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Ultra-fast broadband in New Zealand: Early adoption experience

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Abstract

The New Zealand Government Ultrafast Broadband Initiative has been in progress now for a little over two years. Are its intended goals being achieved? As at December 2012, the rollout is essentially on schedule, even though there have been some challenges. In particular, the Government specified that most priority customers within the candidate areas should be addressed by the end of 2015 and this appears to be on track. Take-up of services by these customers is also progressing well. The paper provides a brief review of three of the ways the

UFB is being used to enhance the outcomes for business, education and healthcare. Residential coverage is also progressing, but the take-up is low at this point of time as suitable services are only just emerging from the Retail Service Provider community. Overall it is assessed that the 10 year programme of work is delivering on expectations at this point in time, but there is still a long way to go and there are likely to be many challenges and perhaps a few surprises ahead.

Background

Back in late 2008, a key policy plank of the newly elected New Zealand National Government (Key 2008 ^[6]) was a \$1.5 billion fund for the rollout of Ultra-Fast Broadband (UFB). The aim was to accelerate deployment of Fibre-to-the-Premises (FTTP), to reach 75 per cent of the population, across 33 towns and cities (urban New Zealand) by the end of 2019. The Government specified that the focus in the period until the end of 2015 should be to provide access to priority broadband users (being businesses, schools & health services) as well as Greenfields developments and certain tranches of residential areas.

The Government's objectives were to use UFB to increase business productivity and support improvements in service delivery in key public policy areas such as health and education.

The Government specified that taxpayers' investment should be made in conjunction with the private sector, and directed so that it should fund wholesale-only, open-access, common infrastructure. Importantly, a company which sold services to end users, such as households and businesses would be prohibited from owning a majority stake in any UFB infrastructure operator.

Public-private partnership

During 2009, after public consultation, the Government issued a tender document known as the 'Invitation to Participate' (MED 2009 ^[7]), and formed a Crown-owned company, Crown Fibre Holdings (CFH, www.crownfibre.govt.nz ^[8]) to manage the UFB initiative.

In late 2010, CFH signed contracts with two electricity lines companies: Northpower (covering the city of Whangarei), and WEL Networks (covering the cities of Hamilton, Tauranga, New Plymouth and Wanganui). Together these represented about 15% of UFB coverage. In May 2011, CFH signed a third contract with Enable Networks Limited, a regional fibre optic network operator owned by the Christchurch City Council. This entity will provide coverage for the city of Christchurch and some surrounding townships, or about 15% of UFB coverage. A fourth contract was also signed with Telecom Corporation of New Zealand (Telecom), the country's incumbent telecommunications company, to deploy UFB across the remaining towns and cities, representing about 70% of UFB coverage.

^[9]

Figure 1 - UFB partner coverage areas.

As required by the UFB tender requirements, Telecom took a proposal to its shareholders to 'demerge' into two entirely separate companies. The proposal was overwhelmingly agreed, and in November 2011, Telecom's former network division called Chorus was listed on the New Zealand Exchange and the Australian Securities Exchange. Under the demerger:

- Chorus owns the former Telecom's 'last mile' copper assets and new UFB fibre assets in each town and city, plus the rural access infrastructure, and

- Telecom Retail (now simply known as Telecom) retains the company's retail customer relationships, Public Switched Telephone Network, 3G wireless network, national backhaul network and 50 per cent interest in the Southern Cross international cable system.

It should be noted that the demerging of the former Telecom New Zealand into Chorus and the new Telecom New Zealand was a relatively straightforward decision for its board and shareholders for two reasons:

- It enabled Telecom to bid for the opportunity to participate in the UFB initiative,
- It released Telecom from the 'Operational Separation' regime that it had been operating under since 2006 (Milner 2009^[10]).

The latter reason may not appear significant at first glance, but was an enormous issue for Telecom. It stated that the constraints imposed by the operational separation regime were greatly hindering its ability to address the emerging competitive market in New Zealand. It is open to debate, as to whether the first of the above conditions alone would have been sufficient to make the demerger attractive to Telecom shareholders.

