



COMMERCE COMMISSION

Investment in Telecommunications Networks: a Perfect Storm?

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Speech to the IET Wellington Branch

20 June 2007

Introduction

Thank you for the invitation to speak to you today. As I am in the final few weeks of my term as Telecommunications Commissioner, I'm enjoying the luxury of reflection on some of the major challenges facing the industry in the years ahead. Probably none of those challenges is greater in its importance both to the industry and to New Zealand generally than that of ensuring sufficient levels of investment in network infrastructure.

Those of you who have read Sebastian Junger's book or seen the movie will know that the perfect storm of the title occurs when two major low pressure systems and a hurricane collide off the North Eastern coast of the United States and generate winds and high seas of unimaginable proportions. A fishing boat has ignored the danger signs. Worse, its communications equipment fails as the weather worsens. The boat is swamped by a monster wave and everyone on board is lost.

We're in our own perfect storm at the moment, with the debate being well and truly joined around:

- the likely evolution of broadband demand in consumer and business markets;
- whether we're doing well enough in comparison with other countries;
- whether the Telecom fixed network will continue to be the major "pipe" for broadband;
- whether the network will cope with demand growth;
- who will make the continuing investments, particularly in optical-fibre, needed to keep pace with that growth;
- the role of central and local government in filling any investment gap.

All of this turbulence was predictable once industry and government frustration with the slowness of Telecom's response over recent years to the pressure for improved broadband services and greater competition had reached critical mass.

The Telecom fixed network and the local loop

Some qualifications to begin with. First, the real focus of this issue relates to part only of the fixed network - the access network, comprising the local loops from local exchanges to the customer. The remainder of the network, the national core linking exchanges and including regional backhaul and the international gateway, is largely a packet-switched network with substantial capacity in the core to meet foreseeable needs, though there may be questions

around regional backhaul. There are also other national and regional fibre-optic networks and wireless networks operated by TelstraClear, FX Networks and Kordia and providing high-capacity backhaul.

Second, increasing numbers of consumers are abandoning a fixed line connection and relying exclusively on either a cellular or fixed wireless connection. This trend is strongest in the major cities, particularly amongst students or groups of young people living in rented accommodation. It may well accelerate once ISPs are able to obtain from Telecom what is being called 'naked DSL' - a bitstream service that will allow ISPs to provide DSL broadband without a requirement to take a fixed line voice service.

In some European countries, mobile-only users represent up to 30% of the residential market. In New Zealand, we may be getting up to these percentages for users under 30 years of age.

Another development that may accelerate the shift from reliance on fixed lines will be the introduction by Vodafone of a HomeZone service later this year. While the terms of the service have not been announced, it seems likely that subscribers will be assigned both a mobile and geographic local number that relates to their home location. Calls to and from a local number within that calling area will be free and will therefore be a substitute for the current fixed line local calling service.

At present, Telecom supplies 1.4 million residential access lines and 300,000 business lines. Though a small number have been wholesaled to Telecom's competitors, the performance of the line remains Telecom's responsibility. For residential lines, Telecom has service quality commitments under the TSO Deed with the Government. The Commission monitors those commitments, which are relatively undemanding and have been consistently met.

The TSO commitments require that voice service is provided at a uniform national price and that basic dial-up Internet access is available to 99% of customers. There is no TSO obligation to provide broadband access, though the Minister of Communications has announced a review of the TSO that may look at that issue.

The "local loop" connection to a house or business is typically a twisted copper pair. The loop will either run to a street cabinet or directly to the local exchange. The connection to the exchange is generally copper cable or, less commonly, optical fibre. Telecom has installed fibre loops in central business districts and in a few new housing developments fibre to the home has replaced copper entirely. In some of the most remote areas, multi-access radio is used in place of copper.

The copper loop network was designed and optimized for voice frequencies. DSL broadband services operate at higher frequencies and provide varying levels of performance depending primarily on loop length. Short loops, found mostly in urban areas, perform better than long loops typical of rural areas. Loop performance is also affected by the age of the copper and the level of maintenance.

Telecom's capital expenditure on the fixed network is around \$450-500 million a year. The apportionment of that expenditure between the access network and the core network is not known.

Competition and the Digital Divide

For the last three years, Telecom's competitors have been able to obtain a regulated bitstream product from Telecom that allows them to design their own DSL-based Internet access service. In this way, they can compete with Xtra broadband. Total DSL connections as at 31 March this year were 565,000 of which 420,000 were Xtra connections and 145,000 were wholesale connections sold by Telecom's competitors.

