connection are all schools, tertiary institutions, medical centres and GP practices, and pharmacies. Lower priority health and education providers, such as early childhood education providers and other heath providers such as physiotherapists, have not been included in the network design, although their locations are known and many would be on the network routes.

3. Rural Plan

The rural network will apply to the rural areas of all eight territorial authorities, recognising that the economics of rural broadband can be very challenging for remote rural areas.

The model proposed is to lay a fibre connection, where possible, to a point of connection in a number of specified rural communities. Generally this would be a rural school, but could also be another appropriate location with access to power. This would provide the basis for:

- fibre or wireless connections to transmission points that would provide further communication reach, such as microwave links to WiMAX or cellular transmission sites;
- community-driven projects that provided further fibre reach, such as mole ploughing fibre along remote roads and across farms; and
- other services that could use these points of connections, such as Wi-Fi nodes at a rural school.

Some of these fibre connections are likely to be relatively high cost. However the installation of this capacity, moving progressively outwards from the core network to more remote locations, is considered the most effective next step in providing higher levels of connectivity. Where appropriate for cost-benefit considerations, alternative technologies could be used to deliver these links.

Analysis of the existing coverage has been made in a series of three reports on the region.

- *Wairarapa-Tararua Region Broadband Capability Audit*, 19 December 2007

- *Kapiti Coast and Horowhenua Districts Broadband Capability Review,* 6 June 2008
- *Four Cities Broadband Assessment*, 11 June 2008

and this has been used to prioritise rural projects that would achieve better connectivity.

4. Staged Approach

4.1 Urban

The eventual scenario for broadband is citywide deployment of a fibre-optic network, where fibre is used for both the backbone and the last mile to every household and premises in urban areas, and as a backbone for rural areas. This, however, comes at a substantial overall cost so although working towards this ultimate outcome is recommended, a staged approach is suggested.

- Backbone and “MUSH” spurs

The first stage would be the deployment of a fibre backbone network across the urban and rural areas of the region. It would connect key sites as nominated above.

- Fibre to the Node (FTTN) + Copper or Wireless Last Mile

This backbone fibre network would assist in achieving stronger performance from last mile links (which could be wireless, fibre, or copper). The length of the copper loop has been noted as a significant barrier to obtaining high broadband speeds.

- Fibre to the Home (FTTH)

Fibre to the Home (FTTH) and Fibre to the Premises (FTTP) includes the extension of fibre optic cable to customers. The cost of running fibre down streets and roads is significant, and would need to be addressed in a further stage of network development,.

4.2 Rural

A number of specific projects have been identified for the rural areas of the region. Using the definition in the Broadband Investment Fund, these would be better described as “remote rural” locations. They provide an initial set of rural projects that would produce significant benefits:

- North-East Masterton to Castle Point
- Parawhariki and surrounds
- Featherston to Cross Creek
- Bidwell Cuttings and Kaiwaiwai

5. Governance and Delivery Agency

Traditional telecommunication companies around the world have traditionally operated under vertically-integrated structures. This is where the owner of the infrastructure can restrict who runs services over the network, creating a significant barrier to entry for new competitors. Through the late 90s and early 2000s, fibre optics and the enormous need for capacity in the digital area, required telecommunications companies to invest large amounts of capital into basic infrastructure - investments that are difficult to justify based on serving only a portion of the market.

This has resulted in many countries looking at a new business model with an open access premise – where the high cost, low risk base infrastructure becomes a shared open access asset and innovation occurs in higher layers of the telecommunications investment ladder.

In the New Zealand context, the government has recently tightened the regulatory framework for Telecom, unbundling the local loop and directing their operational separation. However this is still not considered sufficient to deliver the level of affordable, high speed connectivity needed and significant government funding has been committed to provide seed funding to stimulate more investment and competition. Fibre optic cable is seen as the only “future proof” technology that can provide the connectivity required.

Councils in the region have agreed that there is a role for the public sector to facilitate and seed new investment in a way that does not “crowd out” private sector investment and promotes sharing of base-layer infrastructure. Table 1 below outlines the layers within a telecommunications system, and compares them to their equivalents in the roading system.

