Ngā Pū Waea

Broadband services

Broadband Services
Costs & Prices

June 2012

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1. Introduction

The government has established the following two programmes that are designed to expand and develop New Zealand's broadband services.

Ultra-Fast Broadband Initiative. This initiative focuses on urban areas and is designed to provide urban schools, hospitals, businesses and homes with ultra-fast broadband services via an optical fibre network. This initiative will enable some 75 percent of New Zealanders to be connected to ultra-fast broadband by 2020.

Rural Broadband Initiative. The objective of the first stage of government initiative was to extend the reach of fibre networks in the rural areas that were beyond the coverage of Telecom's fibre to the cabinet programme. This initiative provides fibre connections to most rural schools, an additional 980 cabinets; and provides for 154 new cell phone towers to enable the delivery mobile of broadband services in many new areas.

Phase two of this initiative fills in the gaps between the urban UFB coverage areas and the more remote area that will be covered by the first stage.

Ngā Pū Waea (National Māori Broadband Working Group) has been established by the Minister of Māori Affairs in conjunction with the Minister for CIT (Hon Joyce), and is funded through Vote: Māori Affairs. Te Puni Kōkiri provides the Secretariat.

The broad role of Ngā Pū Waea is to assist in ensuring Māori communities can be connected in a timely and efficient manner, and are able to maximise opportunities arising from the deployment of broadband.

One of the specific roles of Ngā Pū Waea is to engage with the RBI and UFB providers about options for maximising rural and urban coverage and connectivity to marae, wānanga, kura, kōhanga, rūnanga, and other Māori organisations through affordable services.

The purpose of this report is to provide Ngā Pu Waea with the following information:

- the factors that go into pricing of broadband services so that Ngā Pū Waea are in a better position to be able to assist communities in understanding the costs that make up charges for internet connectivity; and

- alternative approaches that might make high speed broadband connectivity more affordable.

2. Introduction to telecommunications networks

In Figure 1 we illustrate the generic structure of a Telecommunications Network. Fixed network engineers traditionally call the access network the "local loop". The local loop provides direct access to the customer for the provision of telecommunications services. It includes the lines between the end customer's building and the closest telephone exchange, whatever the technology – whether the links are wired, wireless, carry TV signals or telephone calls.
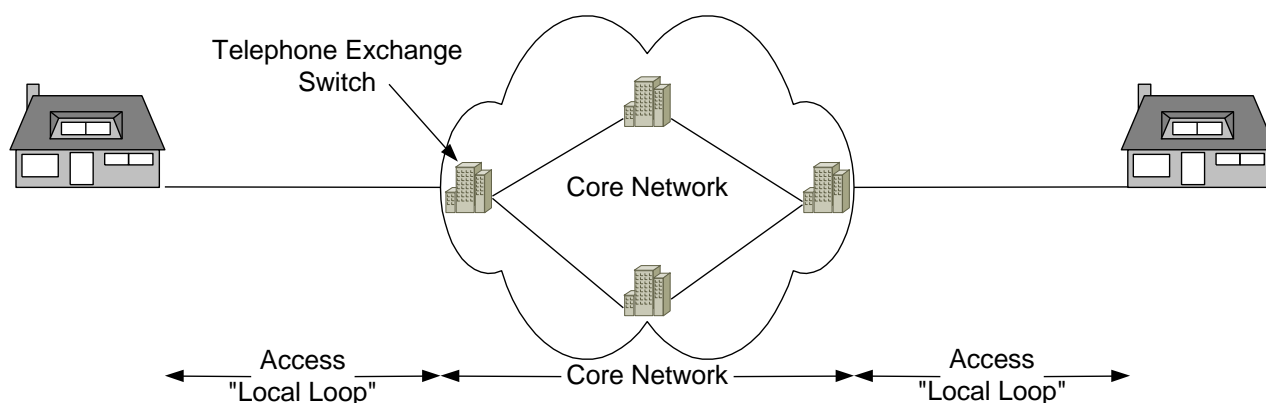
Figure 1 – Basic telecommunications network structure

2.1 Access network technologies

In spite of the development of many new technologies, copper cable dominates the access network. For example, nearly all of Chorus's residential access lines use copper cables for the last mile. However fibre cable is now commonly deployed in most central business areas.

TelstraClear has built a cable TV network that uses fibre and coaxial cable to distribute TV, telephone and data in parts of Wellington and Christchurch.

A number of regional operators have built wireless broadband networks that use either WIMAX or WiFi equipment to deliver Internet connections to their customers.

Cellular wireless technology also, is increasingly being used to bypass the traditional local loop and to provide broadband service to portable devices.

In the traditional network, copper cables radiate out from the telephone exchange in a star like formation to roadside cabinets where many smaller cables radiate out to serve individual streets and sub-divisions. (Refer Figure 2)
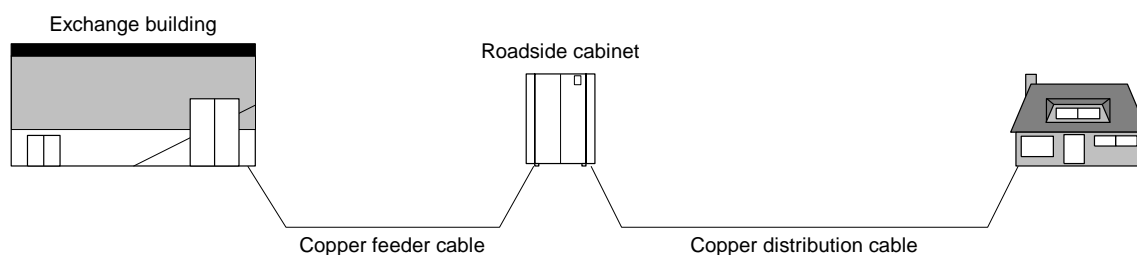
Figure 2 – Structure of a typical local loop

2.2 Local loop developments

2.2.1 Digital subscriber line technology

A telephone line equipped with digital subscriber line (DSL) equipment can carry both data and telephone signals. The low frequency band is used for the ordinary telephone signals and the high frequency band is used for the data signals.

DSL can deliver information that requires higher speeds (and therefore higher bandwidth) to homes and small businesses over ordinary copper telephone lines. For example if your home or small business is close enough to a telephone exchange, you may be able to receive data at rates up to 20 Mbps (millions of bits per second) enabling continuous transmission of motion video, audio, and even 3-D effects.

DSL equipment was originally developed by telephone companies to deliver video services to residential users over their existing copper cable local loops. Video delivery requires significant bandwidth in the downstream direction to wards the customer and very little bandwidth in the upstream direction towards the source of the video. This explains the origin of asymmetric DSL equipment (ADSL) equipment.

