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ME HEKE KI PŌNEKE
WELLINGTON CITY COUNCIL

STRATEGY AND POLICY COMMITTEE
10 APRIL 2008

REPORT 1
(1215/52/IM)

WELLINGTON BROADBAND PROJECT

1. Purpose of Report

To report back on the broadband work programme agreed on 1 March 2007, and recommend next steps in an implementation plan for the Broadband Vision agreed by Council - for high speed, affordable and ubiquitous broadband.

To achieve this, the report includes:

- Further quantitative and qualitative analysis of potential broadband benefits for Wellington City;
- An update on recent developments in the NZ telecommunications sector and the impact on this project;
- Results of a Request for Concept process and ongoing dialogue with stakeholders;
- The rationale for Council intervention in the broadband market;
- Discussion of ways in which Council could achieve public good objectives and drive investment and competition in the broadband market;
- Recommended next steps in four key areas: policy changes; establishment of a duct network; advocacy to government; and preparation of a business model for direct investment in an urban fibre network;
- A communication and consultation plan.

2. Executive Summary

By adopting a clear vision for high speed, affordable and ubiquitous broadband[1], the Council has recognised the critical importance of telecommunications infrastructure to our modern, knowledge-based economy. New, resource-hungry methods of communication are now an integral part of people's lives. High capacity broadband is widely recognised as a key enabler and is expected to bring significant benefits in areas such as innovation, productivity, and health and education delivery.

[1] A note on terminology – please see **Appendix 1** for definitions of key terms.

Wellington City needs to rapidly improve access to fast, affordable broadband to overcome the disadvantages of its remoteness from the world and maintain competitiveness. Although more investment is happening, it is not expected at a rate that will maintain a competitive position. This assessment takes account of recent regulatory changes and investment announcements by existing providers.

A range of technologies are capable of delivering high capacity broadband. Although wireless will play a part, deployment of optical fibre deeper into the local access network is required, to the roadside cabinet and eventually to customer premises.

The Council has a number of tools that could influence this situation, such as:

- Direct investment in infrastructure provision, as it does for other essential networks;
- Changing policy settings to facilitate investment, for example making assets available or relaxing regulatory controls;
- Advocacy to government for targeted investment that is consistent with Council actions.

These options are examined in more detail in the paper and a way forward recommended for each.

To assist with this decision-making a set of principles for the Council's role are proposed, including intervening to the least extent necessary; promoting shared open access infrastructure; and prioritising social and community benefits, followed by "transformative" economic development benefits. Since the Council is already a significant provider of network infrastructure and community assets, there are possibilities to leverage this ownership and expertise.

The challenge then, is to catalyse and accelerate new investment, particularly in fibre, and provide mechanisms for greater sharing of base-level infrastructure, without distorting the market or pre-empting private sector investment.

Four key areas are proposed:

(1) Policy changes – making Council assets available free or for nominal charge, and conducting a shallow and/or micro trenching trial which would be reviewed for wider applicability on completion – in both cases for deployment of open access broadband infrastructure.

(2) Progressive establishment of a Council-owned duct network, subject to approval of full costings.

(3) Advocacy to government for funding support, and for any new trans-Tasman fibre optic cable to land in Wellington.

(4) Continued development of a business model for possible direct Council investment in an urban fibre network.

Agreement is sought for the parameters that would guide the Council's role, and proposals for each of these four areas.

3. Recommendations

It is recommended that the Committee:

1. *Receive the information.*
2. *Note the Vision for high speed, affordable and ubiquitous broadband agreed on 1 March 2007, and the agreement that Council will have a role in facilitating provision of broadband infrastructure and developing demand, with further work to be undertaken on options for implementing the vision.*
3. *Note that in the ensuing months:*
   a. *A Request for Concept has been issued, 24 responses received, and this information has been used to:*
      i. *confirm initial policy analysis of the broadband area;*
      ii. *identify ways in which WCC could facilitate progress towards its broadband vision;*
      iii. *identify potential strategic partners through assessing their credentials and future plans.*
   b. *Regular discussions have been held with these partners and with public sector stakeholders.*
   c. *A policy framework has been developed to address issues including:*
      i. *low cost deployment methods (e.g. shallow trenching, aerial);*
      ii. *possible District Plan changes;*
      iii. *use of abandoned pipes and duct installation; and*
      iv. *greenfields and brownfields development.*
   d. *A detailed financial model has been prepared to assess the merits of various options including possible direct Council investment in fibre infrastructure.*
4. *Agree that the parameters guiding the Council's role in delivering the broadband vision for Wellington City will be to:*
   a. *intervene in the broadband market to the least extent necessary;*
   b. *encourage electronics and services competition (competition at layers 2 and 3) not infrastructure competition (layers 0 and 1);*
   c. *focus on initiatives that help deliver social and community benefits, as well as "transformative" economic development benefits;*
   d. *leverage ownership and management of Council assets in a way that balances Council objectives, such as those above, with others*

such as visual amenity, construction disruption, and effective management of infrastructure assets;

e. *leverage Council's existing expertise and experience in management of Rights of Way (RoW) and infrastructure networks, including their construction, operation and maintenance using an outsourced approach.*

5. *Agree to the following key changes to advance achievement of the Council's broadband Vision:*

   a. *Making Council assets such as buildings, light poles and unused pipes and ducts available for nil or nominal charge for deployment of open access broadband infrastructure.*

   b. *Conducting a micro and/or shallow trenching trial, for deployment of open access broadband infrastructure, which would be reviewed for wider applicability on completion.*

   c. *Progressive establishment of a Council-owned duct network, subject to detailed costings being brought to Committee for approval.*

   d. *Advocacy to government for funding support, and for any new trans-Tasman fibre optic cable to land in Wellington.*

   e. *Continued development of a business model for possible direct Council investment in an urban fibre network.*

4. Background

4.1 Council's ICT Policy and Broadband Vision

This development of the Broadband Vision flows from the Council's Information and Communications Technology (ICT) Policy, adopted in June 2006. The Policy sets out a Council position that:

> "electronic information processing technologies including the internet, cellular, digital and wireless technologies have the ability to enhance enable the city's economic development, contribute to the well-being of the community, and enhance and increase engagement in local democracy".

The Wellington Regional Strategy has identified broadband as a key enabler of economic growth and one of seven priorities.

On 1 March 2007, Strategy and Policy Committee (SPC) adopted a Vision for high capacity broadband connectivity -

> "That, by 2012, all of Wellington City will have affordable access to an interactive and open broadband network capable of supporting applications and services using integrated layers of voice, video and data, with sufficient two-way capacity in the city, and out to the world, to meet the ongoing information and communications needs of the city's residents, businesses, investors and institutions."

- and agreed a key role for Council in developing and owning an implementation plan for the community to achieve it.

A key rationale underpinning Council involvement is that incentives are weak for the level of private sector investment needed to deliver these outcomes. The underlying driver is the high cost of base-level infrastructure and the division of investment across multiple providers. In the face of rapidly rising demand this has resulted in multiple, inadequate networks, in terms of capacity and/or coverage.

4.2 Benefits of Broadband – an Update

The evolution of new communications technologies has been very rapid, and quantifiable evidence of its impact has only been emerging over the past few years. Ongoing research and feedback has reinforced officers' assessment in the 1 March 2007 report to SPC – that there is an international consensus on the benefits of broadband infrastructure and its importance for cities that wish to compete globally.

High quality broadband infrastructure enables economic development and increased productivity, transforms the delivery of many social and health services, and facilitates 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 international air travel through the use of telepresence (very high definition) video conferencing.

A significant body of research now exists which has analysed these benefits and impacts. Some, such as productivity improvements, are readily quantifiable, and others, such as the benefits of increased e-democracy, relate more to wellbeing and quality of life and are therefore difficult to put a monetary value on. The wide range of positive economic, environmental, and social impacts that can be achieved through high capacity broadband infrastructure are mapped in **Appendix 2**.

4.3 National and International Broadband Projects

Over the last year the number of cities and regions in New Zealand and around the world addressing broadband infrastructure has continued to grow. The approach taken has varied depending on the specific dynamics of each market and the ownership and regulatory changes that have led to their current environment. Privatisation of major telecommunications providers was common in advanced countries through the '80s and '90s. However because of concerns over the pace of new investment, most jurisdictions are considering or implementing a more active role for the public sector, through regulation, policy settings or direct investment.

This confirms the earlier assessment that this is an important area for the Council to be involved in, and a number of projects elsewhere have been analysed to ensure best practice is being followed. A summary is contained in the **Appendix 3: National and International Broadband Projects**.

4.4 Developments in the NZ Telecommunications Sector

Recent developments in the New Zealand telecommunications market beg the question of whether they are sufficient to deliver the type of broadband benefits described above. They have been assessed for their impact on achievement of Wellington City's Broadband Vision. A wider picture is presented, but three of the critical ones are the operational separation of Telecom, local loop unbundling process (a significant regulatory change to force sharing of infrastructure), and the recently announced plans for additional investment by Telecom.

4.4.1 The Digital Strategy Refresh and central government policy changes

The Digital Strategy is the government's plan to realise the full potential of new technologies. It deals with physical infrastructure, the services that run over it and the skills and confidence of the community in using it. In 2005 the Strategy included a contestable seed fund to implement different initiatives around the country, which included $17.9m for infrastructure and $17.4m for community based projects. 5 out of 11 metro areas received infrastructure funding and are currently implementing urban fibre loops (see **Appendix 3** for details). Wellington City received $414,000 of community-based funding for the Loop Project to connect six inner-city schools.

The Government is undertaking a refresh of the Digital Strategy that started last October in Auckland with the Digital Strategy Summit. The first draft of the updated Strategy will be released soon and the final in June to guide development over the next 2 to 3 years.

4.4.2 Telecom

Major changes since this was last reported on are:

- **Operational separation of Telecom**: The release of Telecom's Undertakings for Operational Separation in accordance with a determination by the Minister under the Telecommunications Act 2001.
- **Local loop unbundling:** The Commerce Commission has released its determination of standard terms for access to Telecom's copper local loop
- **Telecom investment plans:** Telecom's late 2007 announcement that it will invest $1.4b over five years in its network including building fibre to 3,500 roadside cabinets. The plans are binding under the Act and specific construction must be nominated two years in advance (see **Appendix 4** for Wellington City cabinetisation details).

These developments should have a positive impact on broadband speed and price by increasing competition in areas where it has been limited and by building higher capacity infrastructure. However, even in total they will only result in a modest increase in performance in an environment of rapidly increasing demand (refer to **Appendix 5** for details of testing referenced).

This type of regulated sharing of infrastructure is a sensible step for New Zealand, but is counteracted by drivers for the dominant provider to leverage their position. They can do this by investing only enough to maintain that position and by rationing capacity.

A recent report by Internet NZ offers the following opinion:

> "The rapid cabinetisation and rollout of DSL based broadband by Telecom (at the behest of the government) will deliver early broadband on a near national scale and ensure a reasonable level of capital investment, and has support in many sectors. However, more in depth analysis shows that this may re-establish Telecom's monopoly via the broadband market and may impede competition in the long term, counter to what is required by the legislation. The establishment of the regulatory environment will take many years yet, and Telecom will have moved far ahead by the time the new entrants can see adequate stability in the market."

In five years time Telecom's investment plans will only deliver the equivalent of 10% to 20% of the download speeds and 1% to 2% of upload speeds that parts of some countries such as Japan, France, Germany, and South Korea are achieving today.

It is therefore the view of Council officers that, even under the best possible scenario resulting from the implementation of the telecommunications operational separation provisions and rapid execution of Telecom's investment plans, there will still be a gap in the Wellington market for broadband in the medium term i.e. until approximately 2013 at the earliest.

4.4.3 Other telco investment

Other telecommunications providers have significant investment plans, or have indicated their likely approach if all the announced initiatives run to their stated dates – in that situation the broadband situation in Wellington will certainly improve. However the critical question is whether this will achieve the Vision that the Council has adopted. The assessment of officers is that it will not, which is consistent with central government acknowledgement that investments are required beyond cabinetisation and this is being reflected in policy work on the Digital Strategy refresh.

Finally it is clear that major wireless operators such as Vodafone, NZ Communications and Kordia are all looking for open access broadband as they aspire to be full service competitors to Telecom. This translates into further latent demand for the type of intervention that the Council is being asked to support.