The involvement of local government to provide open access (fair price and non-discriminatory access) to a fibre network is therefore driven by:

- Insufficient investment by private providers in fibre optics – incumbents and traditional telecommunication companies have weak incentives to invest in new infrastructure.
- Telecommunications companies are natural monopolies - the very high cost of deploying underground networks such as fibre optics make duplication of infrastructure inefficient and risky to private investors.
- Open access networks with fairly-priced basic infrastructure can ensure further service level competition and innovation in ICT and ICT-related industries.
- Proven evidence that the proliferation of affordable high speed broadband services stimulates economic growth and achieves social, environmental and commercial benefits to the community.

Infrastructure Layer	Component of Broadband Network	Role description	Equivalent Road Network component
Layer 0	• Trenches • Ducts • Aerial infrastructure (e.g. power poles)	• Underground (conduit as in duct) or overhead right-of-way	• Road corridor
Layer 1	• Fibre-optic cable (dark fibre, ie unlit) • Wireless i.e. radio spectrum	• Medium for transmitting information	• Carriageway • Footpaths • Bridges
Layer 2	• Optics & electronics • Electronics • Wireless transmission equipment • Ethernet switches	• Transmits and receives information – e.g. for fiber-optic cable “lights up” the fibre	• Cars • Trucks/couriers • Pedestrians/cyclists
Layer 3 +	• Voice services • TV and video • Internet Access	• Services the customer actually buys that provide benefits	• Freight services • Personal mobility

Table 1 Telecommunication system layers. Source Wellington City Council

Layers 0 and 1 particularly are where costs are highest, the life of the assets is long and risks are relatively low. The risks of establishing a duct network are very low because the technology will not change, i.e. you will still need the right-of-way and can pull out the fibre and replace, so the length of life is more about the physical longevity of the asset - at least 20-25 years. Fibre also lasts a long time (at least 20-25 years) and capacity can be upgraded by installing new electronics at each end. So the technology risk around the optics and electronics is much greater - this might get upgraded every five years, or become obsolete.

This base-layer or passive infrastructure (ie where the fibre is non-active) is where councils have a role, leaving competition to flourish at the higher layers. In principle this is similar to a road, where the community maintains ownership of the expensive base asset and companies can conduct their business freely on a shared infrastructure.

There is a very natural role for councils in essential community networks, which have monopoly characteristics and are long-life, high-cost assets. Over the past few years cities in the region have participated in urban fibre networks that have mainly serviced their CBD areas. For Hutt, Upper Hutt and Porirua, this has been undertaken by SmartLinx3, and in Wellington City by CityLink, which was originally part-funded by Wellington City Council but has been a private sector company since the late 90s. Kapiti and Wairarapa are part of the planning for broadband going forward.

6. Resource management processes

Resource Management Act processes are regularly cited as hindering telecommunications infrastructure investment, particularly the differences in rules between councils. While this is probably overstated, it is does need attention across a wider perspective that includes rules for greenfields and brownfields developments, and conditions for use of existing assets like unused pipes.

Accordingly a process to develop a common approach to RMA processes and council policies in this area is currently being developed

7. Deployment Methodologies

Investigations are currently being undertaken to determine the cheapest and most effective method of deploying broadband fibre.

7.1 Using Council Assets

7.1.1 Stormwater pipes

Technology has been developed that can enable fibre cable to be deployed within existing pipes – such as water, stormwater and sewerage. Mechanical equipment is used to feed the fibre through the pipes and attach it to the “soffit” (ceiling) of the pipe, or it can simply be laid loose in the bottom of the pipe if only water is passing through it.

7.1.2 Sewerage pipes

The sewerage system is used in some parts of the world for fibre deployment with examples in Europe, the USA and Scotland. However the sewer poses many challenges and so needs to be suitable.

7.1.3 Abandoned pipes

Wellington City Council has over 100 kms of abandoned or decommissioned pipes that could potentially be used as ducts. Investigations have shown that about 3-5% of proposed new underground fibre deployment could use abandoned pipes. It is not known if these pipes are in a suitable condition for use. Using abandoned pipes can sometimes create more challenges and costs than they solve.

7.1.4 Under kerb deployment

Underneath the kerb and 300mm of footpath and carriageway on either side is prohibited for use by utility companies by most councils. For this reason the area is free of other utilities and may have some possible uses with fibre. Some possibilities are to use this

area when kerbs are being replaced. Or microtrenching may be possible where the kerb meets the footpath.