DSL systems employ a modem at the customer's end to convert the data from the computer into a high-frequency electrical signal. At either the exchange or local cabinet a Digital Subscriber Line Access Multiplexer (DSLAM) separates the telephone and data signals and feeds them to the appropriate networks. (Refer Figure 3)
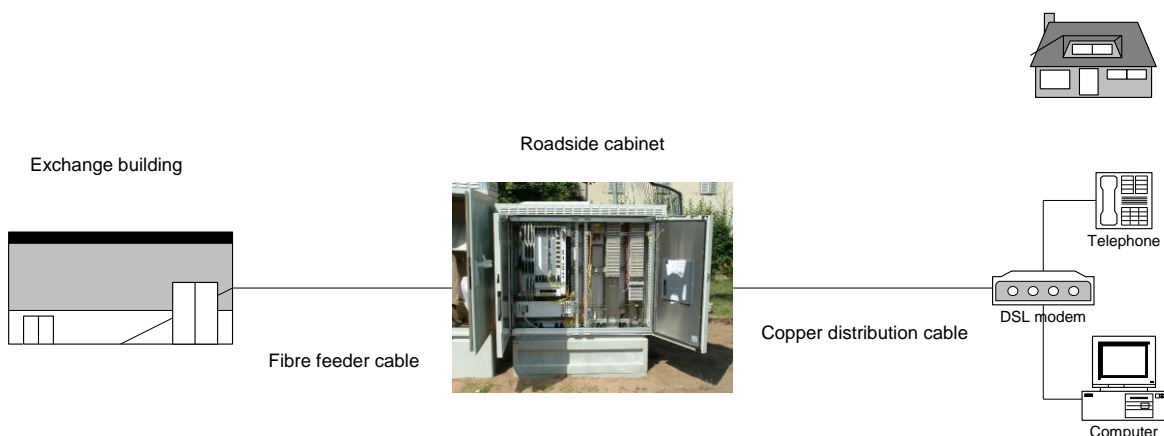
Figure 3 – Basic ADSL system building blocks

2.2.2 Optical fibre cable

Optical fibre systems are high capacity systems and can deliver broadband services. Since the late 1980's optical fibre cable has replaced copper on high-density routes (feeder cables) and the longer rural feeder routes. At the same time there has been tendency to move the roadside cabinet closer to the customer.

Many rural towns, sub-divisions and most CBD buildings are connected to the core network by optical fibre cable. (Telecom estimates that some 90% of its customers are probably within 2km from an optical fibre cable.). Figure 4 illustrates the use of optical fibre cable to serve a small community, a residential area and a high-rise building.
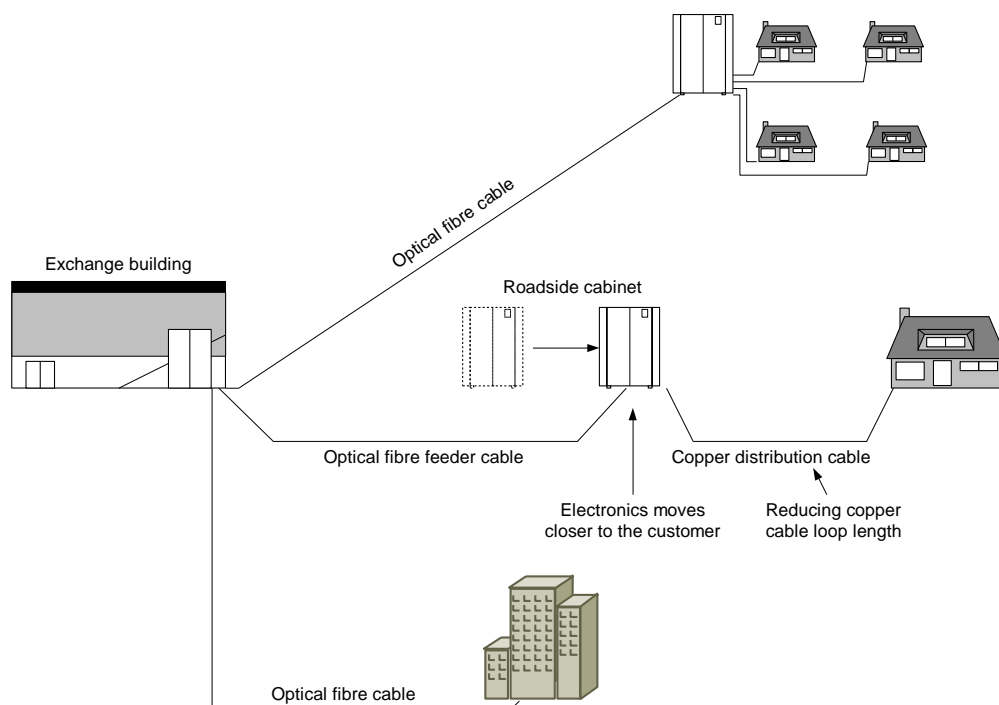
Figure 4 – Optical fibre cable in the local loop

3. Internet Service Providers

An Internet service provider (ISP) is an organisation that provides homes and other businesses access to the Internet and other related services such as web site development and virtual hosting. A typical ISP usually owns its service platforms; for example access control systems, e-mail, servers, billing etc. equipment. Some larger ISPs also own networks whilst others purchase network capacity from others.

Although New Zealand has some 50+ ISP's, the market is dominated by just 5 ISP's who between them hold 92% of the market.

ISP	Market Share
Telecom	49%
TelstraClear	16%
Vodafone	13%
CallPlus (Slingshot)	9%
Orcon	5%
Others	8%

Table 5 – Optical fibre cable in the local loop **(Source Commerce Commission)**

3.1 ISP Services

In addition to providing access to the Internet, ISPs typically provide some or all of the following services to their customers.

- E-mail often with additional filtering, anti-spam and virus checking options;

- Enhanced e-mail services (Yahoo Pro-Mail for example);

- Customer terminal equipment such as modems, wireless routers and firewalls;

- Personal and business web page hosting;

- Flickr accounts;

- Cloud storage; and

- Private content (For example Telstra, in Australia, provides exclusive access to NRL content).

3.2 ISP's building blocks

The following table and diagram provide overviews of the significant components of the "broadband eco-system."