5. Achieving the Council's Broadband Vision

5.1 Development of an Implementation Plan

In March 2007 the Strategy and Policy Committee instructed officers to undertake further work across a number of areas to explore potential roles for Council including:

a) Issuing a Request for Concept document to engage potential industry partners in developing implementation options for the vision.

b) Undertaking continuous dialogue with potential industry partners and relevant business, government and community sector stakeholders.

c) Consulting with the community.

d) Considering policy changes that could be made.

e) Researching the economic, social and environmental benefits of broadband for Wellington.

f) Surveying MUSH entities (Municipalities, Universities, Schools and Hospitals) to estimate willingness to pay, future demand and affordability to pay.

g) Developing a financial model to determine viability and establish critical success factors.

Of these, d) and e) are reported on elsewhere in this paper, and the balance below.

5.1.1 Request for Concept process

At the end of April 2007 the Council issued a Request for Concept (RfC), designed to elicit information and views from the private sector on:

- their financial and technical credentials;
- existing planned investment;
- appropriate business models and financing options;
- technical implementation options; and
- the role of the Council and other stakeholders in achieving the Council's broadband objectives.

24 detailed responses were received from a mix of network operators, potential investors or anchor tenants, wireless providers, technology partners, network constructors and consultants. This included all the major existing infrastructure owners. A significant amount of valuable information was received and formally analysed by a Council Evaluation Team comprising officers and an external consultant. The quality of the responses and willingness to participate was heartening, with several participants providing comprehensive, confidential information about their plans and ideas.

Respondents highlighted the following points, which have been incorporated in further development of broadband options:

- They confirmed the importance of broadband and the need to look for new ways to accelerate investment.

- The need for facilitated access to WCC infrastructure such as street poles and buildings.
- The need for policy changes by Council to accelerate deployment, implementation timeframes and reduce infrastructure building costs.
- The different roles they could play as network integrator, constructor, operator, technology partner, potential anchor tenant, or catalyst agent.
- The way in which each party should contribute, in terms of a public private partnership, according to respective core capabilities and competencies.
- The leadership role the Council needs to play to endorse and promote the network, including promotion on the demand side.
- The importance of anchor tenants.
- The need for private investors to get an adequate return on investment.
- Adherence to a basic principle that if a private sector partner was making a significant investment and taking risk, that entitled them to enjoy any returns that flowed and they would expect a strong influence in the direction of any joint project.
- Some expectation of Council funding to reduce the current investment "gap".
- A plea to maintain a high level of communication and dialogue as options were developed, and avoid a "tendering mode mentality" where discussion was curtailed.

5.1.2 Engaging with key business, government and community sector stakeholders

Stakeholders have been engaged throughout the project for promotion, information sharing and the testing of concepts. The current key stakeholders include the following:

- The Broadband Advisory Group, comprising representatives from TUANZ, Internet NZ, the Chamber of Commerce, and industry experts.
- Potential key stakeholders, including the major incumbents, identified through the RfC process.
- Potential anchor tenants (MUSH entities) such as Capital and Coast District Health Board and the primary health providers they are associated with.
- Central government stakeholders including State Services Commission, Ministry of Economic Development and Ministry of Education.
- Local government partners and a variety of community groups including community associations, Wellington Loop, the Tech Execs, and Senior Net.

5.1.3 Consulting with the community

In 2007 public consultation on the Broadband project occurred through submissions received on the Council's Draft Annual Plan 2007/08 as well as the Residents' Satisfaction Survey.

Draft Annual Plan – As part of the 2007/08 DAP consultation, residents were asked for their feedback on the Council's Broadband vision. 18 submissions were received by the Council regarding broadband and more than 60% were positive about the Council's involvement.

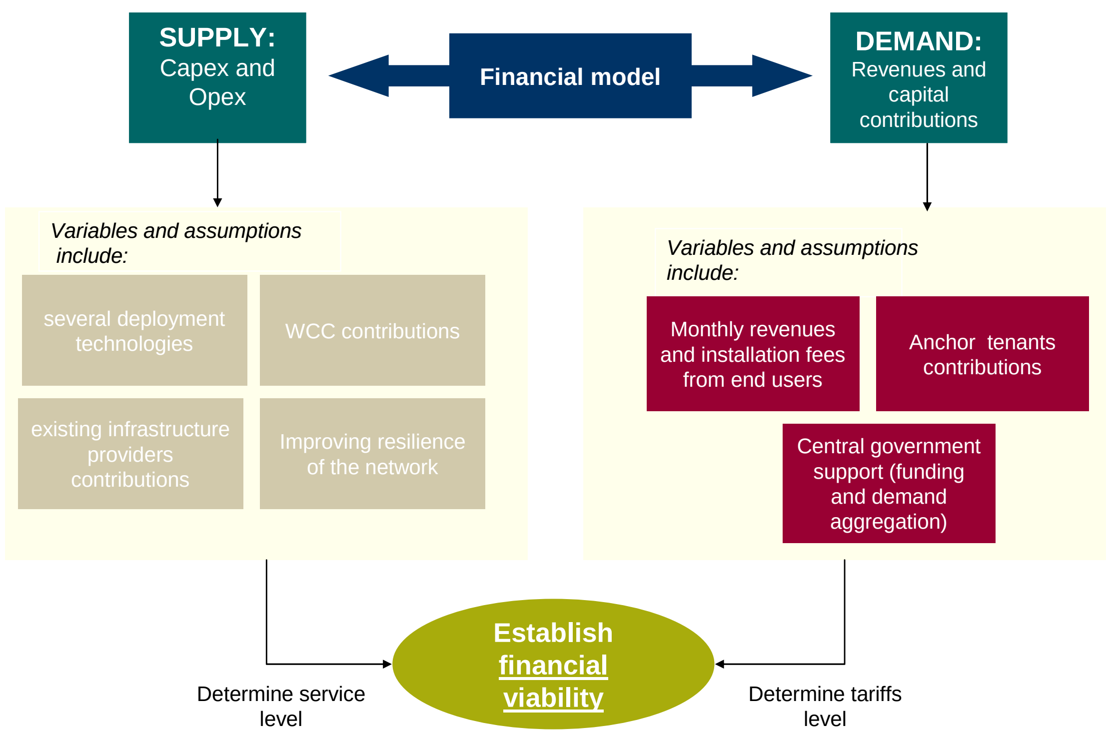
Residents' Satisfaction Survey – A May 2007 telephone survey on the Annual Plan showed 53 percent of residents surveyed were in favour of (17 percent opposed) the Council's involvement in access to affordable broadband.

Note that both of these consultations spoke generally about the Council's possible role in broadband and did not put forward a specific proposal with costs. However a central assumption of the proposed plans for broadband is that be broadly cost-neutral for Council. The plan for communication and consultation going forward is included in section 5.5.

5.1.4 Development of a financial model

A peer-reviewed financial model has been built as a tool to help understand the economics and the viability of the broadband infrastructure market, and in particular an urban fibre network serving MUSH entities in Wellington city. As part of this a survey of MUSH entities was undertaken to determine their willingness to pay for high speed services. The following diagram summarizes financial model components:

Components of the financial model



5.2 Rationale and Parameters for the Council's Role

The justifications for public sector (central and local government) intervention include the need to: address market failure in the areas of insufficient investment and the resulting low level of services offered; ensure equitable distribution of welfare gains; and ensure regional competitiveness.

The knowledge base built from the results of the work described in section 5.1 has fed into development of five recommended parameters for the Council's role in achieving its broadband vision. These have been used to consider the extent to which Council should intervene, and how it should structure any intervention.

These recommended parameters are that the Council will:

1. **Intervene in the broadband market to the least extent necessary** to achieve the vision for broadband in Wellington. Although interventions will focus on infrastructure, Council is also involved in some demand side initiatives and may consider demand aggregation activities.

2. **Focus on initiatives and policy changes** that help deliver the social and community benefits of broadband (i.e. to MUSH-type entities) as well as "transformative" economic development benefits for Wellington. The Council believes that these are most likely to occur when the city's broadband infrastructure is:
   - Open Access
   - Affordable
   - Offers symmetrical connections
   - High speed, removing capacity as a constraint, and
   - Ubiquitous.

3. **Encourage services competition not infrastructure competition,** based on the assumption that shared open access infrastructure is preferable to duplicated closed access infrastructure, allowing the private sector to focus on product and service differentiation and competition.

4. **Leverage our ownership and management of Council assets** across all business units and Council controlled organisations, where this will assist delivering the broadband vision. Other objectives of Council should not be unduly impacted by the use of assets for broadband roll out.

5. **Leverage Council's existing expertise and experience** in the:
   - Management of Rights of Way (RoW)
   - Management of infrastructure networks (i.e. water and waste water,

roads)

- Construction, operation and maintenance of infrastructure using a management contracts, rather than direct provision.

Layer Analysis

The table below explains the layers within a telecommunications system:

Infrastructure Layer	Component of Broadband Network	Role description	Equivalent Road Network component
Layer 0	• Right of way (overhead or underground) • Trenches • Ducts	Providing access to: • Duct or other pipes • Co-location facilities (e.g. cabinets, server rooms) • Aerial infrastructure (e.g. poles, trolley bus lines) • Rights of way (e.g. rail/road reserve)	• Right of way • Road reserve • Poles and holes
Layer 1	• Dark fibre • Radio masts • Light waves	• Dark fibre leasing • Wavelength leasing	• Streets • Footpaths • Bridges
Layer 2	• Ethernet switches	• Own electronics on the end of fibre • Access is supplied to providers as VLANs, ATM or similar technology	• Traffic lights • Signage • Road markings
Layer 3 +	• Voice services • TV and video • Internet Access	• Provides true service to the premises • Ownership and operation customer premises equipment.	• Cars • Trucks • Taxis/couriers

Infrastructure service providers (layers 0 and 1) own passive infrastructure assets which connect end users to the network and interconnect end users with each other. They operate only these base-level assets, and ideally focus on management of them with investment under a utility model with low return over long return cycles. Network service providers supply active opto-electronics to operate on these assets. They deliver bit-stream type services to end users and may or may not have a retail relationship with them. Service providers (also called application service providers) develop and distribute applications across one or more networks.

The principles above imply Council's level of intervention would be most effective at the Right of Way (layer 0) and Infrastructure (layer 1) levels, limiting the duplication of infrastructure and encouraging electronics and services competition from the commercial sector.

5.3 Options for Intervention

5.3.1 A stepwise rollout

Telecommunications networks are clearly large and complex, and they may be some components where market-led competition is appropriate or will deliver desired outcomes. An example is the core CBD, where the density of customers provides sufficient business for multiple high capacity networks to operate[2].

In addition, a staged approach to implementation is likely to be attractive to reduce risk and allow a focus on high-priority public entities. Drawing on earlier thinking, as well as the information provided through the RfC and input from industry experts, a three-stage model is proposed, comprising:

- Promotion of optical fibre deployment deeper into the local access network to provide backhaul capacity and allow linkages to MUSH entities;
- Potentially, **wireless/cellular services** that delivered new services using a backbone network for high capacity connections;
- Further development of **fibre to the home** (FTTH) options at a later stage, probably initially through a pilot[3].

The challenge will be to catalyse and accelerate new investment, particularly in fibre, and provide a vehicle for greater sharing of base-level infrastructure, without distorting the market or pre-empting private sector investment. Clearly, the major areas of community benefit, such as health, education and sustainability, should be a focus. And previous analysis has shown the desirability of this stepwise process to reduce risk and gain the maximum performance from existing infrastructure.

5.3.2 Council role

Broadly speaking, options for the Council include:

1. A purely **advocacy and facilitation** role.

The Council is already involved in this area, through its history with CityLink, CafeNet (CityLink's wireless service in selected Wellington cafes), and promoting a knowledge economy in Wellington. Where private sector providers wish to deploy new infrastructure, Council takes a proactive approach to facilitate this, whilst being mindful of other policy objectives such as disruption to the transport network resulting from road openings.

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[2] Noting, of course, that competition in the Wellington City CBD was accelerated by the City Council's role in the establishment of CityLink in 1995.

[3] In the March 2007 paper, an intermediate step of fibre to the node/cabinet (FTTN or FTTC) was mooted. This has not been separated out as an option in this discussion because of the fundamental differences in economics between single large customers and residential customers. FTTN deployments would need to be considered as part of residential options.