Ultra-fast broadband products

The Government defines UFB to mean the availability of broadband services at a minimum speed of 100 Megabits per second (Mbps) downstream and a minimum of 50 Mbps upstream. By comparison, according to Akamai (Akamai 2012^[11]) the average Internet speed in New Zealand is currently around 4Mbps downstream and less than 1Mbps upstream.

CFH agreed with the industry and tendering parties on the UFB architecture and product specifications. UFB uses a mixture of Point-to-Point (P2P) and Point to Multi-point optical technologies. P2P services are offered on a wholesale basis in both 'unlit' dark fibre at Layer 1 and 'lit' at Layer 2 forms. The Layer 2 services use either P2P Ethernet or Gigabit Passive Optical Networking (GPON) technologies.

P2P services are mostly intended for Corporate & Government customers, but can be packaged by Retail Service Providers (RSPs) for use by any customer. GPON services are mostly intended for Residential customers, but will also be packaged for use by Small to Medium Enterprises (SMEs).

Layer 2 products range from a basic starter package operating at 30Mbps downstream and 10Mbps upstream through to 10 Gigabits per second (Gbps) symmetrical in the initial release of services. The starter package was introduced to provide a price point in the residential market which is similar to that for current regulated wholesale ADSL based broadband products. All services can have specified 'committed' and 'excess' bandwidth components (TCF 2011b^[12]) to ensure the delivery of any desired quality of service to end users. Service guarantees are also offered on all products, ranging from 'basic' for commodity applications through to 'enhanced' for critical applications. The network can be upgraded in future to support advances in technology over time, without any known restrictions to date.

UFB deployment gathering pace

UFB deployment commenced with trials in Whangarei, using Northpower as the build contractor in late 2010, but did not gather substantial pace until late 2011. It was early 2012 before the rollout ramped up in the larger cities, such as Auckland, Wellington, Christchurch, Hamilton and Tauranga.

[13]

Figure 2 - Optical fibre deployment using underground trenching methods.

During 2011-12 all four of the Government's partner's commenced UFB deployment, activated points of interconnect, conducted testing with Retail Service Providers (RSPs), and connected early adopter end customers. A wide variety of RSPs signed wholesale service agreements to sell UFB services, including a number of non-traditional telecommunications firms.

As at 30 September 2012:

- Around 97,000 premises had been passed by UFB, representing just over 8 per cent of the total deployment;
- Around 102,000 end-users such as households and businesses were able to connect to UFB (a higher number than premises because of multi-dwelling units);
- An estimated 19 per cent were 'priority' users (businesses, schools & health facilities) and the remainder residential;
- This means that around 14 per cent of 'priority' users were able to connect compared with around 7 per cent of residential households.

Deployment continues to accelerate, and by 30 June 2013 approximately 20 per cent of targeted premises are expected to have been passed by UFB. Critically, deployment is on track to reach the vast majority of priority users by the target of year-end 2015.

[14]

Figure 3 - Optical fibre deployment using aerial methods on electricity distribution poles.

As at 30 September 2012, UFB customer uptake was at an early stage, with around 2,500 connections in place, about 2.4% of end users who were able to connect. Importantly, uptake is much stronger amongst priority customers at just over 10%, and is weaker for residential households at just under 1%. This is in line with government policy objectives.

The level of uptake reflects the level of market maturity around fibre-enabled products. The telecommunications sector in New Zealand has been oriented around Digital Subscriber Loop (DSL) based products for over a decade, and the move to UFB, while providing new opportunities, is also somewhat disruptive to RSPs and their operational processes.

Retail service provider readiness

The New Zealand retail broadband market is dominated by four RSPs. These are Telecom, with around 49% market share of fixed broadband according to the Commerce Commission [ComCom 2012 ^[15]]; Vodafone (including its recent acquisition of TelstraClear) with around 29%; CallPlus (retail brand: Slingshot) with around 9%; and Kordia / Orcon with around 5%. The remaining 8% market share is spread across around 55 other small ISPs.