The access network	The connection between the customer's premises and the ISP's domestic network
Domestic network	The fibre based connections between the ISP's various geographic points of presence and the various switches and routers to manage and direct traffic flows. ISPs typically allocate a set amount of domestic bandwidth for each user that reflects the relative quality characteristics of their service. For example, a typical ISP may allocate 45 kbit/s of capacity per customer. Obviously, higher quality service providers allocate a larger bandwidth per customer.
International network	The connections to overseas ISP networks.
Service and management platforms	Access control and management, E-mail, web-hosting, billing, help desk etc.
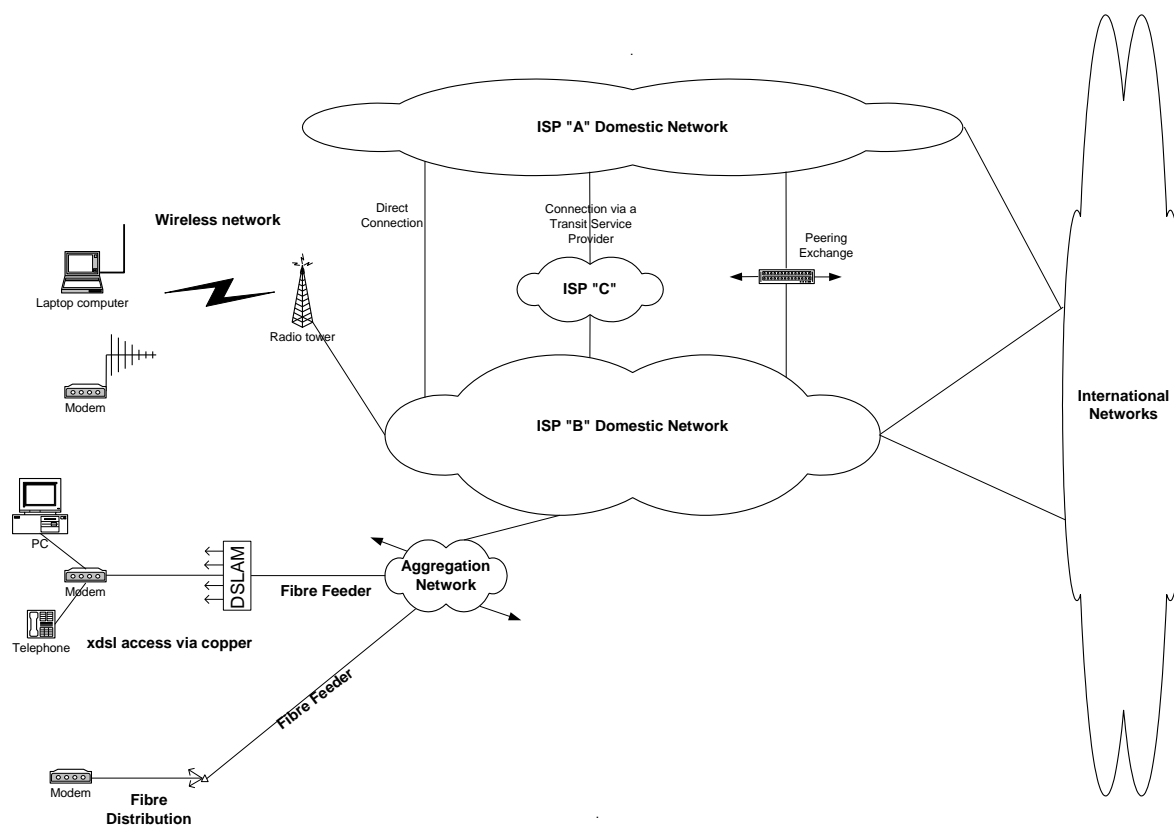
Figure 6 – The Building Blocks of the Broadband Eco-System

3.2.1 Internet access technologies

Broadband Internet access technologies in New Zealand include:

- digital subscriber line (ADSL)—utilises the existing copper-based access network back to either a fibre connected cabinet or local exchange;

- hybrid fibre coaxial (HFC) cable—a separate network combining a fibre backbone and high-speed coaxial cable providing the connection from the node to the premises. (TelstraClear uses this technology in Wellington and Christchurch.)

- mobile internet (including mobile wireless—dongle, datacards, USB modems—and mobile handset internet);

- fixed wireless systems using either WiMAX or WiFi radio equipment;

- fibre to the premises; and

- satellite.

3.2.2 ISP Interconnection

Interconnection of an Internet service provider's network with other networks is achieved by either a peering or transit arrangement.

Peering is an agreement between ISPs to carry traffic for each other and their respective customers.

Transit is an agreement where an ISP agrees to carry traffic on behalf of another ISP or end user.

Peering is often agreed on a no charge basis where each party exchanges roughly the same amount of traffic (i.e. there is perceived equality in the peering relationship), while transit is usually agreed on a straight charged basis.

ISPs typically peer with each other and with major content providers, such as the Yahoo or Google to:

- lower their transit costs by not having to purchase capacity from other backbone providers to reach these sites;

- to make their own network more attractive in terms of sale of transit or peering; and

- to provide better service to their customers (i.e. minimise latency etc).

In general, ISPs will peer where the volume of traffic is such that it is cheaper to peer rather than purchase transit and vice versa. This balance changes dynamically, hence such arrangements are subject to constant change.

3.3 ISP's cost elements

For any ISP the key cost drivers arise from the following components:

- Access network;

- Domestic carriage and peering;

- International carriage and peering;

- Service platforms; and

- Customer management and billing functions.

4. Wholesale market and pricing

4.1 Introduction

In the most general case a new entrant has a range of build versus buy choices. For example:

Telecom	Outsources the provision and operation of its e-mail platform to Yahoo
Vodafone	Uses a mix of Chorus unbundled bitstream services, but has also deployed its own DSL equipment.
Inspire	Has constructed its own fibre and wireless networks in the Wanganui / Manawatu areas, but buys in their domestic carriage and international capacity.
TelstraClear	Provides a Virtual Internet Service Provider with a complete "white label" solution that can be used by a "virtual ISP" to provide their own branded customer offering.
FX Networks	FX has built a new inter-city network that offers domestic transit services to ISP's.

In practice an ISP's build versus buy decisions will be based on private arrangements rather than purchases from publicly available wholesale rate cards. The following sections outline the wholesale prices that ISP's can expect to pay for some of the key components. All wholesale prices exclude GST.

4.2 Access network prices

The Commerce Commission and Crown Fibre Holdings (CFH) set copper and fibre access network charges respectively. They are as follows:

4.2.1 Copper based services

Service	Monthly price
Unbundled copper local loop	Urban $19.84 Rural $36.63
Bitsream services with POTS	
Basic UBA	$21.46
EUBA 40	$25.86
EUBA 90	$33.91
EUBA 180	$40.78
Bitsream services without POTS	
Basic UBA (without POTS)	$45.92
EUBA 40	$50.32
EUBA 90	$58.37
EUBA 180	$65.24

4.2.2 Fibre based services

Service	Monthly price
Dark fibre	$355.00
Bitsream services	
Residential entry	$37.50
Residential entry – triple play	$41.25
Business entry	$49.95
Education services	
Education 30 / 30	$50.00
Education 50 / 50	$58.00
Education 100 / 100	$150.00

4.3 National and international carriage prices

ISP's can purchase

- <u>national</u> carriage and transit services on a competitive basis from aggregators and infrastructure owners such as Chorus, Telecom, TelstraClear, FX Networks and Kordia. Prices for national transit services typically range from $25 ~ $50 per Mbps.

- <u>international</u> carriage and transit services on a competitive basis from aggregators such as Telecom, TelstraClear, Pacnet, Vocus and Odyssey. Prices for international transit services typically range from $50 ~ $90 per Mbps.