This role will continue and could be strengthened in some areas, such as advocacy to government to accelerate regulatory changes and investigation of new public sector investment in broadband infrastructure. A new trans-Tasman cable has been mooted and one possibility would be to deploy from Sydney to Wellington which would be highly beneficial for the City. In a direct financial sense, Wellington customers could reduce their international access charges, as well as charges for the Wellington-Auckland link. Indirectly, a high capacity connection would increase our status as an important digital hub and location.

Although it is unlikely that the Council would have any financial role in such a cable, it is recommended that the Council advocate strongly to government and potential investors that any new trans-Tasman cable land in Wellington.

Overall, advocacy and facilitation is not considered sufficient alone to achieve the broadband vision without more active intervention. In key areas such as facilitating the sharing existing of infrastructure, the current delivery model drives providers to leverage their infrastructure networks to their own advantage and competitors' disadvantage.

2. **Policy changes and making existing assets available (**at nil or nominal charge).

The Council was perhaps a leader in this area, when in 1995 it made trolley bus wires available at nominal charge to CityLink to set up a high-speed fibre based network in the CBD. Later when new capacity had been established, the Council sold its share (it was one of many shareholders) as the company required more capital to expand and was by then a self-sustaining commercial venture.

Policy changes could include relaxation of the rules around new technologies such as shallow trenching, and requiring new subdivisions to have ducting for fibre.

These options involve little cash cost to Council, but important considerations are the impact on other Council policies and the "fairness" to other providers of making a community-owned asset available for financial gain. It is likely that the possible risks of options like shallow trenching could be limited by requiring deployments under new rules to be for provision of open access services only, which would encourage sharing of base-level infrastructure.

These changes are the major next step recommended for working towards the Council's broadband vision, as they are seen as providing a more attractive environment for additional investment.

3. **Subsidising existing providers** to deliver the services required.

Since Council has identified some key areas of need, a simple measure would be to subsidise delivery of high-speed services to those users. Existing telcos could provide those services, or even invest in some additional capacity against a long term contract.

Unfortunately in an environment where capacity is a scarce resource, it is in the interests of telcos to ration it. Even if the additional capacity is available, profit maximisation incentives lead to constraint in the market through higher prices. This is entirely rational and commendable behaviour from the point of view of a shareholder, who are the group telcos are accountable to, but may not meet the wider needs of the community. So this option is rejected on the basis of not being able to demonstrate value for money

4. Council investment in new, **supplementary fibre capacity.**

This would be a new role for Council, and is based on the need discussed above and market failure to address it. It would take account of the principles for intervention set out in section 5.2. If structured to provide services to, first and foremost, MUSH-type entities, it would be operating in an area of low interest to telcos and where the case for intervention to deliver high levels of public benefits was strongest.

However this option is not recommended at this stage because of the potential for option 2 above to deliver significant new investment, and current government policy around additional broadband funding. Because of the priority given to health and education outcomes, significant support from government would be warranted and this appears unlikely in the short term.

However, continued work on business models is recommended to maintain this option for the future should it be required. And importantly, progressive establishment of a Council-owned duct network is recommended which could be achieved over time at modest cost if done in conjunction with existing works. A duct network would encourage sharing of base-level infrastructure and provide a valuable long-term option for possible Council investment – it would be a necessary component of any urban fibre network.

5.3.3 Proposed approach

From the options above four key areas are proposed:

(1) Policy changes – making Council assets available free or for nominal charge, and conducting a shallow and/or micro trenching trial which would be reviewed for wider applicability on completion – in both cases for deployment of open access broadband infrastructure.

(2) Progressive establishment of a Council-owned duct network, subject to approval of full costings.

(3) Advocacy to government for funding support, and for any new trans-Tasman fibre optic cable to land in Wellington.

(4) Continued development of a business model for possible direct Council investment in an urban fibre network.

These are discussed in more detail below.

5.4 Recommended Options

5.4.1 Policy changes

Overview

As instructed, officers have considered a range of policy options to facilitate broadband development. As always, this involves a balance between Council objectives, such as the trade-off between overhead deployment and the visual impact of these cables. Although adverse impacts should always be avoided as much as possible, the unequivocal reasoning in this paper is that significantly greater weight should be given to the wider benefits of broadband to the city. Conceptually, this is similar to the trade-off made between the benefits of café seating on footpaths and the restriction of pedestrian access.

As stated in the March 2007 report to this Committee, the Council can use its regulatory and policy making roles to further its broadband vision. By either adjusting current rules or policy or creating new ones that enable it to leverage off its property assets and its own or others' network infrastructure, the Council can address the cost of deploying fibre – reducing the cost associated with stand alone trenching (the main deployment method currently allowed by the Council)

The following changes are recommended. Note that overheading, ducting new developments, and RMA process changes, are discussed in more detail in **Appendix 6**, and the balance below. New national telecommunications infrastructure rules (National Environmental Standards for Telecommunications (NES) and the National Code of Practice for Working in the Road) are dealt with in **Appendix 3**.

- **Access to Council buildings and structures** would be made available for nil or nominal charge, providing the services delivered are open access.
- **Laying fibre in existing Council pipes** will be more fully investigated on the same basis as above.
- **Overhead or above-ground deployment** will remain allowable under current District Plan rules, but progressive undergrounding and provision of a single open access cable will be strongly encouraged.
- **Micro or shallow trenching** technologies would be subject to a defined trial to assess benefits and risks, and the trial would only be allowed for open access purposes.
- **Greenfield sites** will be ducted with fibre-optic cable as the standard level of service.
- Further investigation will be undertaken on methods to ensure future-proofing of **new and refurbished buildings**.

- Officers will investigate the establishment of a stronger telecommunications infrastructure team for the **consenting process**, so that a more proactive approach can be implemented.

Use of existing assets

The Council has a current pricing policy around the usage of its property (including road reserve) and assets (including lighting poles, traffic lights, buildings and water tanks) for broadband/telecommunications infrastructure. A critical factor is ownership permission, as distinct from District Plan or other permission (for example under a reserve's management plan).

That ownership permission can contain conditions around the resulting services being open access. This would encourage shared infrastructure with the corollary that some potentially negative outcomes, such as a multiple antennae on buildings, would be curtailed. A condition of permission for a second or subsequent operator could be that they have shown how they have investigated the use of existing open access equipment. Note that the District Plan controls the actual size and location of equipment.

Abandoned pipes

It is recommended that, in principle, a policy be adopted that abandoned pipes be made available as ducting for telecommunications usage. Usage would be subject to appropriate arrangements around liability, maintenance and cost to make pipes serviceable. Since fibre optic cable is inert, unaffected by water and usually in a sheathed cable, even a poor quality pipe could be useful as long as it provides an access path.

The Council has over 100 kms of abandoned or decommissioned pipes that could potentially be utilised as empty ducting. Investigation is required to fully identify the quality of abandoned pipes and their alignment in the roads, as it is possible that some pipes would have collapsed, been damaged, or be unusable due to their depth, condition and/or alignment. Some of the minimal lengths of abandoned pipes might also make them non-viable for usage.

As part of this policy, officers would also actively manage a GIS database showing the location and condition of known abandoned pipes.

Laying fibre in existing infrastructure networks

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.

The Council's initial investigations indicate that the stormwater network, if any, may be best suited to such technology as there are few public health risks associated with this service and it is not pressurised (like water). Our stormwater pipes are, however, narrow and investigation is underway on:

- whether or not the technology could be deployed within them;
- what the potential maintenance issues would be; and
- understanding how the alignment of the stormwater network would work with optimum telecommunications alignment.

Shallow or micro trenching

Currently, Council rules and policy mainly enable broadband infrastructure (via cabling) to be deployed either under the ground in traditional trenches or, in certain conditions, strung overhead between poles.

New technologies (such as “shallow” or “micro” trenching) potentially provide significantly cheaper, alternative deployment methods – as outlined in the following comparison:

Type of Fibre Deployment	Estimated Cost per metre
Overheading	$32
Micro-trenching	$40-130
Directional Drilling	$175
Traditional Trenching	$300

Currently, however, this technology cannot meet requirements in the Council’s Code of Practice for Working in the Road, as cable cannot be laid to a minimum depth of 600mm or 900mm (depending on where it is being placed in the roadway)[4], and trench and surface reinstatement techniques are not always suitable to ensure the ongoing viability of the road.

Through micro or shallow trenching, a cable is typically laid at a depth of 200-300mm, in a trench approximately 100mm wide. The machine that installs the network is also able to reseal the road.

If the Council allowed this type of trenching above the minimum depths liability issues would need to be fully defined, as the cost of any subsequent relaying at full depth would be very high and damage may occur to other utilities, particularly ones with lateral connections that may be laid at higher depths within the roading asset. It is also possible that the Council would need to require all utilities and laterals to be well marked out and hand excavated, which would significantly increase the cost of micro-trenching to network providers.

[4] Note: these are depths that are unlikely to change with the proposed National Code of Practice for Working on the Road, which is currently being developed.

Saw cutting is very narrow micro-trenching (10-12mm), where the cable is directly buried in the ground. The details of such technology are unclear, though it would be achieved by a hand-held machine. This option is likely to have issues around appropriate road resealing to fill a trench this size, running the risk of damaging the integrity of the road surface, a higher likelihood of damage to other networks and laterals, and the difficulty of repairs to a direct-buried cable.

Despite all this, the potential cost savings make these technologies very attractive and they could facilitate significant additional broadband deployment. To fully examine the risks a defined trial is proposed that would only be available to an open access provider.

5.4.2 Establishment of a duct network

It is recommended that a Council-owned duct network be established, using existing unused pipes as a starting point and laying duct in conjunction with other road works as its main method of implementation. This would mean a policy that ducting should be laid by or on behalf of the Council whenever the Council or a third party provider digs a trench as part of utilities provision, roadworks or a road opening notice[5]. Each specific situation would be assessed on its merits, taking into account factors like the suitability of trench alignments (where designed primarily for another purpose), and the extent of any additional costs due to separation requirements.

Such a policy takes a long-term view of the broadband network – and the end focus on a FTTH network. It could be implemented progressively dependent on funding and assessment of progress towards a network with meaningful reach, but working to a master plan.

A duct network would encourage sharing of the right-of-way under the road and could over time reduce the amount of duplicated infrastructure installation (and associated road works). It would maintain important options for the Council, should any Council-owned urban fibre network be progressed in the future, since ducting would naturally be a component for any fibre build.

The Council digs every year to maintain, replace and upgrade parts of its water, sewerage, stormwater, roading and footpath networks. While not all trenches will be in an optimal alignment for a telecommunications network (which is best placed on both sides of the road), some, such as the water network, are able to do so.

The water network also has a more substantial scheduled replacement plan than the other networks (i.e. the sewerage and stormwater networks tend to be replaced on more of a reactive basis than a planned one). Approximately 10-

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[5] A similar policy is being considered by other councils including the Waitakere, Hutt, Upper Hutt, and Porirua city councils.

14km of replacement is planned in each year from 07/08 through to 09/10.

A new initiative covering the cost of laying duct will need to be developed. The network to be provided could be as simple as just providing the ducting that a fibre cable could be fed through, or it could be made increasingly complex by also providing for access points (chambers, vaults and pits) and housing connections – in view of the ultimate goal of FTTH. Based on the complexity of the network design, a first cut of base costs (i.e. excluding the cost of trenching) is estimated as follows:

Costs per km	**Most basic**	**With access points**	**With house connections**
uPVC pipes (and seal)	$13,468	$13,468	$13,468
Vaults and pits	0	$8,000	$8,000
House connectors	0	0	$2,100
Total	**$13,468**	**$21,468**	**$23,568**

X 10kms per year	$134,680	$214,680	$235,680

Utility operators are able to dig in the roads by right. Currently utilities (including telecommunications companies) are required to inform each other when a trench is being dug, so they have the option of sharing the costs – which also helps the Council ensure roads are being opened in a coordinated way, reducing disruption to road users and the potential for damage to the roads.

Further advice is being sought on the:
- mechanism the Council could use to place Council-owned ducting in trenches dug by third parties and have it vested to council
- level to which the Council would need to contribute to the cost – i.e. for ducting, wider trenching, increased traffic management, etc.

5.4.3 Advocacy and facilitation

Councils have a natural role in advocating for more investment in broadband infrastructure in their communities. The wide range of benefits to the community make this a high priority – with the theme that telecommunications infrastructure is becoming the “roads and rail of the 21st century”.