Of the large RSPs only CallPlus and Kordia / Orcon have so far launched commercial UFB products for the mass market. These operators have acquired a modest number of high-value new customers through being in the market at an early stage. Telecom and Vodafone (including TelstraClear) remain in customer trials at this stage. As these two companies account for close to four in five retail connections today, any major migration to UFB will depend on their active participation.

[16]

Figure 4 - Retail Service Provider (RSP) readiness in New Zealand.

Taking a longer-term viewpoint, UFB supports a transition to mainstream use of the Internet for content streaming (triple play/ quad play), application service provision, cloud computing, home automation and the like. These services provide the means for RSPs to grow Average Revenue Per User (ARPU) through differentiated offerings, which offer unique customer value. RSPs choosing to take up the challenge to explore these opportunities may be rewarded in future with enhanced revenue growth and customer loyalty, although this potential first mover advantage has yet to be proven in the New Zealand market

Northland leading the way

Whangarei (pronounced 'Fung-ar-ay') is New Zealand's 12th largest city, with a population of just over 50,000. The Ultra-Fast Broadband program has made strong progress in Whangarei, as the Government's partner, local electricity lines company Northpower, commenced rolling out Fibre-to-the-Premises prior to the UFB scheme. With the addition of co-funding from the Government, Northpower has accelerated their rollout and as at October 2012 more than half of Whangarei can access FTTP.

Whangarei's head start over other cities in New Zealand is already showing interesting examples of high-speed broadband usage & applications emerging. As indicated above, this development has started with the priority customer base, which is aligned to the Government policy objectives. Following are some examples of priority customer adoption (some of which are also highlighted in short videos at <http://www.crownfibre.govt.nz> ^[17]).

Magnetism ? An innovative software development company

Magnetism is a software development business, with 22 staff located in offices in Whangarei and Auckland. The firm commenced operations in Whangarei five years ago, and has rapidly expanded, so that it now relies heavily on high-speed symmetric broadband to service clients around NZ, as well as Canada and the United Kingdom.

Magnetism (<http://www.magnetism.co.nz/> ^[18]) is a Microsoft CRM partner, offering Microsoft Dynamics CRM, software integration, cloud computing solutions and IT training. They are advocates of the 'Scrum Agile' software development framework, to deliver rapid, efficient software development, tailored to customer needs. They achieve this outcome with intense collaboration across their own and their clients' sites, using virtual collaboration tools over UFB. Magnetism saves time with live business interactions, sharing screens in video by teleconference and using tools such as Microsoft Lync (Microsoft 2012 ^[19]). Through this virtual collaboration both internally and with clients, Magnetism saves money because staff time is used efficiently from their desktops and they do not need to travel or work offsite at a client's premises.

[20]

Figure 5 - CEO of Magnetism using the remote collaboration tools via UFB.

Magnetism can often move 30GB in a single file load. They have stated that without a UFB connection they simply could not operate. The UFB connectivity Magnetism enjoys has been one of the factors enabling it to reach a global marketplace. As a provider of IT services, it foresees that businesses of all sizes will begin to move data such as payroll and accounts to the cloud, enabled by UFB.

Manaia View School ? The first of a new breed of schools

Manaia View School is a primary school in Raumanga, a suburb of Whangarei, and was the first school to formally use UFB through its connection by Northpower in late 2010. The school is rated as 'Decile 1', meaning that average incomes in the local community are in the lowest 10 per cent in New Zealand. It also has a very high Maori to European pupil ratio. Improving education outcomes for schools with these characteristics is a policy goal for the New Zealand Government.

[21]

Figure 6 - Manaia View school pupils using the UFB in the classroom.

Notwithstanding these challenges, the school was an acknowledged leader in the use of ICT prior to the arrival of the UFB, which is a major tribute to the local community. Since its connection to UFB, Manaia View has formed a UFB buying cluster with five other local schools. Together they specified common requirements (including software and hardware) to prospective Retail Service Providers, and invited tenders to select the best provider.

Manaia View and the other schools in the area are now using UFB for new forms of e-learning, with an increased number of Apple devices such as the iPad and iPod Touch provided in schools. Pupils have 'digital desktops' so that parents can look over their work, alongside their teachers, creating much increased engagement by parents in their children's learning. They record, upload and share video such as their whakapapa (a recited genealogy which is an important part of indigenous Maori culture).