4.4 Wholesale price trends

4.4.1 Access

Unbundled local loop

Since the unbundled local loop (UCLL) prices were first set in November 2007, Chorus has deployed a fibre-to-the-node network through a process referred to as cabinetisation. The cabinetisation programme effectively shortens the length of copper in its network and as a result the Commerce Commission has recently released a draft determination for the unbundled copper local loop service. The Commission has proposed that UCCL prices should fall over a three year period. At the time that this paper was prepared the Commission has not released its final determination.
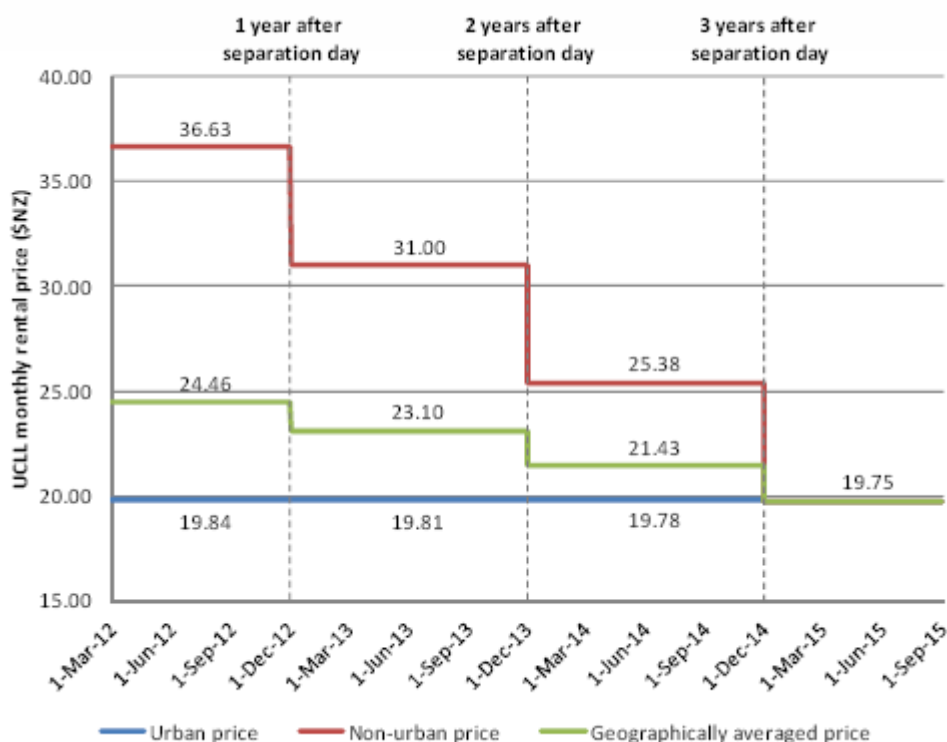

Figure 7 – Proposed glide path for UCLL monthly prices

Copper bitstream services

The UBA price is set under a retail-minus (18%) pricing principle. UBA (with POTS) prices have been frozen by the Government for three years from the day that Telecom was separated into two parts. UBA (without POTS) prices will decrease as the geographically averaged price for the underlying copper price decreases as illustrated in Figure 7 above.

UFB prices

Wholesale residential UFB prices set out above are fixed until 31 December 2015, after this date the CFH contract permits a $1 increase for each year until 2020. Business and school rates are fixed until 31December 2019.

4.4.2 Domestic carriage

Whilst the Commerce Commission has set prices for a number of Chorus's backhaul services these prices now represent an upper limit. Whilst there have been significant price reductions over the past three years, prices have stabilised recently, but it is likely that there will further price reductions as volumes on "thick routes" increase. It is less likely that prices will not fall as quickly on thin provincial routes.

4.4.3 International

TeleGeography reports that the annual rate of international bandwidth growth is dropping off, from 60% in recent years to 47% last year, and expects it to relax further – down into the mid -30% region – over the next few years. Whilst trans-Pacific routes now account for almost 80% as much traffic as the traditionally dominant trans-Atlantic systems, the utilisation is reported to be under 20% on most routes.

New Zealand has access to two prime international routes, viz:

- A direct trans-Pacific route to the USA; and

- A direct trans-Tasman route to Australia where operators can gain competitive access to a number of US and Asia routes.

Southern Cross has recently reduced prices to the US from both New Zealand and Australia by 44%. Further reductions can be expected but, at the end of the day, specific limiting factors mean that cable construction costs are unlikely to see a corresponding decline. "The fundamentals of building cable systems – the cost of steel, the cost of oil both for the vessels and to make polythene, the cost of copper, the cost of materials to build repeaters – that isn't going down. All those indices are going up," remarked Huawei Marine Networks CEO Nigel Bayliff at a recent Australian conference.

"We can try and space things out more, we can try and squeeze more out of each cable – but fundamentally, those costs have an endpoint."

5. Retail prices

5.1 Introduction

Broadband services are frequently sold as mixed bundles, allowing users to choose among stand-alone offers or bundles of services.

The complexity of some of the bundled offers makes them increasingly hard to interpret and compare.

For the purposes of this report we have chosen to present retail prices for the following three user scenarios.

Entry level user   E-mail and occasional browsing (5 ~ 10 GBytes)

Mid-range user   Typical family, but with limitations with respect to video viewing (~ 40 GBytes)

Power user   Teenage family with significant video use. (80 ~ 100 GBytes)

The Commerce Commission reports[1] that an average New Zealand broadband connection uses approximately 10 GBytes of data each month. (Up from 7.5 GBytes in the previous year and similar to the Australian average.)

In every case we have excluded short terms specials, product bundles that include either national or international calling offers and the Auckland / Wellington / Christchurch discounts that some ISP's offer.

All retail prices include GST and Appendix 1 provides a more comprehensive data set.

5.2 Copper based services

These services typically use ADSL2+ equipment to deliver the broadband service over a standard telephone line and the cost of the copper line is shared across the telephone and broadband services.

Typical retail prices are as follows.

User type	Monthly price
Entry level	$70 - $80
Mid-range	$90 - $110
Power	$115 - $155

The above prices include a standard telephone line that comes with free local calling. Customers then have the opportunity to add national and international calling packages to the baseline telephone and broadband package.

5.2.1 Price and competition

Slingshot is the only ISP that clearly competes on price[2]. Arguably there are very small price differences between the other significant providers.

This is partly because access network and telephone line wholesale inputs are regulated and partly because ISP's have chosen to compete in other ways. For example:

1. All suppliers have increased data caps as the wholesale prices for national and international carriage has decreased.

2. Telecom bundles "Pro-email and Fickr accounts plus anti- virus software for up to three computers.

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[1] Commerce Commission Annual Telecommunications Monitoring Report 30 April 2012

[2] They appear to do this by allocating less bandwidth per customer

3. TelstraClear has a unique way of structuring its data caps and provides free[3] access to content.

4. Orcon offers unmetered access to iSKY.

5. SNAP provides free access to Youtube content.

5.2.2 Standalone broadband services

Vodafone, Orcon, Slingshot and a number of the Tier 2 ISP's offer a standalone or naked broadband service. A naked DSL connection does not include a standard telephone line, and therefore the cost of the cable pair can't be shared across the broadband and telephone services.

In a February 12th NBR article, Chris Keall reports that:

- IDC reports that naked broadband accounts for 45,000 broadband accounts or 4% of the market;

- CallPlus has around 15% of its 160,000 Slingshot customers on naked DSL plans; and

- Vodafone has some 14% of its customers on naked accounts[4].