It is therefore recommended that the Council continue to make the case to government that more investment should occur, probably with additional investment from the Crown to recognise national significance, and that councils are natural local partners. The collective local government investment of $80-odd billion in (primarily network) infrastructure demonstrates the existing role in providing essential networks.

The government has also identified the need for additional undersea capacity, and when this happens there are options for it to come ashore at Auckland, Wellington, or Invercargill. A landing point other than Auckland would enhance network resilience, make additional cost effective capacity available to the region and increase our status as an important digital hub and location. It is recommended that the Council advocate to government and potential investors that any new trans-Tasman fibre optic cable land in Wellington.

Engaging Central Government as a partner adds important strengths to the broadband project, in addition to any funding contribution it might make. These include the ability to aggregate public sector demand – demand aggregation in education and health sectors is essential to guarantee sustainability and generate economic transformation.

5.4.4 Business model development

Development of a business model has been a key component of the broadband project. It has enabled a deeper understanding of the economics of fibre deployment, which is valuable when considering options like direct purchase of services for public good entities, and possible Council investment in an urban fibre network.

The model has assembled detailed information on likely costs and revenues, the latter based on a survey of 244 MUSH entities to evaluate the existing demand for broadband in the City, and determine their interest, willingness and ability to pay. The cost structure for deployment was calculated from a route-by-route analysis and GIS locations for major target customers.

This work showed the critical importance of access to Council assets and facilities in order to reduce capital costs; central government support which would be needed in the form of demand aggregation for health and education providers plus funding assistance; and partnership with a substantial private sector operator or operators to bring existing fibre infrastructure, relevant assets, customer base and expertise.

It is recommended that this model continue to be refined, to maintain this option for the future should it be required. Implementation is not recommended because of the potential for the options above to deliver significant new investment, and current government policy around additional broadband funding.

5.5 Communication and Consultation Plan

It is recommended that:

- general, city-wide consultation be undertaken on the proposals outlined in this paper; and

- targeted consultation be undertaken concurrently to ensure that identified stakeholders and interested individuals and groups have the opportunity to respond to the Council's proposals.

The consultation plan (attached at **Appendix 7**) outlines the key messages the consultation will have, identifies existing and additional stakeholders who will be asked to respond to the Council's proposals and provides a timeline for the consultation.

6. Conclusion

The case for high quality communications to support modern lifestyles, productivity and innovation is now well established. Council's Broadband Vision recognises the importance of fast, affordable broadband to the future competitiveness of the city.

This paper examines a number of options to advance the Vision, and recommends some specific policy changes and further work in some areas.

Further costings and analysis will be reported back to the Strategy and Policy Committee over the next 2-3 months, and a close watching brief kept on national developments in the telecommunications sector.

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Supporting Information

1) Strategic Fit / Strategic Outcome

The recommendations in the paper support Council's overall vision of Creative Wellington – Innovation Capital, and are a strong fit with the economic development strategy .

2) LTCCP/Annual Plan reference and long term financial impact

The project is referenced by. The changes indicated here may lead to an increase in capital expenditure in the 08/09 financial year related to establishment of a duct network, but final costings for this still need to be developed.

3) Treaty of Waitangi considerations

No direct implications for Treaty of Waitangi considerations.

4) Decision-Making

This is not a significant decision in terms of the Local Government Act 2002.

5) Consultation

a)General Consultation

Some non-specific consultation has already been carried out through the 07/08 Draft Annual Plan process and the Resident's satisfaction survey. This is reported on in the paper.

The report also contains a proposed consultation plan as part of the future development of this project.

b) Consultation with Maori

No specific consultation with Maori.

6) Legal Implications

Specific legal advice will be sought on some aspects related to the recommendations.

7) Consistency with existing policy

The recommendations in the report are consistent with existing policy, and in some areas amend that policy to better drive overall Council objectives.

APPENDIX 1
References and Definition of Key Terms

- Internet NZ- Cabinetisation and Local Loop Unbundling-The Way Forward, 14th January 2008

  http://www.internetnz.net.nz/media/2008/cabinetisation

- The NZ Institute- Creating a Weightless Economy: Positioning New Zealand to compete in the global economy, September 2007

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- The NZ Institute- A broadband strategy for New Zealand: Why world-class communications infrastructure matters and how we can get it, September 2007

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  www.nzinstitute.org

- Department of Internal Affairs - The Digital Strategy: Report on Progress 2007

  http://www.digitalstrategy.govt.nz/upload/CaseStudies/DigitalStrategy_ReportonProgress_2007web.pdf

- Dirk van de Woude- An Overview of Fibre, November 2007

  http://www.citynet.nl/upload/FttX-in-Europe-29june2007.pdf

- CTC- Fiber Optics for Government and Public Broadband: A Feasibility Study , Prepared for the City and County of San Francisco, January 2007.

  http://www.sfgov.org/site/uploadedfiles/dtis/tech_connect/SFFiberFeasibility.pdf

Definition of Key Terms

Abandoned pipes – WCC has identified over 100km of 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 the 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 the Council could consider.

Layers – the 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 the 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.

Overheading – cabling that can be attached to the overhead wires e.g. trolleybus lines in Wellington. 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

Staged Network Architecture – WCC has proposed a three component model for Broadband development comprising an urban fibre network, a wireless/ cellular network, and further development of FTTH options.

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.

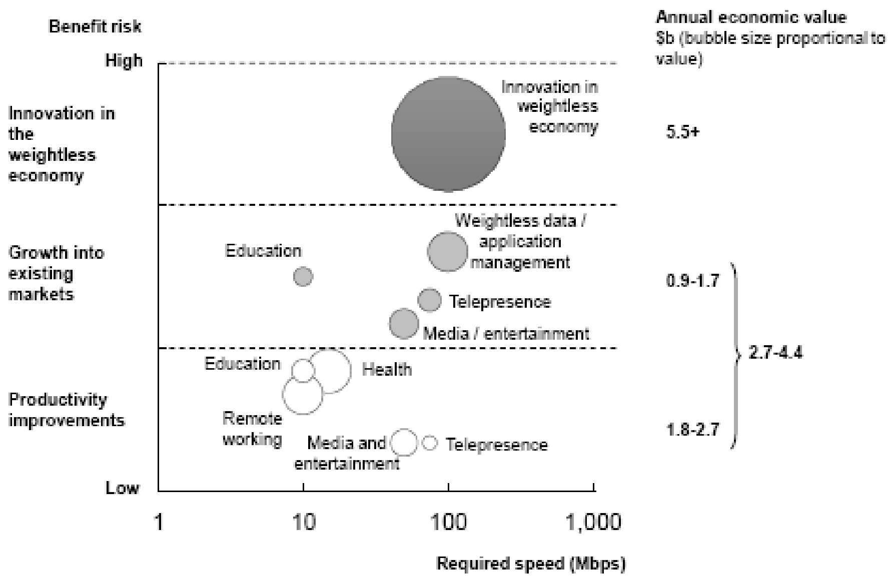
WiMAX – Worldwide Interoperability for Microwave Access, is a telecommunications technology aimed at providing wireless data over long distances in a variety of ways, from point-to-point links to full mobile cellular type access.

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.

APPENDIX 2
Benefits of Broadband

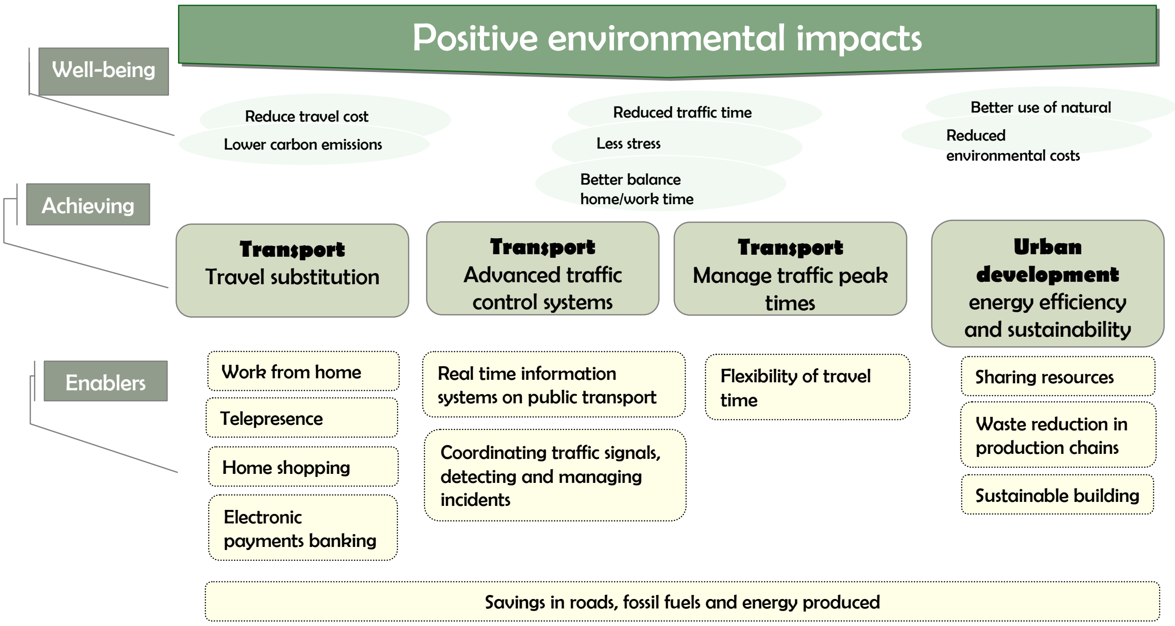
The New Zealand Institute recently launched a research project with the objective of identifying the potential economic benefits to New Zealand of deploying world class communications infrastructure. The national economic benefits from unconstrained broadband are estimated at NZ$ 2.7 to 4.4 b p.a.:

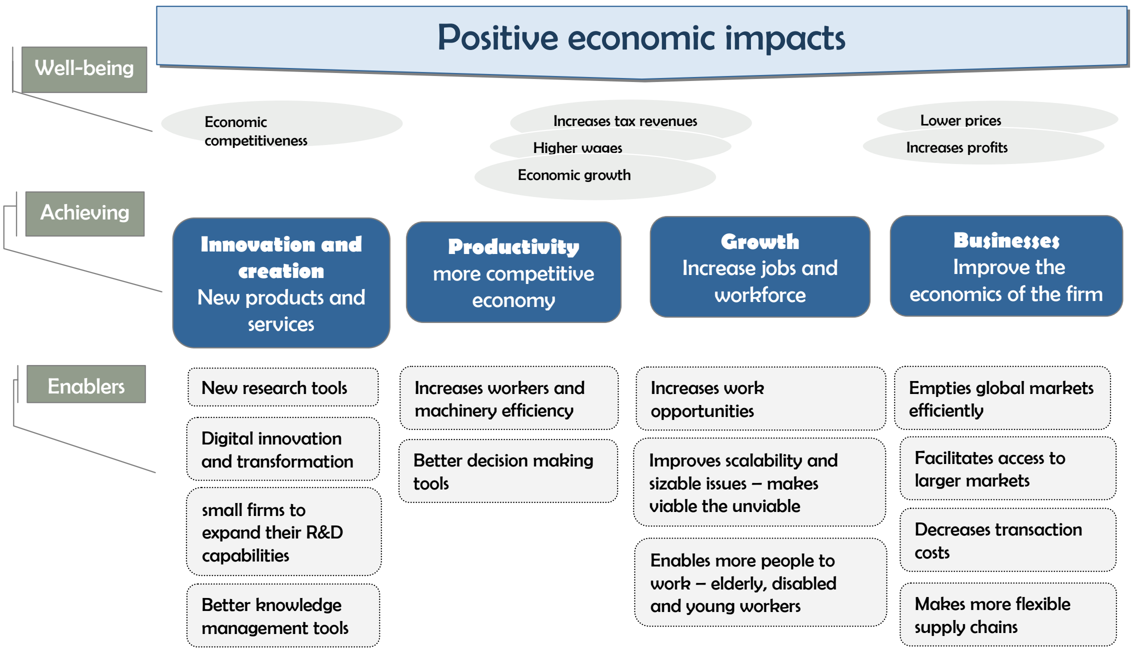
New Zealand Institute: Required Speed (Mbps) Vs. Annual Economic Value



This translates to potential benefits for the Wellington region of $400m - $650m, and the city $250m - $400m (on basis of region and city shares of national GDP). Note that this is an increase of about 0.25% in GDP, and the high connectivity in the CBD provided by CityLink may have already delivered some of these benefits.