7.1.5 Lighting poles, buildings and water tanks

Councils have pricing policies for using road reserves and assets such as lighting poles, traffic lights, buildings and water tanks for telecommunications infrastructure. It may be possible to run wire up through the hollow lighting poles to a small transmitter for providing last mile broadband service. However each pole would need a recharging battery as power is only supplied to the lighting poles at night time. The cost of supplying power to the light poles 24 hours a day would be a cost that would probably need to be met by Councils and reflected in access charges.

7.1.6 Trolley bus wires

Trolley bus wires have been used extensively by CityLink since 1993. It has successfully provided low cost deployment although adds to the visual pollution of the wires above the city.

7.2 Deployment Technologies

7.2.1 Micro-trenching and sawcuts

Saw cutting is very narrow micro-trenching (10-12mm), where the cable is directly buried in the sidewalk or street asphalt. Current standards in Wellington City do not allow this kind of trenching although it may be possible in Porirua. The standard minimum depth requirements for mains are 600mm under carriageways and 500mm under footpaths and berms.

Laying the fibre in the "sweet spot" in the road surface just above the road base is harder than it might seem because the depth of the road surface can vary by as much as 20cm over time as roads are built up during repairs, and then milled down and resurfaced.

The cost is roughly a half to quarter of traditional trenching costs with the added benefits of faster surveying and permit procedures. Using this method, a crew can lay as much as a 300m of fibre per day reducing road closure time. US experience shows that a typical micro-trench from planning to completion is around 50 days, compared with 160 days from traditional techniques.

Micro-trenching is making inroads into North America and parts of Europe. In some places it has been used for the last mile, but in other areas it has also been used for backhaul. There are concerns that micro-trenching is not suitable for urban networks that require ease of taking off separate cables.

The code of practice of utilities access to road and rail corridors does not cover micro-trenching as it is focussed on traditional trenching methods. However the regulatory framework established by the code could accommodate micro trenching.

7.2.2 Shallow trenching

Shallow trenching is generally a 400mm deep trench of which 100mm is used for ducting and 300mm for cover. At peak performance around 700m can be completed in a day, although 400m is more common.

There are some sophisticated machines that enable rapid deployment of fibre reinstating the surface as they go. Ground-penetrating radar identifies buried utilities under the road surface, which is added to mapped information. The machines are able to precisely follow a demarcated route. Some machines have a suction function that allows for the evacuated material to be vacuumed from the trench. The waste material is then stored on the vehicle.

While the trench is being dug cables or ducts are laid, and then a backfill mix that solidifies quickly and remains flexible and pickable. Asphalt is then laid on top of this to renew the road's surface.

The technique is widely used in Europe in all parts of cities.

7.2.3 Directional drilling

Directional drilling can be used to drill under the road surface. Conventional trenches are cut at intervals with a machine drilling between the sites. Where the technology is suitable, directional drilling typically accounts for 80% of the distance and conventional trenching for 20% of the distance. It has been used in CBD Auckland and Christchurch as well as in suburbs.

It requires reasonable soil conditions such as those found in the Hutt Valley and Masterton. Kapiti is likely to be too sandy, Wellington too rocky. Directional drilling is about a third to half the cost of conventional trenching.

7.2.4 Moleploughing

Moleploughing is a simple, low cost technology used widely in rural deployment. The mole ploughing blade is pulled through the ground, cutting a channel of the required width and depth. The box chute is attached to the blade which enables the cables to be laid directly into the channel along with the sand surround and the specified system of protection. Due to the narrowness of the channel the ground closes in after the box. Moleploughing works well in arable soils. The cost of deployment is about $20/m.

7.2.5 Wireless

Wireless can be an intermediate bridge to a fibre future. It has a permanent place for some rural solutions, although 5% of the remotest citizens in New Zealand will still need to rely on satellite. It may also have a permanent place in providing mobile solutions in urban areas.

There are competing wireless technologies that have small differences. Some go point to point, others like WiMax go point to multipoint. For economical transmission to communities WiMax is gaining popularity. WiMax is theoretically capable of broadcasting

to a 30km range however there is a significant drop off in performance the more customers are on the system. In practice it is better to look at a 2km range in urban areas.

The viability of installing WiMax improves with the height of the tower. The companies can remain within the RMA at the height of the lighting pole plus 3m. This is a height of about 14m, but companies would prefer to install equipment on 20m towers. This provides a greater range and keeps it clear of trees and other obstructions.

Council buildings, water tanks and other assets can be good options for installing wireless transmission equipment. Where possible it is also desirable to share cellphone towers with other telcos. These can be complex negotiations because there is some competition between the companies and technologies.