Typical naked broadband prices are as follows.

User type	Monthly price
Entry level	Not generally offered
Mid-range	~$60
Power	~$100

Orcon, Callplus and others offer a Voice over IP service as an alternative to the standard telephone line. In this case the voice traffic is carried by the broadband service. Typical broadband + VoIP package add ~$15.00 to the above prices. In each case the voice service doesn't support ancillary voice services such as FAX and security and medical alarms.

If customers do not wish to subscribe to any of the telephony add-ons then they can use either a mobile phone or one of the proprietary "over-the-top" (of the broadband service) products, such as Skype, Instant Messenger, etc.

5.2.3 Higher speed copper based services

A small number of ISP's are beginning to offer higher speed services that use VDSL technology, such as that deployed by Chorus. The Chorus service guarantees a minimum 15Mbps download / 5Mbps upload speed with guaranteed throughput of 96kbps.

For example SNAP offers a VDSL service that has a $50 uplift over their standard naked ADSL2+ plans.

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[3] This content that does not count against a users data volume cap

[4] Vodafone requires these customers to be "on account" mobile customers

5.3 Fibre based services

Although fibre to the business services have been available for a number of years, fibre to the home services are only just beginning to emerge. At the time of preparing this report the Orcon is the only Tier 1 ISP to have announced a fibre plan. Uber and Inspire also have consumer fibre plans.

Typical prices based on a 30Mbps connection are as follows.

User type	Monthly price
Entry level	Not offered
Mid-range	$90
Power	$100+

5.4 Broadband wireless based services

Apart from mobile wireless Internet, fixed-wireless broadband (such as WiMAX WiFi) is also used to provide Internet access to consumers. Fixed-wireless broadband services use an air interface to connect a broadband service. An antenna installed at the customer's premises receives signals from the service provider's base station.

There were approximately 20 fixed-wireless broadband providers in New Zealand, operating in both metropolitan and rural areas.

Typical prices for a broadband wireless that offers at least a 5 Mbps service are as follows:

User type	Monthly price
Entry level	$50 - $60
Mid-range	$90 - $120
Power	Not generally available

5.5 Satellite based services

Satellite broadband services are available throughout New Zealand, but they primarily serve customers living in low population density areas where there is no copper based broadband service.

Although satellite service headline speeds are usually quoted as being 5 Mbps the actual download speed is much less than this. This is because web-based services exchange their data using a protocol whereby the sender forwards a burst of data and then it waits for an acknowledgement that the data has been received before it forwards another burst of data. If it takes a long time for the acknowledgement to be received then the overall data transmission rate will be slowed. In the case of a satellite connection the data signals have to travel an additional 72,000Km via a geostationary satellite. The additional delay of 450mS will reduce the maximum speed to less than 1 Mbps. Each satellite connection requires the installation of a 0.8m satellite antenna and a special modem. Typical satellite service prices are as follows.

User type	Monthly price
Entry level (1 GByte)	$56.35
Mid-range (7 GBytes)	$217.35

Excess data can be purchased at the following rates ay $16 to $18 per additional GByte.

5.6 Data caps and excess data charges

In many OECD countries fixed line operators do not mention bit caps at all or they do not form part of the variables considered by consumers – although a "reasonable use" clause may exist in the operators general terms and conditions. However in some 13 OECD countries most plans are capped and the bit cap amount constitutes a pricing criterion. The following chart illustrates the prevalence of data caps as measured by the OECD in September 2011.
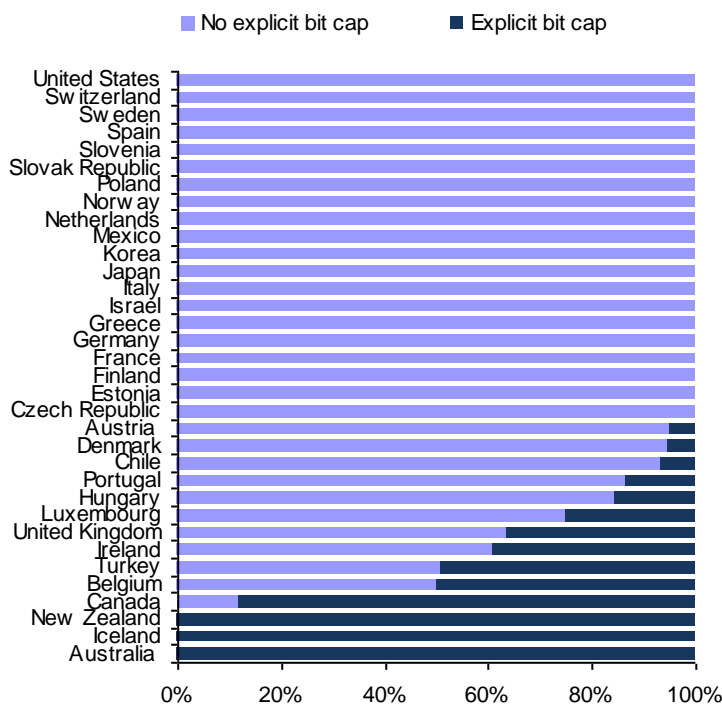
Figure 8 – Data cap prevalence[5]

Prices for excess data range from $1 per GByte when small volumes are added to an entry-level plan down to $0.40 per GByte when significant volumes are added to a medium to heavy use plan.

5.7 Retail price trends

As we have identified in a previous section we don't expect any significant reductions to occur in wholesale network prices. We do however expect that the content market will undergo significant change.

At present most content is imported from offshore servers, however there is an increasing trend to locate this content in NZ. For example, Goggle has servers in Auckland and Christchurch, Akamai delivers Microsoft software updates from a NZ server and Kordia has begun to market its content distribution network.

These initiatives will mean that an increasing number if ISP's will exclude NZ hosted content from their data cap count.

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[5] OECD report at http://www.oecd.org/sti/ict/broadband

In addition it is arguable that some ISP will remove standard telephony services from their bundles as VoIP services and the various "over the top" gain in popularity

6. Business Broadband prices

6.1 Introduction

The following section summarises business broadband service prices from a small range of ISP's that have advertised either "business" or "at work" solutions. Overseas this would mean that the ISP has probably allocated more bandwidth to each business customer. i.e. Overseas ISPs will say that they will offer a service with a lower contention ratio. In general, NZ ISPs do not advertise contention ratios, therefore it is very difficult to provide a meaningful comparison of the differences between typical residential and business plans.

In reality the NZ ISP business plans are probably aimed at the SME market, as it is likely that any larger business will purchase a customised solution that they have selected from the following components:

Fibre or copper access

International traffic

National traffic

Web and e-mail hosting

All retail prices include GST and Appendix 2 provides a more comprehensive data set.

6.2 Copper based plans

A typical plan for say 40 GBytes will cost $80 - $110. It is likely that the price variation can be accounted for by differences in bandwidth allocation.