The following diagrams map quantifiable and non-quantifiable impacts:


Positive environmental impacts
Well-being
Reduce travel cost
Lower carbon emissions
Reduced traffic time
Less stress
Better balance home/work time
Better use of natural
Reduced environmental costs
Achieving
Transport Travel substitution
Transport Advanced traffic control systems
Transport Manage traffic peak times
Urban development energy efficiency and sustainability
Enablers
Work from home
Telepresence
Home shopping
Electronic payments banking
Real time information systems on public transport
Coordinating traffic signals, detecting and managing incidents
Flexibility of travel time
Sharing resources
Waste reduction in production chains
Sustainable building
Savings in roads, fossil fuels and energy produced


Positive economic impacts
Well-being
Economic competitiveness
Increases tax revenues
Higher wages
Economic growth
Lower prices
Increases profits
Achieving
Innovation and creation New products and services
Productivity more competitive economy
Growth Increase jobs and workforce
Businesses Improve the economics of the firm
Enablers
New research tools
Digital innovation and transformation
small firms to expand their R&D capabilities
Better knowledge management tools
Increases workers and machinery efficiency
Better decision making tools
Increases work opportunities
Improves scalability and sizable issues – makes viable the unviable
Enables more people to work – elderly, disabled and young workers
Empties global markets efficiently
Facilitates access to larger markets
Decreases transaction costs
Makes more flexible supply chains

Positive social impacts

Well-being

- Strengthens social identity
- Reduces social gaps
- More inclusive
- Improves productivity
- Improves staff professional development
- Improves quality
- Improves resources allocation
- More efficient diagnosis
- Reduces patients inconvenience and discomfort

Achieving

Cultural Well-being

Enablers

- greater participation of disabled, elderly and young into the economy and society
- Preserves multicultural heritage and ethnicity
- Reduces cost of professional training

Educational

- Increases opportunities to learn
- Reduces cost of education
- Increases students engagement and willingness to learn
- Increases flexibility to the learning process
- Improves research tools

Health

- Better access to medical records
- Improves preventive care
- Increases in-home supported care
- Patient monitoring -reduces admissions
- Remote diagnosis and consultation
- Improves access to remote health training

Positive social impacts.. continuation

Well-being

- Improves citizen engagement
- Safer City
- Improves consultation and communication
- Stronger sense of place
- More social cohesion
- Improves resources allocation
- More liveable
- Better connected to the world
- More technological savvy people
- Socially connected city
- Better employment prospects

Achieving

Governance

Enablers

- Government to citizens
- Government to business
- Government to Government
- Internal efficiency and effectiveness
- Better emergency connectivity
- Monitoring management systems

Social and recreation

- Better community facilities
- Better asset management
- Better services in libraries
- More recreational options
- More learning and research tools
- Greater cultural exposure

Media and entertainment

- Access to international, national and local events
- Improved audio and video quality (digital)
- Access to huge range of entertainment
- Music swapping , online gaming

APPENDIX 3

National and International Broadband Projects

New telecommunications infrastructure rules

Central government is currently in the process of establishing country-wide rules that will provide consistency and remove perceived impediments to deployment of telecommunications infrastructure:

The ***National Environmental Standards for Telecommunications*** *(NES)* will override all councils' district plans – except for where the community has identified specific values it wants to manage or protect (i.e. historical/heritage values). The following would be "permitted activities" (i.e. they would not need resource consent):

- activities that emit radio-frequency fields (such as a mobile phone transmitters) which comply with the existing NZ Standard[6].
- telecommunications equipment cabinets installed along roads or in the road reserve that are not more than 1.8m in height and 2.5m^2 in volume
- the noise limits from telecommunications equipment cabinets which meet certain standards
- the height and size of masts and antennas installed on existing structures (such as lighting poles) alongside roads or in the road reserve.

Although this will result in slightly higher masts and larger cabinets, officers do not see the proposed changes as being significantly different from Council's current District Plan. This will need to be reviewed once the standard is finalised and becomes mandatory.

The ***National Code of Practice for Working in the Road***, which seeks to provide a consistent approach to the road opening process. The main impact will be on the "reasonable conditions" the Council can place on road opening notices. The main basis for establishing conditions will be traffic safety – removing "visual amenity" and footpath width as possible conditions. It is expected that this document will be mandatory from mid-2009.

National Projects

The Broadband Challenge (BBC) fund was set up to allocate $24 million seed funding over four years. There were two categories under this fund- 'Urban and Metropolitan Networks' and 'Remote and Under Served Communities'. The focus of the funding for Urban and Metropolitan Networks was on high capacity (1 Gbps) open–fibre networks that would serve the needs of urban and regional centres and their businesses, whether by upgrading existing facilities or by installing new fibre. Below is a summary of the five metro areas (out of eleven) that received funding from the Broadband Challenge ***** (totalling $16.3M), as well as other additional projects which have not yet received funding.

[6] NZS2772.1:1999 *Radio-frequency Fields Part 1: Maximum Exposure Levels 3kHz-300GHz*

Metro Area	Project Description	BBC $
1. North Shore City Council (and Vector Communications Ltd)	The 38km NEAL (North Shore Education and Access Loop) fibre backbone linking the majority of the schools on the North Shore went live in June 2007. Funded by Vector Communications and the government through the Broadband Challenge Fund. Provides a 1 gigabit per second virtual network connection over Vector Communication's UFN as well as access to KAREN. Most of the network is underground; North Shore City Council has agreed to allow 4km above ground so that the budget can be extended to provide services to 8 additional more distant schools that would otherwise not be connected. The network is not strictly an open access model. Currently only 51 out of 70 schools are connected. Vector has reserved the right to control access for customers that join the network later on.	4.641
2. Hamilton City Council	The Hamilton Urban Fibre Network is a collaborative project led by Hamilton City Council with strong support from Wintec, Environment Waikato, the University of Waikato, and Waikato DHB. It intends to improve and extend its fibre network which is currently used for inner city security. Hamilton City Council will own the network and lease it to a private entity - Lite-Up Ltd, who will operate and manage the network. The current focus is on ownership and governance structures. A key issue is to avoid creating a long-term monopoly concession controlled by a private entity.	3.291
3. Porirua City Council/ Hutt City Council/ Upper Hutt City Council (SmartLinx3)	SmartLinx3 is continuing to deploy an open-access mixed fibre and wireless network in Hutt City, Upper Hutt and Porirua. The core of the network is intended to be fibre across urban and suburban areas, with intention to use licensed and unlicensed spectrum wireless to deliver full community coverage. The recent key development has been completion of a fibre backbone from Wellington Railway Station to Upper Hutt Railway Station, laid in the rail corridor. Kapiti and Wairarapa are currently in discussion to join.	2.373
4. Nelson City Council (Nelson Marlborough Inforegion)	The Nelson Marlborough Inforegion's (a regional broadband enabling organisation) proposal is to expand fibre capacity in main population centres and establish internet exchanges in Nelson (NIX) and Marlborough (MIX). Funding will be used to create a network operating company to set up and run the Internet Exchanges, and to create fibre links to connect Picton to Blenheim.	1.789

5. Christchurch (Canterbury Development Corporation)	Christchurch City Holdings Limited (CCHL) have let the first tenders for construction of an 88km underground fibre loop in the central city, with 5 laterals that connect the major business areas of the city outside the CBD, including the airport and university. These will in turn be connected by an outer ring of fibre. The urban fibre network will focus on connecting councils, schools, health facilities, universities and businesses. CCHL will own layer 1 dark fibre and allow multiple layer 2 operators to light up fibres. The loop is costing approximately $13m, with CCHL funding the remainder of the cost The project is scheduled to be completed by the end of 2008, but a major issue confronting CCHL is the shortage of contractors and equipment to complete the work.	4.219
TOTAL:		**16.3M**

Other Metro Projects (that have not received funding)

Metro Area	Project Description
6. Palmerston North	Inspire Networks, an open access provider, is able (via an agreement) to lay duct and/or fibre whenever local roading contractors are digging trenches in the road. The Council is involved at a minimal level. They have allowed Inspire Networks to lay duct in the trenches dug as part of their upgrade plan for the city's water mains.
7. Bay of Plenty	Bay Broadband is a project which started in 2006 across the seven Bay of Plenty Councils to ensure there is a bright future for Broadband in the region. So far a cross Council project team has developed key objectives for the project and has commissioned extensive issue analysis seeking to: • understand the key contributing factors • identify stakeholders affected by broadband delivery • identify areas where concerted efforts could improve the situation. A Bay of Plenty Broadband Business case study was completed by GDI in 2007.
8. Manukau City Council	May be involved in the future with the Auckland City Council UFN project. FTTH Flat Bush Project- New houses in the Mission Heights subdivision, one of the first parts of Flat Bush to be developed, are being wired specifically for fibre optic broadband.

9. Auckland City Council	Auckland is taking an active role to ensure the delivery of more competitive broadband offerings for its residents. It is focusing on: • A Wi-Fi wireless network in the CBD and CBD fringe. The Council does not intend to pay or own but allow access to assets and may help to promote it. A Request for Information was issued in June 2oo7. • An Urban fibre network connecting MUSH entities, high broadband business users and Telecom exchanges on the Auckland Isthmus. The council expects the 150km open access fibre ring would cost $20-25m ($2 million in the 07/08 Annual Plan). The Council is in detailed discussions with a range of potential partners and is actively exploring opportunities to work jointly with other Councils in the Auckland region, including Waitakere, Manukau and the Regional Council.
10. Dunedin City Council	Dunedin has completed a feasibility study for a 31 km fibre ring extending from the CBD to Mosgiel with suburban connections, concluding that the loop is technically and financially feasible. The study also considered the important role of wireless broadband. In March 2007, the Council agreed to: • Advocate for the establishment of an open access, high speed broadband service, and advocate for development of additional high capacity connections out of Dunedin to the world. • The use of the city's physical infrastructure (in principle), to assist with the deployment of an open access network • Pursue government funding for an urban fibre network • Develop a business plan to develop and operate a MUSH open access network that would be operated by a separate Dunedin City Holdings Limited commercial entity. The Council acknowledged that this investment would be unlikely, initially.

* Other projects that also received funding under the Broadband Challenge through the 'Remote and Underserved Communities' category (totalling $1.1M) were Waitakere City Council ($175,000); WiKarekare Trust in West Auckland ($5,000); West Coast Development Trust ($600,000); Waikato 2020 Communications Trust ($47,000); Tuhoe Education Authority ($500,000).

International Broadband Projects

PLACE	Description/ Type of FttX and Reach		Ownership Structure and Financing	Municipal Finance Participation	Open Access Network
	Pilot/ Initial Rollout	Ultimate Goal			
1. Almere (Netherlands)	The Almere Fibre Pilot Project was initiated by UNet in 2003, connecting 1,500 -1,700 households and SMEs. The company on its own accord also connected 500 businesses in the city. By 2005, UNet had set up a 120km long fibre-optic backbone around the city that connected 165 locations, including schools and hospitals. It was announced in December 2007 that Reggefiber (a cable construction company) has commenced rolled out of FttH to the entire city, to be completed in the next few months. Incumbent KPN will use the network as a SP and stimulate its copper subs to transfer to FttH. The city has benefited from symmetrical broadband connections of up to 2 gigabit/ sec.	By 2010 the whole city, including all 70,000 houses and 250,000 residents in Almere will be receive FTTH. This is expected to be the first big city in Europe to achieve this. There is also a possible plan to link the UNet network with CityNet's fibre network in Amsterdam (to be approved in the next 12 months).	The municipality is the owner of the passive optical fibre infrastructure. They established a public-private partnership to build an optical fibre, equal access network for the city in 2002, with the vision to create the "Almere Knowledge City" and create jobs in the new city. First Mile Ventures (part of the UNET group) manages the network in Almere while UNET supplies broadband services for consumers and businesses.	Yes- the municipal funding over 6 years has been9M Euros. Funding was also received from regional government and the EU. It was also reported that the city received 200M Euro from other investors. But at present the Almere fibre project is being financed by Reggefiber due to recent scrutiny of municipal funding by the European Commission.	Yes- at service level.
2. Amsterdam (Netherlands)	In 2000, a few low income housing developments received FTTH from a private Swedish company. Due to the resulting economic benefits, a project was approved by the City Council in 2006 with BBNet as the operator. The first phase rolled out 40,000 homes initially. Deployment of the network started on 12 October	Glasvezelnetamsterdam (GNA) aims to rollout 420,000 households and all businesses – (to approx. 450,000 meter boxes in the city). Fibre will be connected to all apartment units within multi-dwelling units as well.	Public Private Partnership to pilot rollout. Financing is coming from debt and private sector partners (housing corporations, Reggefiber, and ING Real Estate Investment Management). The first rollout will take 7 yrs and cost NZ$580 million. BBNet will serve as operator,	Yes- 6 million of 30 million (passive). 10% of the cost in Stage 1. Less Council involvement after Stage 1. The City will build and own a portion of the passive elements of the network only. The Citys	Yes- BBNet's contract is non-exclusive and other service providers may use the fibre under network terms and conditions.