Wireless always needs backhaul which is best provided by fibre, if it can be obtained economically. While microwave can be used it is not robust in differing weather conditions nor readily scalable.

7.3 Working with partners

7.3.1 New Zealand Transport Agency

New Zealand Transport Agency (NZTA) has stringent requirements for deploying cables on highways. Trenches need to be 1.5m deep under the road way and 1.0m deep under the berm. Traffic management requirements are extensive and expensive as these are high usage arterial routes.

However NZTA is keen to work with utilities to reduce the cost and disruption. NZTA can cost share to build new ducts but it cannot rent duct space. Although it is unwilling to share fibres it will share duct which it charges at a nominal annual fee.
They are installing cameras and electronic signs along high usage routes to help with traffic management. The UK has number plate recognition software which they use to calculate the average speed of traffic and respond to any disruption. This technology will be used on

the new ALPURT B2 - Northern Motorway Extension Project to collect a toll. Over time there will be an increase in the need for broadband access along major highways.

NZTA contacts utility organisations when it is planning to dig up the road or it seeks partners to cost share when it plans to lay fibre. For example, NZTA is keen to lay fibre along Highway 58 which will come under traffic pressure if Transmission Gully proceeds, as well as on the Paremata roundabout to Johnsonville route. They have approached five organisations seeking joint investment in fibre along these routes.

Increasingly NZTA is establishing principles that utilities must take the opportunity to work on their infrastructure while the road is open, or wait up to 10 years for the next opportunity. They are also taking a lead in encouraging collaboration. While the roads are open NZTA is requiring contractors to install ducts such as the current work at the Dowse Interchange.

7.3.2 FX Networks

FX Networks obtained a long term lease from OnTrack for its fibre optic cable along railway lines. The pipe was installed by NZ Rail, as it used to be called, two decades ago. The company has used this as a spring board to provide high capacity backhaul between urban centres throughout the North Island, with points of presence in major cities in the South Island.

The company is upgrading its fibre from Wellington. It is in the process of using the rail network to build capacity from Upper Hutt to Palmerston North via Masterton. In 2009 the company plans to begin a programme to upgrade its fibre along the west coast from Wellington to Palmerston North.The Johnsonville rail line is currently in a major upgrade. It is likely to be 2010 before the route is available for laying fibre. Railway lines inside urban centres are not generally ideal for an urban network as there can be significant costs getting the fibre out of the rail corridor.

7.3.3 Transpower

Transpower have major requirements for providing broadband to manage their high-voltage electricity transmission grid. In the Wellington region Transpower have new requirements with wind power sources being developed at Makara and are in a resource consent process for a wind farm at Ohariu. Resource management consent for power lines requires a separate consent if it is to be used for other uses such as telecommunications.

7.3.4 Power companies

Power poles are potentially a low cost deployment option for fibre. Along with trolley bus wires, this is arguably the cheapest way of deploying fibre. The National Government has expressed interest in using this network as an option for rolling out broadband, including moving towards their vision of fibre to the home.

There are some challenges with using power poles. The companies generally require a meter separation between the power and fibre services on the pole. This can mean that the fibre hangs too low over roadways and driveways. The fibre is an additional weight and wind drag on the (often aging) poles. Most councils are seeking to get aerial deployment underground to eliminate the visual pollution. However modern fibre is lighter than the original heavy cables used by companies such as Saturn and coloured grey rather than black which goes some way towards reducing the physical and visual impact of these deployments. Nonetheless the fibre casing needs to be of a heavier grade than that put underground to withstand the elements.

Aerial deployment is considered to have about half of the life of underground deployment and be more prone to breakage. However FX Networks and CityLink that have both forms of deployment have found they have had fewer problems with their aerial deployment although neither company has deployed fibre for longer than 15 years.

The backbone for an urban deployment needs multiple fibres in separate casings that can be easily split off from the main line.

7.3.5 Chorus

Chorus is deploying 3,600 roadside cabinets and 2,500 kilometres of new fibre optic cable nationally as part of their legal commitment to enable the delivery of broadband connections between 10Mbps and 20Mbps to 80% of New Zealanders by the end of 2011. This work is being done in conjunction with exchange technology upgrades by Telecom to benefit towns with 500 or more phone lines. The result is that customers within about 2km of these new cabinets should be able to connect at the faster ADSL2+ speeds.