Initially, wholesale bitstream download speed was limited and matched Telecom's retail offerings. Gradually though the download speeds have increased. Last year, the Commission required Telecom to lift all downstream speed restrictions, with the result that instead of specified maximum line rates, Telecom's retail plans are now marketed at whatever line rate the network is able to support for each customer at that time.

The results have been mixed. While some customers who are close to exchanges (say, within 800 metres) have experienced download speeds of up to 6 Mbps, substantially faster than the speeds previously on offer, many others have found that speeds have remained the same or have dropped.

There is another problem. Even in urban areas, the availability of broadband has been surprisingly patchy. You will have heard of the difficulties of one well-known resident of Paritai Drive, Auckland, in getting a broadband connection, apparently because the local exchange had insufficient capacity. When the *Herald* ran this story, it generated a flow of similar experiences. This was clearly not an isolated case.

With this backdrop, there have been continuing complaints from internet service providers that Telecom's network is not coping well with the surge in broadband demand and to suggestions that for some years there has been insufficient capital and operating investment in the access network.

Bandwidth demands are about to increase even further, leading to further pressure on network capacity. By the end of this year, the Commission will have finalized the terms for Telecom to provide unbundled local loops to its wholesale customers. Competitors will be able to install their own electronics in Telecom exchanges and to provide whatever retail broadband services they choose. Almost certainly, competitors will opt for advanced generation electronics that will support much higher download and upload speeds. Telecom will probably match those offerings.

The result will be a traffic surge from a small proportion of users who consume disproportionately large volumes of capacity (think YouTube and BitTorrent), though higher speed services will only be able to be effectively exploited by those using relatively short loops, probably no more than 800 metres (around 15% of lines). In the UK, which is the benchmark for future trends, Internet traffic is growing 50 per cent year-on-year.

The term 'digital divide' has been used to describe this emerging scenario. A few users living in major cities close to an upgraded exchange may achieve peak rate speeds of up to 24Mbps. That's more than enough to support services such as DVD-quality video, high definition TV, and high quality voice. Telecom estimates that 75% of its lines are capable of speeds of more

than 6Mbps and 65% more than 8Mbps. Some users in rural and remote areas who are on very long cables will still be in dial-up world.

In the medium term, the Government is committed to a substantially improved and uniform set of outcomes. Its current targets for broadband performance would require 90% of lines to be capable of 5 Mbps by 2010. This implies that many customers (Telecom estimates over 70%) would be getting as high as 20 Mbps. These service levels could only be met by major and expensive changes in the access network.

The fibre solution

Meeting the Government's targets, assuming they remain unchanged, will require widespread replacement of copper loops by optical fibre, the installation of significant numbers of new street cabinets, and associated investments, at a cost recently estimated by Telecom of \$1.5 billion.

It should be noted that this assumes that fibre would replace copper between exchanges and roadside cabinets and that copper would continue to be used to connect the end-user's premises with the cabinet. Because cabling is typically much longer in rural areas than urban, the costs of fibre replacement rise exponentially and quickly become uneconomic.

The size of this investment requirement would rise sharply if a more ambitious approach were to be followed of completely replacing the copper loops with fibre. Programs of this kind are underway in parts of the United States, France and Japan. With fibre to the home or business, super fast speeds of 100 Mbps are achievable. Verizon in the US is planning investment of up to NZ\$16 billion in order to reach 20 million homes, though it is important to note that this is a highly targeted roll-out in dense and high-income suburban fringes of major population centres.

The Institute of Professional Engineers has provided an estimate of \$10 billion for a national fibre-to-the-home investment program.

Is there a sensible business case for investments of this magnitude? If not, is there a sufficient public good from the widespread availability of high bandwidth that public support would be justifiable?

The business case will largely depend on the willingness of consumers to pay substantially more than at present for improved broadband services. Telstra in Australia is proposing a fibre access network investment costing A\$4 billion. This is not a fibre-to-the-home plan. It is more comparable to the Telecom proposal for loop shortening to meet the Digital Strategy targets. Telstra is talking of a retail price structure that would see consumers paying around A\$100 a month for a high speed service.

Compare that with a high-end Telecom plan such as the Adventure plan, running at up to 6 Mbps download, though with a slow upstream speed. The Adventure plan costs \$59.95 a month with a 10 GB cap. Other ISPs have similar offerings.