Large file downloads, which would have previously taken hours are also now completed in minutes or seconds. Whereas a 10GB file would previously have taken more than five hours to download, it now takes around 10 minutes. The improved speed has positively contributed to an increase in overall student engagement, which in turn has helped to reduce truancy and lateness levels, which previously have been problems in this and similar schools.

Northland Dialysis Service - A new model of care

Northland is an area of New Zealand where there is a high prevalence of diabetes, with a subsequent high rate of kidney failure. Hence dialysis is an essential treatment routine for a number of patients scattered throughout the Northland region. At the same time, Whangarei Hospital has limitations in terms of qualified renal clinicians to undertake this work. The innovative approach being adopted to address this model of care dilemma is to use a single qualified renal clinician to manage the delivery of dialysis to multiple patients geographically scattered throughout the Northland region, using high-resolution videoconferencing facilities.



Dialysis machines can be deployed at a number of Integrated Family Health Centres located throughout the Northland region, so that they are close to where the patients need them. The set up and operation of the dialysis machines is done by suitably qualified nursing staff, under the watchful eye of the remote renal clinician, who is physically located in Whangarei hospital. The renal clinician spends time with each patient to assess current conditions prior to, during and after each dialysis session, to ensure that there are no irregular conditions arising. In this manner, a single clinician can manage several dialysis sessions simultaneously with patients located around the region. Two satellite facilities are currently in operation.

[22]

Figure 7 - A Whangarei hospital based renal clinician managing a dialysis session for a patient located in a remote Integrated Family Health Centre.

Integrated Family Health Centres located within the Whangarei city are connected to the Whangarei hospital via UFB. Those located in outlying towns are connected via the Rural Broadband Initiative (Treloar 2012 ^[23]) which provides fibre connectivity for schools and selected health facilities outside of the 75% urban UFB coverage area. In order to properly manage patient safety and privacy, the connectivity is delivered under the Connected Health (NHITB 2012 ^[24]) virtual private networking umbrella.

Residential take-up

As indicated in the introductory material, the government identified the need to service businesses, educational institutions, health facilities and other government entities as a priority within the UFB rollout. As can be seen from the examples described above, the early focus has definitely been placed on these entities. However, in parallel, there is a need to deliver the benefits of UFB into residential premises.

Residential take-up has been slower than priority customer take-up, as this has been dependent on the deployment of a GPON based layer 2 capability onto the fibre infrastructure. In most areas of the country this capability has only been deployed in scale in recent months. CFH's partners and RSPs have found a few 'teething' issues with this equipment, and have been working to improve their offerings. In addition, the cost of provisioning residential customers has been challenging.

As in most countries where fibre has been rolled out to residential customers, the initial delivery of service into residential homes has faced process difficulties, and so the initial cost per connection has been high. The last six months has been focussed on improving the provisioning process into residential homes across the UFB deployment areas; there is still a lot of learning to be done. Industry collaboration on a common approach to the provision of operational support capability for UFB is being supported by the Telecommunications Carriers Forum (TCF) (TCF 2011a ^[25]).

It also needs to be noted that to date, the services that are being provisioned are quite simple, being broadband access and Voice over IP type services. While residential uptake so far has been modest, it can be expected to grow in 2013. In the longer term it is expected that entertainment video services for home consumption will drive residential uptake, but this component of the market is immature today and will take some time to evolve.

Overall innovation in terms of applications which drive UFB uptake in the residential market is at an early stage of maturity. Data Caps have been steadily increasing and various forms of storage are beginning to be bundled with the broadband connectivity packages. RSPs are experimenting with offering UFB plans with low national & international contention ratios to deliver improved end-to-end broadband speeds. However, there is still a long way to go before we see real service innovation emerging in the residential UFB market.

Achievement of policy objectives

The UFB rollout in New Zealand is some 18 months into a nine-year program of work. Fewer than 10% of the premises expected to be passed as part of this initiative have been delivered. Given the ramp up period required to achieve scale deployment of the fibre infrastructure, progress to date is on track to achieve the government objective of passing 75% of the New Zealand population by 2019. Looking ahead, extension of UFB coverage beyond 75%, while possible, would go beyond current Government policy, potentially requiring additional taxpayer funding.