With local loop unbundling, this enables other companies to add their equipment to road side cabinets to access the local loop and the fibre backhaul capacity put in by Chorus. Companies who have worked with Chorus have publicly complimented them on the ease with which they have been able to deploy equipment into their cabinets and exchanges.

8. Benefits

The Wellington region sees the opportunity for an affordable open access duct and fibre network to the MUSH sites as creating a number of benefits for the region:

- Enhancing the quality and performance of education, health, e-governance and public service;
- Enhancing business success in the region especially in the film, media and IT services sectors that are key parts of the Wellington regional economy;
- Fostering innovative business developments in the weightless economy;
- Future proofing the region to prosper with reduced affordability of transport;
- Significantly lowering the barrier-to-entry for new telecommunication service providers;
- Providing a fibre infrastructure backbone for the region such that ultimately affordable broadband will no longer be a constraint on private and public sector performance.

The spread of such a network will result in significant opportunities to access key public users (MUSH sites), large high-value users, many smaller businesses and existing points of connection such as exchanges. These commercial opportunities are recognised by our likely private sector partners and give us confidence that a sustainable and successful business model can be developed.

We see a range of other strategic projects aligning with and contributing to this project, such as the Wellington Loop Project and community initiatives that utilise high-capacity communications.

By working closely with other public sector organisations, and those with a community interest, we expect to be able to deliver on a range of additional objectives such as shared base level infrastructure which means potentially less disruption to roads from trenching and less visual pollution from overhead wires.

8.1 Rural

Schools are a top priority for fibre connectivity in rural areas. Apart from the obvious direct benefits in enabling rural schools to deliver high quality education, these institutions are considered critical parts of the rural community. They are often a central part of rural life as places of social interaction and community building. Other examples of the benefits of high capacity communication are:

- Commercial benefits for farmers and lifestyle block owners who can receive up-to-date information, communicate with their customers, and participate with health care possibilities like remote monitoring and diagnosis;
- The ability to communicate remotely rather than travel producing time savings and reducing pressure on roads overall, services that enable people to live and work in rural communities therefore maintaining the viability of those communities.

9. Costs and Funding

The current government has made a commitment to funding broadband throughout the country. The Wellington Region Broadband Plan is based on the assumption that Government funding in this area will be significant and on-going.

The total build cost is yet to be finalised but will be in the tens of millions. A significant portion of this will be sought from the Broadband Investment Fund and private sector investors are expected to be major contributors.

10. Uptake Strategy

Broadband uptake demand scenarios and anticipated levels of usage Statistics New Zealand's Household Use of ICT survey December 2006, indicates that the Wellington region has a relatively high take up of broadband by New Zealand standards, with 38.3% of households having it, a level of uptake second only to Auckland region. Cost appears to be the primary issue holding back further uptake

Councils in the Wellington region have used a variety of research tools to understand stakeholder demand for enhanced broadband service, including:

- Region-wide surveys of broadband provision, uptake and use with a gap analysis quantitative market research of MUSH entities, consultation with major users, industry groups and stakeholders;
- Demand curve analysis;
- Focus interview groups;
- Expert interviews;
- Direct experience with the impact of public broadband investment;
- Extensive secondary research into experiences in other markets.

Grow Wellington conducted broadband studies in three Wellington areas – Tararua and Wairarapa Districts; the Horowhenua and the Kapiti Coast Districts; and the four cities in the region (Wellington, Porirua, Hutt and Upper Hutt). These studies were a gap analysis between broadband provision, uptake and use by industry, sectors, and geographic areas.

These three studies identified areas of significant need. Examples are significant business users and high capacity public sector users such as secondary schools. Rural examples include the film/creative sector on the Kapiti Coast, businesses between Waikanae and Otaki, tourism and hospitality businesses in semi rural Wairarapa and Kapiti, and some schools still on dial up access.

The purpose of an Uptake Strategy is to increase the demand for broadband in the region across the economy using a balanced set of initiatives that are aligned to the central government Broadband policies and programmes. This work is being carried out by Grow Wellington to ensure that demand for broadband is intrinsically tied to economic growth activities ranging from internationalisation of business (exports) as well as fundamental improvements to efficiency and effectiveness.

The work in progress is organised around three broad types of organisation reflecting their natural economic and decision-making disposition.