PLACE	Description/ Type of FttX and Reach		Ownership Structure and Financing	Municipal Finance Participation	Open Access Network
	Pilot/ Initial Rollout	Ultimate Goal			
	2006 after a legal challenge from UPC. Another challenge came from the European Union in 2006.		provide electronics and provide 10 years of (non exclusive) services.	owns 33% of GNA.	
3. Brisbane (Australia)	The Queensland government initiated Project Vista on 26 Oct 2006, and announced a planned rollout of FttP to all households in Brisbane. Expressions of Interest were invited from private companies from Nov 06. Sept 07 was the target to select preferred proponent, with the contract to be awarded Dec 07. Rollout was planned to start in July 2008, however the recent broadband announcements by both the Federal Government and the Federal Opposition have the potential to overtake the Project Vista strategy.	The proposed network would span 945 km and connect almost 1 million residents – and provide speeds of over 100Mbps.	The Queensland government estimated the project would cost $550 million.	Partial- Access to government assets, but no financial assistance to be provided to the project.	Yes
4. Catalonia Region (Spain)	The massive planned open network will reach a large no. of cities in the region using multiple fibre rings. A pilot network was planned to be installed by early 2006. Requests for proposal for the production network were also due to go out in 2006. The project is still in the planning stages. Focus is currently metropolitan and long distance fibre and it is unclear whether this will involve much FTTH.	Build is expected to take 4 years.	The government of Catalonia and Localret (a consortium of 782 municipalities) are carrying out this project.	Yes- EUR 500 million	Yes- an equal access model.

5. Deventer (Netherlands)	It was announced in 2007 that Reggefibre will roll out FttH to the entire city (popn. 110,000). Deventer has been on the forefront of broadband deployment since 1997. All 52 schools have received FttH. An alternative approach for facilitating roll out of fibre has been the approach of the city of Deventer. Deventer has focused on demand aggregation. It has aggregated 100 customers requiring 100 Mbps symmetrical connections, for 3 year contracts at €300/month. The customers are a mix of SMEs, education and health institutions and residents.	All buildings are expected to be joined by fibre in the year 2009.	The incumbent Telco and cable company have jointly agreed to roll out FTTH to these customers (effectively the anchor tenants on the backbone of the network), and then compete with each other for the business of these customers. The incumbents are working together because a climate of cooperation is growing in the Netherlands and there is now the threat that the municipality will actually enter the market if they do not roll out FTTH.	Unknown	Not clear
6. Hauts-de-Seine (western side of greater Paris, France)	The Tres Haut Debit (very high speed) 92" project was announced in March 2006 by the Conseil Général of which Nicolas Sarkozy is President. Trials have started; first connections will be starting in 2008.	FttH for all homes and companies in the Hauts-de-Seine (all 36 areas). The area is comprised of 100 000 companies, 6 500 registered offices and 1 500 000 inhabitants.	Two phased public-private project.	Up to 70 million in subsidies (first phase 25M). The General Counsel will own the network and delegate it to the chosen operator (the cost is shared by the operator and by the Department).	Yes
7. Japan	On July 4 2007 it was announced that Japan has 10 million FttH subscribers or over 36% of all broadband connections. Japan has the world's fastest internet, up to 100 megabits per second. Unbundling of the copper lines occurred in 2000, with low rent on bandwidth for companies ($2 month).	NTT (Nippon Telegraph and Telephone Corp.) Plans to roll out "ubiquitous" broadband to 30 million households (FttH), spending $40 billion to 2010.	Joint Venture (PPP)	NTT is 34% owned by government. Govt provided subsidies and tax breaks.	Yes

8. Koln *(Cologne)* (Germany)	CityNet Cologne rolled out in parallel to the incumbent VDSL network. At the moment, it is estimated that the network covers about 1,300 buildings. ------ Other German cities following Cologne are Hamburg and Munich: In Hamburg, HanseNet is rolling out FttH to 15,000 homes and then plans to expand rapidly to 100,000 homes. In Munich a trial by M-Net involves 62 buildings covering 567 homes, with the objective of covering 110,000 homes by end of 2008 and 60% of Munich by 2011.	200,000 FttH. The network will be expanded throughout 2007 to include 9,000 households in the inner city areas.	NetCologne is a 100% municipal corporation. (I.e. a 100% subsidiary of GEW AG, which is a 100% subsidiary of Stadwerke Koln, which is a 100% subsidiary of the Koln Municipality).	Yes - 250 million	No
9. Kuusiokunnat and Kouvola (Finland)	Kuusiokunnat is located about 350 km north of Helsinki and has an area of 3.409,2 km2. In 2002 the Project 6 Net started to build a fibre network out to 6 municipalities. The first phase was finished in 2004. The 1,300 km 2x 1 Gbps backbone network connects FTTH to 30 000 people, about 10 000 households and 2000 small business (built by Verkko-osuuskunta Kuuskaista). The original backbone network was established in 1997. In Kouvola -Ftt village, and then ADSL.	**Phase 1** - Fibre Core network 6net 280km 6€/m 1 681 000€ Municipalities 55%, EU 45% **Phase 2** - FTTH 448km (4800E/house) 6€/m 2 400 000€ Public private, EU **Phase 3** - FTTH 550 km (4800E/house) 6€/m public and private funding.	A cooperative, which is owned by the members. The network is owned by the municipalities. The Network Cooperative Kuuskaista was established in Nov 2002 and consists of 6 municipalities: Kuortane, Alavus, Toysa, Ahtari, Lehtimaki and Soini.	Yes- financed by the municipalities -55% and EU+ state - 45%. The budget for the initial backbone was 1, 681, 000 Euro.	Yes- open to all service providers and operators.

10. Milan (Italy)	In 1999, FastWeb was launched in Milan as one of the first muni fibre projects. Now it is a highly successful company covering all of Italy. Telecom Italia has recently entered into an agreement with Metroweb to expand its fibre-optic network in and around Milan**.** The agreement will give Telecom Italia access to 70,000 buildings, partly through Metroweb's original network infrastructure. Telecom Italia is not massively investing in FTTH (fibre to the home) solutions. Instead, it plans to deploy both **FTTCab** (fibre to the cabinet) and **FTTB** (fibre to the building) solutions using **VDSL2** technology over copper on customer drop.	By the end of 2010, Fastweb hopes to cover half of all Italian homes and connect all major cities.	100% of MetroWeb shares are held by AEM spA (the municipal energy company), of which the Milan Municipality holds a controlling 44% of shares.	Yes- 100 million The Milan municipality was one of the original co-founders. Years later the company was split between a service provider Fastweb, (owned by other investors), and an infrastructure holder in Milan (Metroweb, owned by the City of Milan). In 2007 the City of Milan sold Metroweb to a private equity company- Sterling Square.	MetroWeb is open access (has a Municipal Area network, district network, and a long distance network).
11. Nuenen (The Netherlands)	Currently 25,000 residents, (7,500 households and 400 businesses) are all connected by a star-shaped fibre network (FttH). The project was launched in 2004. 97% of households in Nuenen joined the cooperation.	Rollout of OnsNet to all of Eindhoven is currently in its planning stages (to 80,000 households).	The network is owned by the members themselves, who formed a corporation. This approach was unparalleled in the world at the time. Co-ownership with 4 entities: Close The Gap, Ons Net, Ons Wijin and the FttH Cooperative Association (owns the fibre through the cooperative ownership model).	Yes- makes use of government funding through the Kenniswijk project. Members of the cooperation all requested the Kenniswijk infrastructural subsidy of € 800. Because of this, members did not have to pay any connect ion costs and received a 10 Mbps Internet subscript ion for free during the first year.	Yes

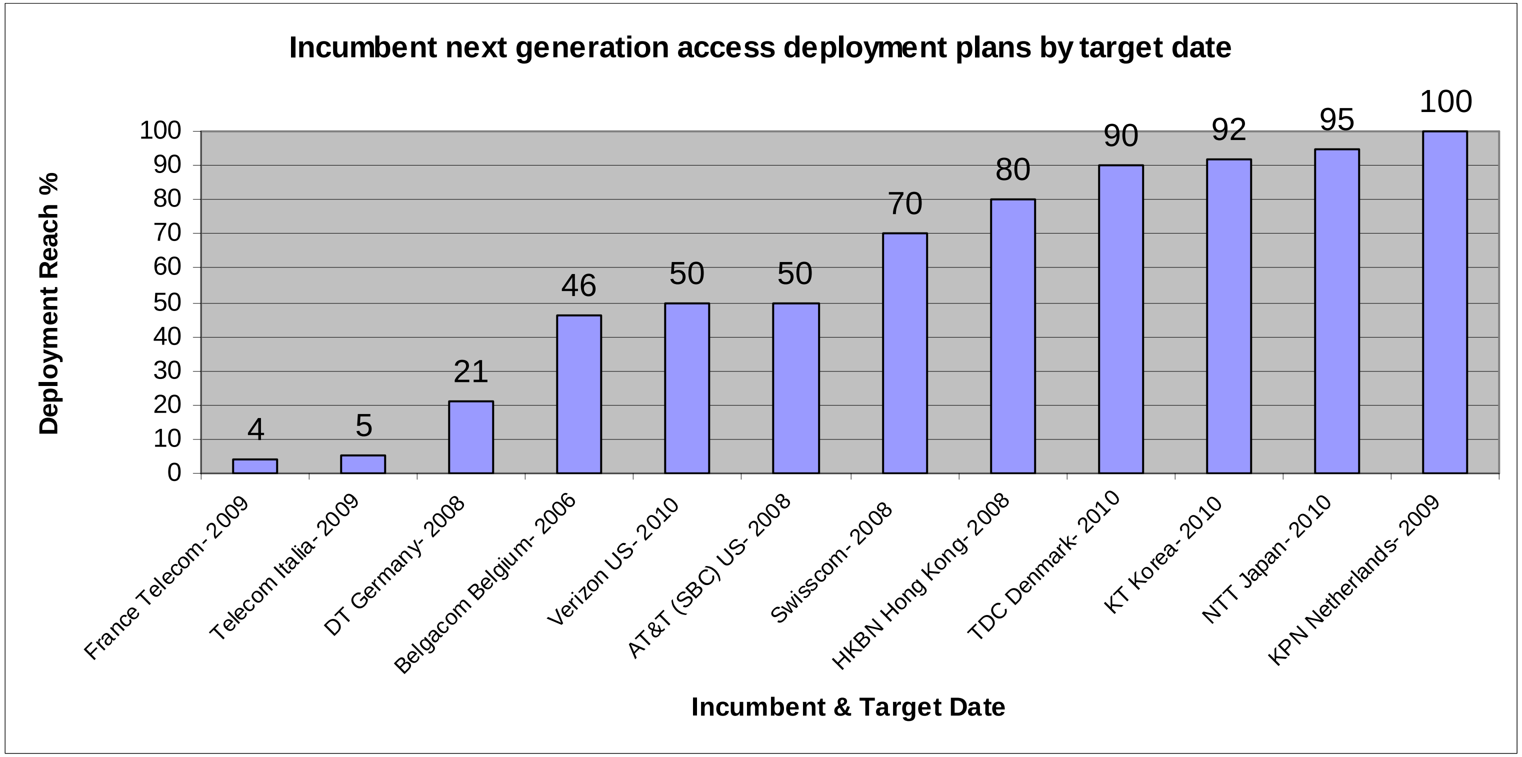
12. Oslo (Norway)	Viken Fibernett has begun building a FTTH network and is now connecting customers.	Ostlandet's 2 million residents to all get FttH.	53% of shares in Hafslund owned by the Municipality	Yes, partially.	Yes
13. Paris (France)	Citefibre (now owned by Iliad) has connected 130 buildings representing 4,000 households (3,000 kms of fibre). Iliad starting deployment in 2007 using the sewer network (5 year project).	2.1 million FttH in the City of Paris. The City of Paris has also announced a city-wide free wi-Fi service (provided by Alcatel and SFR) which was to be launched in late 2007.	Iliad is a private company (investment of 1 billion)	Yes-support (75-100M worth of support in lowered RoW costs). The City Government is making the sewer network available for deployment of fibre.	Yes?
14. San Francisco (USA)	The Mayor's office allocated $300,000 in 2006 to study the feasibility and costs of building an FTTH network. Currently the city has 50 miles of fibre serving MUSH entities such as the community colleges, the City government, and public safety agencies. The San Francisco Enterprise Zone would be the first piloted area to be rolled out, at a cost of $150 million. **Wi-Fi -** An agreement between Earthlink, Google and the City of San Francisco was to provide free a Wi-Fi network. Plans have since been abandoned. EarthLink would have paid the city $2 million for the right to build, install and run a free Wi-Fi network and to partner with Google to provide Internet service.	In Jan 08 Meraki Networks announced a bold plan to create a citywide Wi-Fi cloud in San Francisco that would provide free Internet access. The Wi-Fi project relies upon residents setting up solar-powered mesh nodes on their rooftops and repeaters in their homes. They believe they will succeed where EarthLink and Google did not.	The City would own the fibre and lease it to service providers.	The cost of building the entire fibre network in San Francisco (to pass 100 percent of homes and businesses and include connections to 50 percent of the premises passed) was estimated at $410- $560 million. It was to compliment the Wi-Fi network. Meraki is backed in part by Google and Sequoia Capital.	Yes?