6.3 Fibre based plans

In general larger businesses use fibre solutions that have customer specific pricing. A 1000 GByte Orcon plan will cost $481 for a 30Mbps (peak speed) connection and $516 for a 100Mbps (peak speed) connection.

7. Rural broadband Initiative

7.1 Introduction

The Rural Broadband Initiative RBI complements the Government's $1.5 billion Ultra-fast Broadband Initiative that seeks to accelerate the rollout of ultra-fast broadband to 75% of New Zealanders. In the first round of contracts covering the Zone 4 area (i.e. the most remote rural area where exchange areas usually have less than 500 lines.) were awarded to Chorus and Vodafone. Following this initial round of contracts the MED has awarded contracts for Zone 3 (i.e. the area between the urban UFB areas and zone 4) and the very remote rural schools. The Phase2 contracts have been awarded to Chorus, Network Tasman, Araneo, Gisborne.Net and Inspire.

7.1.1 Chorus

Chorus has undertaken to:

- Provide 100 Mps (most of these will be fibre connections) connections to:

    o all but 57 very remote schools,

    o all rural hospitals and up to 100 rural health centres;

- Install fibre backhaul rural cabinets that serve some 104,700 lines; and

- Install fibre backhaul to up to 154 cellular wireless sites.

7.1.2 Vodafone

Vodafone has undertaken to provide a wholesale cellular wireless based service that provides coverage of 80% of households in Zone 4.

The RBI Broadband Service is a wireless service that enables access to, and interconnection with, that part of Vodafone's network that connects end users premises to Vodafone's local data network (or equivalent facility) and includes backhaul from that local data network back to a POI. It provides an Access Seeker with an internet grade "best efforts" bitstream service and enables an Access Seeker to offer its End Users fixed wireless broadband services.

Vodafone's RBI Broadband Service consists of a single "best efforts" IP broadband service. The service is designed to have a peak throughput of at least 5Mbps downlink and 500kbps uplink, and dimensioned to deliver a 99.9% probability of providing to any End User a minimum average throughput of 45kbps downlink during any 15 minute period;

The service is supplied to an End User by a wireless radio transmitter located at a Vodafone cell site and a wireless terminal that has been installed by the Access Seeker in accordance with Vodafone's guidelines;

7.1.3 Network Tasman

Network Tasman has undertaken to fibre based connections to 7 schools and libraries located in the rural Nelson, Motueka and Picton areas.

7.1.4 Araneo

Araneo has undertaken to provide a broadband service to 28 schools scattered from Mangamuka School in the North to Half Moon Bay School on Stewart Island.

The service is designed to have a peak speed of at least 10 Mbps with a guaranteed throughput of 5 Mbps in both the downstream and upstream paths. i.e. the proposed service will is symmetrical.

7.1.5 Gisborne.Net

Gisborne.Net has undertaken to provide a broadband service to 12 Poverty Bay schools.

The service is designed to have a peak speed of at least 20 Mbps with a guaranteed throughput of 5 Mbps in both the downstream and upstream paths. i.e. the proposed service will is symmetrical.

7.1.6 Inspire

Inspire has undertaken to provide a broadband service to 15 schools in the Wanganui, Waimarino, Rangitikei and Manawatu areas.

The service is designed to have a peak speed of at least 10 Mbps with a guaranteed throughput of 5 Mbps in both the downstream and upstream paths. i.e. the proposed service will is symmetrical.

7.2 RBI wholesale prices

In general the RBI fibre prices are equivalent to the UFB prices for the same products.

The wholesale prices for Vodafone's cellular broadband service are as follows:

Product	Price	Data cap	Overage rate
RBI Broadband Service	$44.35	10 GBytes on peak 50 GBytes off peak	$1.50 / GByte
RBI Broadband Service plus voice	$52.17	10 GBytes on peak 50 GBytes off peak	$1.50 / GByte
Enhanced RBI Broadband Service	$64.40	Not applicable	Not applicable

8. Provision of broadband services to small communities

8.1 Introduction

Telecommunications network are characterised by having high fixed costs with low variable costs. This means that there are very few opportunities to reduce prices to end-users unless one connection can be shared across many end-users. (Party lines were the norm many years ago years ago!)

8.2 International and domestic network sharing

Many users share this component of the service. To some extent Slingshot is able to offer slightly lower prices because they appear to allocate a little less (national and international) bandwidth to each customer. They offset some of the downside of this approach by carefully prioritising sensitive traffic.

8.3 Access network sharing

As we have outlined above the cost of access network forms a significant part of the overall cost of providing an individual broadband connection and any sharing arrangement is likely to offer significant savings to an end user.

If we dig a little deeper it quickly becomes apparent that civil costs of installing cable networks can't be shared. That is because a cable is required to every user. However wireless technologies do allow the civil costs (towers and sites) to be shared across many users. In practice there are two types of wireless networks. These are:

- Regional networks that cover significant areas; and

- Local networks such as a single home or a community housing area.

If a wireless network is contemplated then there must be a line of sight path between the broadband wireless terminal and the end-user's terminal.
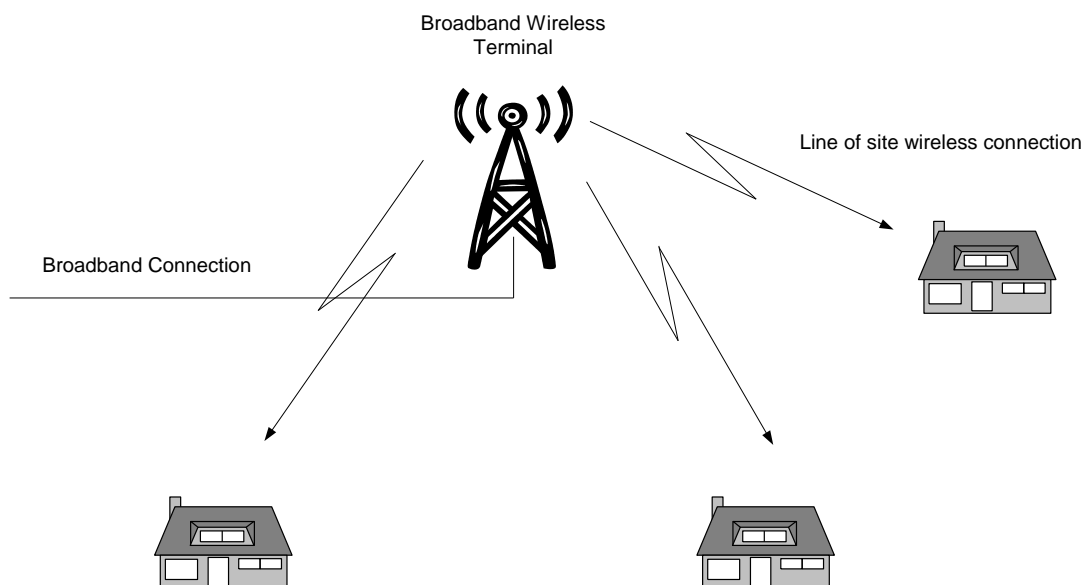
Figure 9 – Community wireless broadband coverage

8.3.1 Regional networks

A number of ISPs such as Uber, Inspire and Gisborne.Net etc have installed regional wireless networks that use a mix of licensed and unlicensed spectrum.