10.1 MUSH[5]

The MUSH entities in the region offer real opportunities for the aggregation of demand and consequent increase in broadband use. Grow Wellington is engaging with the key demand stakeholders in this group namely:

- The central government Joint Procurement Group (under the aegis of the State Services Commission);
- Ministry of Health;
- Ministry of Education;
- The Independent Practice Associations (e.g. WIPA/Compasshealth);
- Kiwi Advanced Research and Education Network (KAREN);
- Government Shared Network (GSN).

[5] Municipalities, Universities, Schools and Hospitals (MUSH). This group is also referred by the central government in its BIF programme as the Key Public Users (KPU).

a. Within this group are schools and PHO's who are clearly the centre of attention at the moment – nationally
b. Local Government (Municipalities) are being urged to demonstrate their leadership through appropriate and rapid adoption of Broadband

10.2 Service Providers[6]

Service providers are important to the objective of driving more investment and competition. In particular a significant increase in backhaul capacity would open up possibilities for new and better services to end use customers.

Grow Wellington will focus on the service provider part of the market with the aim of working closely with these companies as a network is established. Grow Wellington's work programme is being developed in the backdrop of ongoing dialogue that has occurred over the last 12 months between these operators and WCC.

10.3 Business[7]

As per the Wellington Regional Strategy, Grow Wellington focuses on five business sectors. Work with this group of organisations will leverage and piggy back on the business as usual work of the Grow Wellington sector managers.

Broadly speaking the work will focus on these fronts:

1. Using successful and innovative regional exemplars (e.g. Wellington LOOP) to kick start individual firms into thinking about doing business differently. Leveraging and aligning the work of the Digital Development Council (DDC) in working through a series of programmes in this area. In particular, the intent being to attract some pilots to be run in the region;

[6] Service Providers, e.g. Mobile service, Internet service, Virus and Spam control, blocking, mail archiving, network storage and so on. Collectively can be said to represent the regions foray into Cloud Computing.

c. Major – such as Vodafone/iHug and Kordia/Orcon
d. Minor – such as Farmside, Actrix and Xero
e. Emerging – such as PlanHQ

[7] Business sectors, the WRS focus sectors of food and beverage, manufacturing, film, education and primary sectors

2. Use other Grow Wellington programmes (e.g. Creative HQ) and allied regional initiatives (e.g. Unlimited Potential) to advocate and proselytise greater, innovative and aggressive use of real Broadband.

11. Conclusion

The Regional Broadband Plan is focused on realising the Wellington Regional Strategy aspirational Broadband intent for the region. In doing so it will leverage and align with national strategies, programmes and initiatives via an active, regular and intensive dialogue with all the organisations involved in this area.

APPENDIX 1

Definition of Key Terms

Abandoned pipes – water, sewer and stormwater pipes that may be potentially useful in laying fibre ducting.

Active Opto-Electronics – are electrical-to-optical or optical-to-electrical transducers which convert one type of energy to another for information transfer. Network service providers install these electronics to 'light up' the dark or passive fibre.

ADSL (Asymmetrical Digital Subscriber Line) – This is the most common fixed connection for broadband and it uses the existing copper lines. It enables faster data transmission over telephone lines than a conventional dial-up modem can provide. The asymmetric nature of the connection means that the downstream speed is faster than the upstream speed.

ADSL 2+– extends the capability of basic ADSL by doubling the number of downstream bits. The data rates can be as high as 24 Mbps downstream and 1 Mbps upstream depending on the distance from the DSLAM to the customer's home.

Anchor tenant – a privately owned network, with the city agreeing to become the anchor tenant by agreeing to buy a minimum annual level of services. The city grants the private company use of public assets and also agrees to be a major customer of the network (an anchor tenant). In exchange the city is compensated for use of public assets. The agreement contains a public benefits section that may include a share of revenue or limited free access to the network.

Backbone network – transports massive volumes of data traffic around cities, and between cities and countries. There is no single backbone network, rather many networks in which service providers exchange traffic with other providers.

Backhaul – the process of transmitting data from multiple dispersed points (e.g. households, businesses, cell phone towers) to the central telecommunications network, usually using fibre cables.

Bitstream capacity – the provision of transmission capacity (upward/downward channels may be asymmetric) between an end-user connected to a telephone connection and the point of interconnection available to the new entrant.

BOOT Model (Build, Own, Operate, Transfer) – a model of private ownership where a council could give a contract to a successful bidder to build own and also operate the network. After 10 years (or a set time) the ownership would be transferred back to the council.