15. Seattle (USA)	The Task Force on Telecommunications Innovation was set up in 2004 by the City. A RFI was issued on May 22, 2006 seeking partners to join the City in creating an FttP network. 28 companies replied to the RFI and the City concluded its discussions with 10 of the respondents in October 2006. A proposal to select a company or a consortium that would build and manage a citywide fibre-optic network was to be announced in late 2007. “Speakeasy” wireless trials completed also. Now on hold similar to San Francisco. Couldn't reach agreement with service providers after offering free use of street lamps for radio transmitters in exchange for a network built, owned and operated by providers at no cost to the city.	Evaluating the feasibility of a PPP to build and own an FttP network to deploy fibre to all of its 270,000 households.	Public-Private Partnership	The City will be an infrastructure partner and would contribute rights-of-way and access to current fibre lines. Costs expected to be $200 million to run the fibre to every neighbourhood and $300 million to connect every home and business.	Yes- planned.
16. Stockholm (Sweden)	StokAB was founded in 1994 when the City of Stockholm chartered a company to lay a publicly owned fibre-optic network throughout the city. They have operated a backbone fibre network over for 10 yrs (dark fibre only). The network comprises 5,600 kilometres of cable and in total 1,200,000 kilometres of fibre. In 2005 the Council decided to have the city’s 100,000 social housing apartments connected in an FttH rollout.	A planned expansion of the network has been announced (by partner Nexans) that will connect directly to fibre LANs (local area networks) in residential buildings.	Public- StokAB is a 100% municipal owned utility. AB Stokab is wholly owned by the company group Stockholms Stadshus AB, which is in turn wholly owned by the City of Stockholm. Stokab started as a construction company regulated by the Swedish government.	Yes- 100 million	Yes- open to all players on equal terms.
17. Vienna (Austria)	Wienstom’s “blizznet” FttH project started on 20 August 2007. A pilot connected 8,000 households, and some buildings in 7 districts. The current length of network is 1,400 km, and the ducts for the additional 2,200 kilometres needed are already waiting to be used. Aims to connect 50,000 households by 2009. Second stage another 250,000 connections. The “Wiener Bildungsnetz” (Vienna education network) connects the city’s 450 compulsory	In the coming 10 to 15 years all 950,000 households and 70,000 SMEs will be connected.	Public- 100% owned utility co. Wienstrom (network constructed and operated through City’s municipal utility). Uses the existing infrastructure of Wien Energie Fernwärme (the municipal energy company) and Wiener Linien (the municipal public transport	Yes- 10 million Euro	Aim: Yes

	schools. "Citynet" links 130 public buildings in Vienna.		company). The sewer network can be utilised.		
18. North Yorkshire (UK)	The North Yorkshire project will offer service providers the ability to offer high speed broadband to (speeds of up to 1GBbit/S) to 330,000 households and 50,000 SMEs and SOHOs in the region. The network is based on a fibre core with major PoPs in the main centres. NYnet (the economic development organisation established by North Yorkshire County Council in conjunction with Yorkshire Forward and Government Office-Yorkshire) has created a backhaul infrastructure to 12 points of presence in North Yorkshire using aggregated public sector demand. NYnet represents one of Europe's largest public sector led, open access, broadband infrastructure initiatives.	NYnet plans to provide benefits to local authorities and citizens in the following areas: Craven, Hambleton, Harrogate, Richmondshire, Ryedale, Scarborough, Selby and York.	Public-Private partnership (PPP) North Yorkshire County Council with support from Yorkshire Forward and Government Office-Yorkshire. The private sector technology partner is BT.	Yes- £0.5m initial capital funding was allocated by the North Yorkshire County Council in 2006. £4 million of funding was approved from the regional development agency Yorkshire Forward, and a further grant of £1.1m from the European Union. The European Commission conducted a state aid investigation into the project in 2007, concluding that that the effect on trade is limited and the overall impact of the measure is positive. It approved the initiative.	Yes

Source: "An Overview of Fibre" (by Dirk van de Woude 2007), and various other sources.

Incumbent Next Generation Access Deployment Plans by Target Date



Incumbent/ Place	France Telecom	Telecom Italia	DT Germany	Belgacom Belgium	Verizon US	AT&T (SBC) US	Swisscom	HKBN Hong Kong	TDC Denmark	KT Korea	NTT Japan	KPN Netherlands
Target Homes m	1	1	8	2	18	18	2	2	2	12	47	8
Investment £b	.19	.12	2.00	.20	11.00	3.20	.285	.067	n/a	n/a	25.00	.67
Technology	FTTH	FTTC	FTTC	FTTC	FTTH	FTTC	FTTC	FTTH	FTTC	FTTH	FTTH	FTTC
Target Year	2009	2009	2008	2006	2010	2008	2008	2008	2010	2010	2010	2009

Source: Adapted from Ofcom Paper (Office of Communications) (UK) – “Future Broadband- Policy Approach to Next Generation Access”- http://www.ofcom.org.uk/consult/condocs/nga/future_broadband_nga.pdf

APPENDIX 4
Telecom Cabinetisation Programme

(Published 21st Nov 2007)

Exchange Name	Planned date for cabinetisation	Planned date status	Suburbs affected
Wellington	1/07/2008	Binding	Kaiwharawhara, Ngaio
Wellington	1/07/2008	Binding	Thorndon, Wadestown
Wellington	1/10/2008	Binding	Wadestown
Wellington	1/10/2008	Binding	Ngauranga
Miramar	1/01/2009	Binding	Karaka Bay, Miramar
Wellington	1/01/2009	Binding	Ngauranga
Wellington	1/01/2009	Binding	Thorndon, Wadestown, Wellington Wharf
Wellington	1/01/2009	Binding	Thorndon, Wadestown, Wilton
Wellington	1/01/2009	Binding	Wadestown
Wellington	1/01/2009	Binding	Thorndon, Wadestown, Wellington Wharf
Wellington	1/01/2009	Binding	Ngauranga
Wellington	1/01/2009	Binding	Thorndon, Wadestown
Wellington	1/01/2009	Binding	Wilton
Wellington	1/01/2009	Binding	Wadestown, Wilton
Wellington	1/01/2009	Binding	Wellington Wharf
Wellington	1/01/2009	Binding	Kaiwharawhara, Khandallah
Wellington	1/01/2009	Binding	Wellington Central, Wellington Wharf
Khandallah	1/04/2009	Binding	Kaiwharawhara, Khandallah
Khandallah	1/04/2009	Binding	Ngaio
Miramar	1/04/2009	Binding	Maupuia, Miramar
Miramar	1/04/2009	Binding	Miramar, Seatoun Heights
Miramar	1/04/2009	Binding	Seatoun, Strathmore
Miramar	1/04/2009	Binding	Seatoun, Seatoun Heights, Strathmore
Miramar	1/04/2009	Binding	Karaka Bay, Miramar, Scorching Bay
Miramar	1/04/2009	Binding	Maupuia, Scorching Bay
Miramar	1/04/2009	Binding	Karaka Bay, Miramar
Miramar	1/04/2009	Binding	Miramar
Miramar	1/04/2009	Binding	Maupuia
Miramar	1/04/2009	Binding	Maupuia
Miramar	1/04/2009	Binding	Karaka Bay, Miramar, Seatoun Heights
Miramar	1/04/2009	Binding	Strathmore
Miramar	1/04/2009	Binding	Seatoun
Miramar	1/04/2009	Binding	Miramar, Scorching Bay
Courtenay Place	1/07/2009	Binding	Wellington Central
Courtenay Place	1/07/2009	Binding	Brooklyn
Courtenay Place	1/07/2009	Binding	Brooklyn

Exchange Name	Planned date for cabinetisation	Planned date status	Suburbs affected
Khandallah	1/07/2009	Binding	Ngaio
Khandallah	1/07/2009	Binding	Khandallah, Rangoon Heights
Khandallah	1/07/2009	Binding	Khandallah, Ngauranga, Rangoon Heights, Raroa
Khandallah	1/07/2009	Binding	Kaiwharawhara, Khandallah
Khandallah	1/07/2009	Binding	Khandallah
Khandallah	1/07/2009	Binding	Crofton Downs
Khandallah	1/07/2009	Binding	Crofton Downs
Wellington South	1/07/2009	Binding	Melrose, Newtown
Wellington South	1/07/2009	Binding	Berhampore, Kingston
Wellington South	1/07/2009	Binding	Kingston
Wellington South	1/07/2009	Binding	Berhampore
Wellington South	1/07/2009	Binding	Brooklyn, Kingston, Vogeltown
Courtenay Place	1/10/2009	Binding	Aro Valley, Brooklyn
Courtenay Place	1/10/2009	Binding	Aro Valley, Brooklyn, Wellington Central
Courtenay Place	1/10/2009	Binding	Wellington Central
Courtenay Place	1/10/2009	Binding	Mt Cook, Newtown, Wellington Central
Courtenay Place	1/10/2009	Binding	Brooklyn
Courtenay Place	1/10/2009	Binding	Aro Valley, Highbury
Courtenay Place	1/10/2009	Binding	Brooklyn, Kowhai Park
Courtenay Place	1/10/2009	Binding	Roseneath
Courtenay Place	1/10/2009	Binding	Hataitai, Roseneath
Courtenay Place	1/10/2009	Binding	Oriental Bay, Roseneath
Island Bay	1/10/2009	Binding	Happy Valley, Kingston
Island Bay	1/10/2009	Binding	Island Bay, Newtown, Southgate
Island Bay	1/10/2009	Binding	Happy Valley
Kilbirnie	1/10/2009	Binding	Houghton Bay, Melrose, Newtown, Southgate
Kilbirnie	1/10/2009	Binding	Houghton Bay, Lyall Bay, Melrose
Kelburn	1/10/2009	Binding	Wilton
Kelburn	1/01/2010	Binding	Wilton
Kelburn	1/01/2010	Binding	Northland, Wilton
Kelburn	1/01/2010	Binding	Northland, Wilton
Karori	1/01/2010	Binding	Karori, Karori South
Karori	1/01/2010	Binding	Karori
Karori	1/01/2010	Binding	Karori, Karori South
Karori	1/01/2010	Binding	Karori, Karori South
Wellington South	31/05/2010	Binding	Berhampore, Newtown
Tawa	1/07/2010	Indicative	Redwood
Tawa	1/07/2010	Indicative	Redwood
Tawa	1/07/2010	Indicative	Redwood, Tawa
Tawa	1/07/2010	Indicative	Linden, Tawa
Tawa	1/07/2010	Indicative	Greenacres, Grenada North
Tawa	1/07/2010	Indicative	Greenacres, Grenada North