Typically installation costs for this type of solution are as follows:

Component	Installation cost
Connection to fibre distribution network	This depends on the distance from the repeater site back to the nearest fibre access point. If there is line of site access back to the fibre access point this connection could be provided by a point-to-point microwave link.
Hill top repeater (solar power, simple pole, enclosure and broadband wireless equipment)	$15,000 - $20,000
End-user terminal including roof mounted outdoor antenna and router.	$1,500 – $2,000

Operating costs will be in the range of 5% – 15% of the initial investment cost.

The cost per connection (and therefore the price) is highly dependent on the take-up and there is no reason to believe that any new operator could be in a position to offer a cheaper service than the prices that are typically offered by existing retailers unless the new operator is able to underwrite / guarantee take-up.

8.3.2 Local networks

This solution is similar to:

- The home or café WiFi system that has a very limited range. These systems can be set up to provide either or open or password access.

- A campus (hot-spot) solution like that offered in various cities. These solutions come with the ability to mange / control access and if necessary charge for usage.

Typically installation costs for this type of solution will be as follows

Component	Installation cost
Connection to fibre distribution network	Assume a typical residential fibre connection
Local hotspot mains powered installed on the roof of a centrally located community building.	$2,000 - $4,000
End-user terminal including small indoor antenna and router.	$300 – $500

There are vendors that offer out-of-the-box solutions that enable public network access for end users. The user will be presented a login screen when first opening his web browser. Once a login and password is provided, the user will be allowed Internet access.

These solutions are ideal where an administrator doesn't have control over the user computer. No software installation or network configuration is needed; the hotspot system will direct any connection request to the login form.

Extensive user management is possible by making different user profiles, each of which can allow certain uptime, upload and download speed limitation, transfer amount limitation and more.

8.4 Community wireless broadband examples

8.4.1 Rural Link

Rural Link is a technology company that specialises in wireless technologies. They are a joint venture between WaikatoLink (University of Waikato's technology transfer and commercialisation office) and rural IT provider Rezare Systems.

Through its various brands Rural Link offers wireless broadband services in both rural and the Hamilton city areas.

Rural Link has a platform that supports casual, pre-pay Internet access in the halls of residence at the University of Waikato. The platform has also since been selected by the Bay of Plenty Polytechnic to control all student access as well as by Hamilton City Council to power their free CBD WiFi project – "Hamiltonline".

Rural Link has also partnered with the following organisations:

Tuhoe Education Authority:

This network was constructed through a partnership between the Tuhoe Education authority, Rural Link and the Government (through the Broadband Challenge fund). This network started as a trial in 2003 in the Te Urewera National Park area, connecting Te Kura Toitu O Te Whaiti-nui-a-toi in Te Whaiti, Te Kura Kaupapa Māori o Huiarau in Ruatahuna and Te Kura Maori-a-rohe O Waiohau in Waiohau.

It is understand that the original network has been expanded to cover the whole of the Tuhoe Rohe.

Hokianga Wireless Network

This network was constructed in a partnership between Rural Link and the communities living at the northern end of the Hokianga Harbour during 2008. I understand that the network serves a couple of schools and 25 – 30 houses.

Computer Clubhouse 274, Clover Park Hamilton

Rural Link has built a community WiFi network to extend the reach of the Clubhouse 274 to the surrounding suburb of Clover Park. Clubhouse 247 is a member of the international group of Computer Clubhouses, who aim to provide a creative and safe community-based learning environment where young people work with adult mentors to explore their own ideas, develop skills and build confidence through the use of technology. The WiFi network enables members of the community to access the network facilities of the clubhouse without requiring them to have an existing Internet connection.

8.4.2 Inspire

Inspire has wireless networks that cover much of Wanganui and Palmerston North. It is understand that they are contemplating rolling out some form of pre-pay or pay as you go system.

8.4.3 Wellington City Council

Wellington City Council has provided a free WiFi network that provides coverage from the stadium to the Embassy cinema, encompassing the waterfront, the Golden Mile and Cuba Street.

The network is funded by the Council, business sponsorship and is provided by TeamTalk through its Araneo and CityLink subsidiaries.

8.4.4 Dunedin "Digital Office"

Dunedin's Digital Office has announced that they propose to provide free community WiFi, to a "less wealthy" part of the city, on a twelve-month trial.

They propose to utilise a South Dunedin school's fibre connection and provide a free after (school) hours WiFi service to about 20 homes. The ODT reports that the trial is expected to cost up to $30,000. InternetNZ has contributed $12,500 and other Dunedin Businesses are offering time and equipment.

**Appendix A
Retail Plans**

1. Copper Access Network Plans

Introduction

The following tables illustrate typical retail plans. Unless stated otherwise each one of these plans includes the following items:

Telephone line with free local calling

Broadband service with:

Internet access

Email with spam filtering.

The tables exclude restricted speed plans, specials, and various discounts that are offered for various service bundles and service delivery locations.

Telecom

Plan name	Price	Data cap	Remarks
Starter	$80	5 GBytes	
Lite	$95	30 GBytes	
Mobile	$109	40 GBytes	
Broadband	$115	120 GBytes	

TelstraClear

Plan name	Price	Data cap	Remarks
	$84	2 GBytes	
	$87	10 GBytes	
	$95	20 GBytes	
	$110	40 GBytes	
	$120	60 GBytes	
	$155	100 GBytes	
	$180	150 GBytes	

Vodafone

Plan name	Price	Data cap	Remarks
Basic	$70	3 GBytes	
Easy	$80	8 GBytes	
Ideal	$90	20 GBytes	
Ultimate	$100	60 GBytes	

Slingshot

Plan name	Price	Data cap	Remarks
Broadband 10	$71	10 GBytes	Slingshot priorities traffic as follows: 1. VOIP 2. Gaming 3. Browsing 4. Streaming 5. Local traffic 6. File sharing (P2P)
Broadband 50	$81	50 GBytes	
Broadband 100	$91	100 GBytes	
Ultimate	$101	unlimited	Limited bandwidth allocated to users of this plan

Orcon

Plan name	Price	Data cap	Remarks
	$70	5 GBytes	
	$79	10 GBytes	
	$85	15 GBytes	
	$95	25 GBytes	
	$105	35 GBytes	
	$125	55 GBytes	
	$155	105 GBytes	
	$235	205 GBytes	
	$315	305 GBytes	

Alternative copper based plans

A number of ISP's offer plans that do not include a standard telephone connection. These are offered as either a pure naked broadband service or a naked broadband service plus a "voice over IP" telephone service.

In general the VoIP telephony services are fine for voice services but they cannot support a number of traditional telephony add-ons such as household and medical alarms and FAX machines.

The following tables illustrate a range of these plans.