Broadband – a generic term for infrastructure that allows communication and connection to the internet – 'high capacity' and 'high speed' refer to much the same thing, as communication across a network relates to a flow of data.

Cabinets/ Cabinetisation – cabinets containing telecommunications equipment can be installed on kerbsides. Makes wireless internet access easier.

Copper local loop – the last few hundred metres of copper wire cables.

Duct network – a network of underground plastic pipes that provide a right-of-way in the road corridor and through which fibre optic cables can be passed.

High speed broadband – a broadband service which delivers data at rates capable of supporting next generation services, such as interactive video, broadcast-quality television and videoconferencing. This is usually at speeds greater than 1.5 megabits per second (Mbps)

Incumbent – a term used to describe existing companies often first established as regulated monopolies.

JV (Joint Venture) – is an entity formed between two or more parties to undertake economic activity together. The parties agree to create a new entity by both contributing equity, and they then share in the revenues, expenses, and control of the enterprise. A possible ownership model that councils could consider.

Layers – a council can have ownership and intervene at different levels of network infrastructure (i.e. layers). Possible ownership levels are at Layer 0, Layer 0 +1, Layer 0+1 + 2, and Layer 0+1+2+3. As we move up in the layers, the control a council could exercise over the network increases and so do the risks.

Local loop unbundling (LLU) – opening the final few kilometres of copper cabling, from the telephone exchanges to each house or premises, to competition so that any telecommunications company can run its services over the copper wires.

Mbps (megabits per second) – a measure of data transfer speed. (A megabit is equal to one million bits).

Micro-trenching – a method of deploying fibre underground. Undertaken by a large machine that is able to create a trench approximately 100mm wide, lay a duct in it, and then reseal the road.

MUSH Backbone – (Municipalities, Universities, Schools and Hospitals) a backbone fibre connection that would connect all entities such as primary and secondary schools, hospitals, medical centres, libraries and pools, service centres, community centres; university sites and research entities, CRI locations; and other community facilities such as fire stations and civil defence centres.

Next Generation Network – a packet-based network able to provide services including Telecommunication Services and able to make use of multiple broadband, Quality of service-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It offers unrestricted access by users to different service providers. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users.

Node – being the first aggregation point for telephone lines from end-users' premises – usually a roadside cabinet or local telephone exchange. Extending fibre to the node allows higher broadband speeds (even though it does not extend all the way to the premises) because its performance does not decline as steeply over distance as does copper's.

Open Access – a system that allows any telecommunications operator to provide its services and applications over the broadband infrastructure – including the backbone, and the connections to each home or premises. This is in contrast to vertically integrated systems where the owner of the infrastructure can restrict who runs services over it and therefore prevent competition.

Open Access Symmetrical Provision – as above

Overheading – cabling that can be attached to overhead infrastructure like power lines. By far the cheapest deployment method, however not a long-term solution.

PPP – ‘Public Private Partnership’ a model of ownership.

Rights of Way (ROW) – Council's right of access to areas e.g. ducts

Saw Cutting – a method of deploying fibre underground. Very narrow micro-trenching (10-12mm), where the cable is directly buried in the ground.

SMEs – small and medium- sized enterprises

UFN- (Urban Fibre Network) – a conduit that provides a path for electronic data between buildings and organisations within the urban area. It is an enabling tool to allow an increased volume of data to flow at a faster speed. Urban fibre networks are quite common throughout the world, usually with a substantial amount of central or local government funding involved.

Undergrounding – burying cables in the ground. A long term favoured solution.

Upstream/upload and downstream/download – this refers to the speed of the broadband connection in each direction. Downstream/download refers to speeds from an external point to your Internet connection. Download is typically faster than the upstream speed (from your Internet connection out to the rest of the Internet).

Wi-Fi – describes the generic wireless interface of mobile computing devices, such as laptops in local area networks. A person with a Wi-Fi enabled device such as a PC, cell phone or PDA can connect to the Internet when in proximity of an access point. The region covered by one or several access points is called a hotspot. Hotspots can range from a single room to many square miles of overlapping hotspots.

WiMAX – Worldwide Interoperability for Microwave Access, is a telecommunications technology aimed at providing wireless data over long distances in a variety of ways, from point-to-point links to full mobile cellular type access.

Wireless – a term used to describe telecommunications in which electromagnetic waves (rather than some form of wire) carry the signal over part or the entire communication path.