Exchange Name	Planned date for cabinetisation	Planned date status	Suburbs affected
Tawa	1/07/2010	Indicative	Linden
Tawa	1/07/2010	Indicative	Glenside, Redwood
Tawa	1/07/2010	Indicative	Grenada North, Redwood, Tawa
Johnsonville	1/10/2010	Indicative	Churton Park
Johnsonville	1/10/2010	Indicative	Churton Park
Johnsonville	1/10/2010	Indicative	Churton Park, Glenside
Johnsonville	1/10/2010	Indicative	Newlands
Johnsonville	1/10/2010	Indicative	Newlands
Johnsonville	1/10/2010	Indicative	Newlands
Johnsonville	1/10/2010	Indicative	Newlands

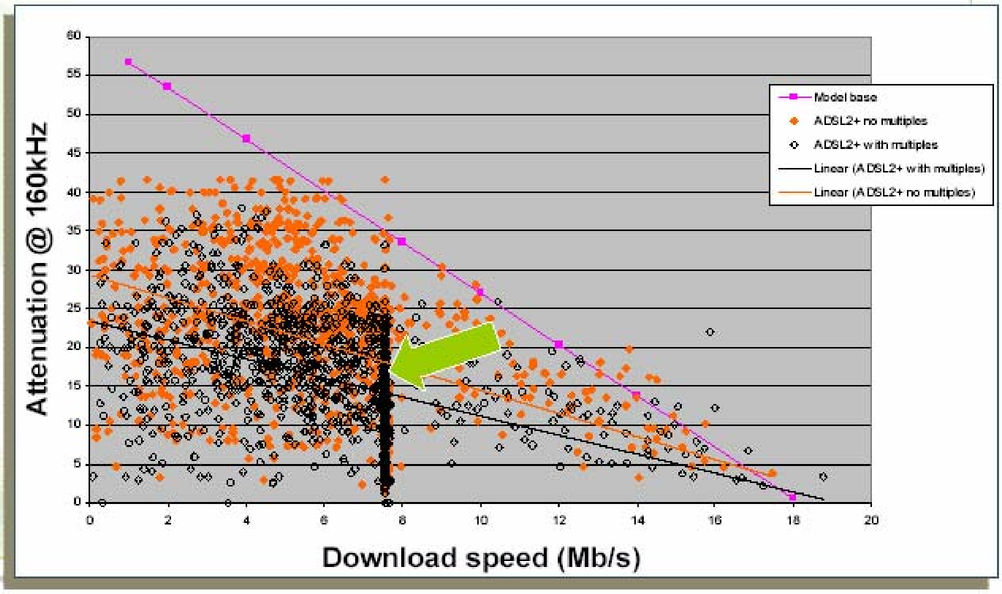
APPENDIX 5
Telecom ADSL2+ Testing

Source: Telecom Wholesale Consultation – Sept 2007

Customer experience

Actual end-user speeds measured at first three ADSL2+ exchanges

Modem performance limits speed to 7.547 Mbit/s



Telecom Wholesale consultatio

Modem testing results - shortly available on Safecom

Modem / Firmware Version at 1 km	Dlink DSL-502T (V3.00B01T01.TX.20060517)	Dlink DSL-504T (Gen I) (V3.00B01T01.TX.20060117)	Dlink DSL-504T (Gen II) (V3.02B01T01.TXC.20061115)	REVISED FIRMWARE Dlink DSL-504T (Gen II) (V3.00B01T01.TXC.20070216)	Dlink DSL-604T (V3.00B01T01.TX.20060516)
XTUC Loop Atten Up (dB's)	28.8	28.6	28.5	28.9	28.6
XTUC Signal Atten Up (dB's)	32.1	32.2	32.3	31.9	32.1
XTUC Noise Margin Up (dB)	12	0.1	11.8	11.8	11.9
XTUC Output Power Down (dBm)	17.1	17.4	18.8	17.8	17.4
XTUC Actual PSD Down (dBm/Hz)	-44.9	-44.6	-43.2	-44.3	-44.6
XTUR Loop Atten Down (dB's)	28.9	28.2	29.7	29.4	28.2
XTUR Signal Atten Down (dB's)	28.9	28.2	30.2	29.9	28.2
XTUR Noise Margin Down (dB)	25.5	21.5	25	12	22
XTUR Output Power Up (dBm)	12.2	12.3	12.2	12.2	12.2
XTUR Actual PSD Up (dBm/Hz)	-38.1	-38	-38.1	-38.1	-38.1
XTUC Bit rate up	590	583	590	583	593
XTUC Max Attainable bit rate up	590	579	590	583	593
XTUR Bit rate down	**7547**	**7547**	**7547**	**13521**	**7547**
XTUR Max Attainable bit rate down	15524	16012	16432	16268	15296
Iperf Upstream (kbit/s)	386	384	388	403	390
Iperf Downstream (kbit/s)	6341	6341	6341	11367	6342
Average Sync time	<30s	<30s	over 30s	<30s	over 30s
Notes	ADSL2+ Annex A	ADSL2+ Annex A	ADSL2+ Annex A	ADSL2+ Annex A	ADSL2+ Annex A

Telecom Wholesale consultation programme - Ethernet 6 September 2007

APPENDIX 6

Other Policy Options

6.1 Overheading

Overheading has significant potential to reduce broadband infrastructure deployment costs. It is currently not encouraged in the Council's District Plan, although it can continue under 'existing use rights' (which enables utilities to replace wires with wires of the same size). A District Plan change made in 2004 prevents any further intensification of overhead cabling in Wellington's urban area – unless resource consent is obtained and:

- the cable is not over 30 mm in diameter; and
- is placed alongside an existing network and is not perceived to have a major visual impact.

The same District Plan change also removed the rule (approved in 1994) which permitted the addition of one overhead cable for the purposes of "new technologies".

The Council encourages the undergrounding of utilities by making it a "permitted" activity – which means that does not require resource consent to proceed. The Council's Undergrounding Policy also reflects public desire to reduce overhead networks by:

- encouraging utility operators to underground their cable networks
- requiring all new subdivisions to have underground cable networks
- providing for a three year contestable fund pilot (from 2006/07) for proposals from residents for partial subsidies for undergrounding projects. To date no money from has been expended from the fund.

Options to relax the District Plan by making overheading a permitted activity (not requiring resource consent) or reinstating the "one cable for new technologies rule" would result in a mixed bag of benefits and risks.

- Although it would enable the rapid deployment of broadband infrastructure without reference to a potentially costly and extended application process, it would not necessarily help the Council meet its broadband objectives, particularly open access.

- The rules would run counter to the Council's Undergrounding Policy, potentially resulting in high profile public opposition. A challenge to the plan change could end up in an extended and costly Environment Court process.

In order to retain control over limiting overheading in the city, no changes are recommended to the Council's current policy and rules around overheading in either the District Plan or Undergrounding Policy.

6.2 Ducting new developments

It is recommended that further work be undertaken on a policy requiring ducting to be laid in all new land (including both greenfields development and single dwelling subdivisions) and multi-dwelling building developments.

Greenfields developments
A number of councils are adjusting their District Plans to require ducting and/or fibre to be laid alongside other utilities established in greenfields developments. Developers are already required to provide for roading, water, stormwater, sewerage and street lighting services (which are vested to the Council on completion) as well as for electricity and telecommunications (though this does not specifically provide for broadband).

The Council already has a District Plan Change process underway to require fibre cabling to be laid in all "urban development zone areas". A specific rule regarding broadband enablement was also included in the Lincolnshire Park structure plan. Once the above plan change is adopted, the structure plans for all developments will be required to specifically include fibre cabling.

This proposed rule, however, may not necessarily meet the Council's broadband objectives as the requirement for fibre cabling does not guarantee that it will be open access infrastructure. A requirement around laying ducting may instead better meet the Council's objectives, though this would require a variation to the change currently underway.

The further work this would require is:
- initiating a variation to the current District Plan change – which would include consultation with affected parties
- changing the Code of Practice for Land Development – to state the network design and materials required
- determining the cost implications, including liability of payment for the infrastructure (this may require a legal opinion).

Small/Single dwelling subdivisions
For smaller subdivisions, any roading is likely to be privately owned (i.e. shared driveways), with any ducting deployed unlikely to be vested back to the Council. Legal advice will be sought on the practicalities of requiring the infrastructure to be laid. Alternative incentives for developers may instead be required.

Multilevel Buildings/Dwellings
Multilevel buildings are also predominantly privately owned spaces. Currently, they are also more likely to be set up for better broadband speeds, even without fibre cabling being installed. NZ Standards currently do provide guidelines for telecommunications that also relate to broadband enablement. Further rules could, however, enhance it further by ensuring buildings have:
- two points of entry for cabling
- 100mm duct available

- usable/accessible space for electronics
- accessible Power source
- provision of a common vault/access pit on the street.

6.3 RMA Process

The Council has already simplified the resource consent/RMA process for telcos by appointing a single telecommunications coordinator to manage all telecommunications infrastructure roll-out requests and provide feedback to improve quality of applications. A key issue in this process has been ensuring that the telcos put in place a protocol whereby they take the lead in communications with adjoining neighbours and interested parties to avoid the Council being overloaded with enquiries and complaints from the public.

Additional resources have also been contracted to ensure the large number of consent applications being received in this area are being processed in an efficient and timely way. Officers are looking to further streamline the Council's processes by identifying a single point of contact who will coordinate not just the resource consent process but the processes for seeking permissions from the Council's Roading and Property teams.

APPENDIX 7

Communication and Consultation Plan

1. Consultation Focus

The formal consultation process will be focused on obtaining comments from the general public, stakeholders, community groups and organisations, and different sector groups on the below key messages.

2. Objectives

The objective of the consultation is to obtain feedback from a representative cross-section of Wellington's residents and ratepayers, community groups and organisations.

3. Key Messages

Before the Council makes any further decisions on its role in facilitating broadband in Wellington city. . . it wants to know what the public thinks.

Key Messages are:

- High quality broadband infrastructure enables economic development and increases productivity. It transforms the delivery of many social and health services, and facilitates new forms of community engagement and participation in public life. Broadband also has positive environmental impacts, such as reduced road congestion and international air travel through for example telecommuting and the use of high definition video conferencing.
- Council's level of intervention in the broadband market will be limited at the Right of Way (layer 0) and Infrastructure (layer 1) levels, limiting the duplication of infrastructure and encouraging services competition from the commercial sector.
- The cost to Council will be minimised and cost-neutral plans promoted.
- Council will promote a shared infrastructure model investing in an urban fibre network that links every school, health provider and community site in Wellington City (MUSH entities).

4. Target Audience

A number of telecommunications companies and information technology experts have already been involved in the process of developing the Council's proposals, and their views have been taken into account.

The planned formal consultation process is intended to encourage a wide range of responses from Wellington's community. All of those who participated in providing initial information and feedback will be given the opportunity to provide further comments. All of the groups that would usually receive the DAP will be made aware of this proposal and additional stakeholder and interested groups and organisations will be targeted – including:

- Telecommunications companies
- Broadband Advisory Group
- Ministry of Economic Development
- Ministry of Education
- Ministry Of Health
- Department of the Prime Minister and Cabinet
- Services State Commission
- District Health Board
- Internet NZ
- TUANZ
- Commerce Commission
- Chamber of Commerce
- Victoria University
- Massey University

5. Consultation Techniques

A number of consultation techniques will be undertaken through the consultation process, and it is intended that we will use the normal channels of print media and use of existing Council publications. The broadband project has a presence on the Council website and electronic submission will be encouraged.

Written comments on the proposal will be invited and submitters will also be given the opportunity to make an oral submission. Submitters will receive advice that their written submission has been received.

Individual meetings with existing stakeholders have been ongoing throughout the process. Additional meetings will be arranged to update them with the most recent project developments.

6. Consultation Evaluation

Written and oral submissions will be summarised and analysed. The result of the consultation will be reported back to the Strategy and Policy Committee.

All submission writers will be notified of the results of consultation.

7. Consultation Programme

The consultation programme is to be determined after Committee approval.