Naked Broadband Plans

Inspire

Plan name	Price	Data cap	Remarks
	$55	10 GBytes	
	$60	50 GBytes	
	$100	100 GBytes	
	$165	200 GBytes	

SNAP

Plan name	Price	Data cap	Remarks
	$60	10 GBytes	
	$80	25 GBytes	
	$90	45 GBytes	
	$120	105 GBytes	
	$160	201 GBytes	

Vodafone

Plan name	Price	Data cap	Remarks
Ideal naked	$55	20 GBytes	
Ultimate naked	$65	60 GBytes	

Woosh

Plan name	Price	Data cap	Remarks
Naked 20	$74.85	20 GBytes	
Naked 40	$89.95	40 GBytes	
Naked 80	$104.85	80 GBytes	

Naked Broadband with VoIP add-on

Orcon (Genius Service)

Plan name	Price	Data cap	Remarks
	$75	30 GBytes	Additional $10 for an integrated one cordless phone
	$89	60 GBytes	
	$99	200 GBytes	
	$199	1000 GBytes	

Fibre Network Plans

Introduction

At the time that this report was prepared only Orcon and Uber had announced retail plans that are based on underlying UFB fibre infrastructure. Their plans are as follows. Inspire has

Orcon

Plan name	Price	Data cap	Remarks
	$75	30 GBytes	Service provides 30Mbps download and 10 Mbps upload speeds.
	$89	40 GBytes	
	$99	200 GBytes	Additional $10 for an integrated one cordless phone
	$199	1000 GBytes	

Uber

Plan name	Price	Data cap	Remarks
	$99	150 GBytes	Service advertised as a 50Mbps service.
	$199	250 GBytes	Service includes a phone line

Inspire has small fibre network in Palmerston North and advertises the follow fibre based plans.

Inspire

Plan name	Price	Data cap	Remarks
	$90	40 GBytes	Service advertised as a 10Mbps service.
	$130	100 GBytes	''
	$155	40 GBytes	Service advertised as a 100Mbps service.
	$195	100 GBytes	''
	$270	200 GBytes	''
	$345	400 GBytes	''

School Plans

In addition Orcon has advised the MED that they propose to release the following plans for schools. These plans are based on the UFB education service prices.

Connection prices

A connection with a peak speed of 30 Mbps and guaranteed through put of 10 Mbps $113.95

A connection with a peak speed of 500 Mbps and guaranteed through put of 10 Mbps $148.35

Data pack prices

30 GBytes	$34.50
60 GBytes	$46.00
100 GBytes	$69.00
250 GBytes	$138.00
1,000 GBytes	$322.00

Broadband Wireless Plans

The following tables illustrate a typical range of wireless broadband prices.

Inspire (Wanganui Manawatu area)

Plan name	Price	Data cap	Remarks
	$37.50	1 GByte	Low speed offer 1 Mbps / 512 Kbps
	$50	5 GBytes	Medium speed offer 4 Mbps / 768 Mbps
	$70	20 GBytes	Max speed 5 Mbps / 1 Mbps
	$90	40 GBytes	
	$130	100 GBytes	
	$205	200 GBytes	

Primowireless (Taranaki area)

Plan name	Price	Data cap	Remarks
Primo 5	$49	5 GByte	Service advertised as a 5 Mbps up 5 Mbps down service.
Primo 10	$59	10 GBytes	
Primo 20	$79	20 GBytes	Excess data charged at $5.12 per Gbyte
Primo 30	$99	30 GBytes	
Primo 40	$109	40 GBytes	

No8 Wireless (Hamilton City WiMax Service)

Plan name	Price	Data cap	Remarks
Starter 2/2	$100	5 GBytes	Service advertised as a 2/2 Mbps service.
Power 5/5	$175	5 GBytes	Service advertised as a 5/5 Mbps service.

No8 Core (Waikato / BoP wireless Service)

Plan name	Price	Data cap	Remarks
Basic	$59	10 GBytes	Service advertised as a 512Kbps / 256 kbps service.
Everyday	$79	20 GBytes	Service advertised as a 1 Mbps / 256 kbps service.
Power	$100	30 GBytes	Service advertised as a 1 Mbps / 1 Mbps service.

Uber (Northland)

Plan name	Price	Data cap	Remarks
	$65	3 GBytes	Service advertised as a 5Mbps service.
	$89	10 GBytes	Service includes a phone line but doesn't support FAX
	$129	30 GBytes	
	$299	100 GBytes	

Woosh

Plan name	Price	Data cap	Remarks
Air 2	$34.95	2 GBytes	Service advertised as a 5Mbps service.
Air 7	$39.95	7 GBytes	Service requires a wireless router which can be rented for $5 per month.
Air 20	$59.95	20 GBytes	

Yrless (Central Otago wireless Service)

Plan name	Price	Data cap	Remarks
	$34.50	10 GBytes	Service advertised as an up to 1 Mbps service.
	$57.50	unlimited	Service advertised as an up to 8 Mbps service.
	$230	Up to 100 GBytes	Service advertised as an up to 50 Mbps service.

Satellite Service Plans

The following table illustrates a typical range of prices for satellite based services.

Farmside

Plan name	Price	Data cap	Remarks
Lite	$56.35	1 GByte	
Regular	$90.85	2 GBytes	
Plus	$113.85	4 GBytes	
Pro	$217.35	7 GBytes	

Additional data

1 GByte	$33.35	10 GBytes	$182.85
2 GBytes	$44.85	15 GBytes	$251.85
5 GBytes	$102.35	20 GBytes	$320.85

Appendix B
Business Plans

Introduction

The following tables illustrate typical retail plans that have been advertised as either business or "at work" plans.

Unless stated otherwise each one of these plans excludes a telephone line.

Copper based plans

Maxnet

Plan name	Price	Data cap	Remarks
	$69.95	20 GBytes	
	$79.95	40 GBytes	
	$89.95	80 GBytes	
	$99.95	Unlimited	Limited availability

Orcon (@ work)

Plan name	Price	Data cap	Remarks
Bronze	$109.19	55 GBytes	
Bronze	$155.19	105 GBytes	
Silver	$126.49	65 GBytes	
Silver	$172.44	115 GBytes	

TelstraClear

Plan name	Price	Data cap	Remarks
Swift	$48.90	10 GBytes	
	$59.90	20 GBytes	
	$74.90	40 GBytes	

Xtreme Networks

Plan name	Price	Data cap	Remarks
BisULTRANZ 40	$299.00	40 GBytes	Unlimited national traffic
BisULTRANZ 50	$349.00	50 GBytes	Unlimited national traffic
BisULTRANZ 60	$399.00	60 GBytes	Unlimited national traffic

Fibre based plans

Orcon (@ work)

Plan name	Price	Data cap	Remarks
30 Mbps PIR / 10 Mbps CIR	$194.35	30 GBytes	
30 / 10	$205.85	60 GBytes	
30 / 10	$228.85	100 GBytes	

30 / 10	$481.85	1000 GBytes	
100 / 50	$228.85	30 GBytes	
100 / 50	$204.35	60 GBytes	
100 / 50	$263.35	100 GBytes	
100 / 50	$516.35	1000 GBytes	