Take-up of the UFB services was always expected to lag behind the deployment of premises passed, as RSPs need a mass of customers to address before they can economically deliver services. In the priority market segment, the required market scale is beginning to emerge and RSPs are beginning to address these customers enthusiastically. As illustrated, some of the expected innovation is starting to emerge in terms of the business, education and health sectors of the economy. It is still early days and the current suite of applications can only be considered as indicative of what is expected to follow. However, the progress to date is promising and supports the Government's policy expectations.

The progress to date in the residential market is somewhat less certain. It is too early to tell how uptake is going to emerge. The next three to four years will be important in providing a more definitive story. Eventually it is also hoped that take-up in the residential market will complement that in the priority market sector, and the synergies between the two will provide a further boost to economic growth. This is yet to be determined based on current experience.

Conclusion

The Ultra-Fast Broadband Initiative in New Zealand was established as a primary policy plank of the National government in the 2008 elections. By the end of 2009, Crown Fibre Holdings was established and during 2010 and into 2011, the private entity partners to deploy the fibre were selected through a competitive process, forming a type of Public Private Partnership. During the second half of 2011 through to now, fibre deployment has been ramped up across urban New Zealand and over 100,000 premises have now been passed.

The take-up of UFB services over this new infrastructure has lagged behind the deployment by a few months, but is now gaining traction, especially in the priority segments. This is in alignment with the intentions of the Government's policy. Several innovative examples of the use of the UFB have been illustrated, which demonstrate the potential economic value expected to be derived through this joint public and private sector initiative.

There is still a long way to go! We are at the beginning of the journey, and progress to date is meeting expectations (Adams 2012^[26]). At the same time, we are discovering the many challenges associated with this type of national deployment. The next few years will continue to present some challenges and without doubt a few unexpected surprises.

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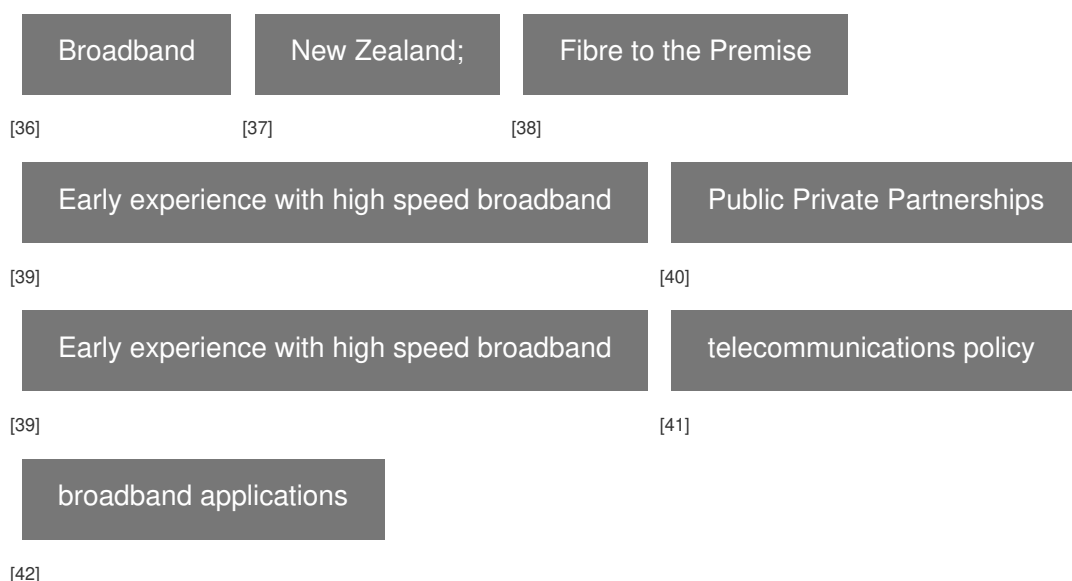
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