There may be some questions around the willingness of New Zealanders to pay a good deal more for the benefits of faster speeds. In some European countries such as France and Italy,

fibre providers are offering bundles of very fast broadband, cheap voice calls and TV packages for around \$60 a month. These are countries with markedly higher per capita GDP than New Zealand and therefore presumably these packages are more affordable.

Interestingly, a recent report on the likely long-term evolution of the UK's broadband infrastructure concluded that there is considerable uncertainty about whether broadband providers can generate sufficient revenue from fibre-based services to fund mass market deployment. The report notes that this situation is exacerbated in the UK where the high penetration of digital TV makes the market for new IPTV services much more challenging. The same may be true in New Zealand, with Sky TV providing digital TV to seven hundred thousand subscribers or more than 50% of households. TVNZ and other broadcasters have also launched a satellite-based digital platform for the Freeview service.

A driver for fibre roll-out in the longer term is the prospect of reduced operating costs. Once fibre has been installed, many items of plant in the current network can be done away with. However, countervailing the rate of decline in operating costs will be the rise in traffic volumes and therefore in the amount of bandwidth required.

The role of public investment

That leads us to the question whether, if there is insufficient private value available, there is a case for public investment to fill the gap.

In some countries, including most of the leaders in broadband uptake, public investment or support plays a major role in fibre network build. In Japan and Korea, central governments have made large direct investments in fibre rollouts. Generous tax incentives are common. In the Scandinavian countries, municipalities have invested heavily in building open-access fibre rings around major population centres. In the United States, cities such as San Francisco have partnered with companies such as Google to build city-wide broadband-capable wireless networks. This week, the Australian Government has announced a \$1 billion commitment to co-fund the expansion of wireless access networks and related fibre backhaul to provide broadband for rural Australia.

There is a growing body of research concerning the economic benefits of wide availability of high-speed broadband. A 2005 MIT study concluded that communities in which mass-market broadband was available experienced more rapid growth in (1) employment, (2) the number of businesses overall, and (3) businesses in IT-intensive sectors.

Both Auckland and Wellington city councils are exploring the case for local broadband infrastructure. Auckland City Council is planning a 100km fibre network and a wireless network in the central city, though it seems that this will not include customer connections.

Wellington City Council has adopted a strategy that by 2012, all of Wellington city will have affordable access to a high-speed broadband network. The council anticipates an expansion of fibre to connect major sites such as council buildings and schools, followed by fibre build-out into suburban areas using public facilities such as overhead trolley bus infrastructure and sub-street ducts.

In both instances, councils appear to see themselves as facilitators rather than principally as investors, though direct investment cannot be ruled out.

The North Shore City Council is building an urban fibre network to connect schools, businesses and council facilities, with support from the Government's Broadband Challenge Fund.

In my view, there are significant opportunities to mitigate the capital costs of fibre build through creative use of existing local body infrastructure. Civil works can be up to 70% of the cost of deploying fibre networks.

The successful Citylink Wellington fibre network demonstrates that private investment can be catalysed through sensible arrangements for the use of public infrastructure, without councils themselves needing to be long-term investors in the network.

At the same time, alternative access technologies such as wireless should not be disadvantaged by council support for fibre deployment. Otherwise, we risk replacing private with public investment and deterring competition between access technologies.

There are also calls for a national rather than regional approach to public support for high-speed bandwidth. The New Zealand Institute argues that one way in which New Zealand can overcome distance from markets is to invest in virtual supply chains, using a world-class communications infrastructure.

Local Government New Zealand has proposed that industry and government work together on the development of a national broadband investment strategy. There is a growing willingness to think about a national high bandwidth network in the same way as roads or electricity transmission.

The Telecom structural separation proposal

The recent Telecom proposal to spin-off its fixed network assets into a new company that would provide arms length and equal access services to both Telecom Retail and other broadband providers, though primarily an alternative to the Government's operational separation proposals, is one possible starting point for a discussion around an open-access national high speed broadband infrastructure.

A standalone network company which is not vertically integrated into retail services does solve one major problem with the status quo – the incentives that Telecom as an integrated business faces to discriminate against its wholesale customers in favour of its own retail operations. If the network company is controlled by investors who are interested only in the available return from the network assets, the investors will want all the wholesale customers to do well and to grow their businesses.

However the proposal has, in my view, some significant flaws.

Telecom recognizes that even an open-access network owner would largely be a monopoly and should therefore be subject to regulated pricing to prevent misuse of pricing power. Telecom's suggested solution is a regulatory contract between the network owner and the

government that would fix access prices to be paid for the use of access assets, with five yearly reviews.

While that approach would provide a high level of predictability for the network owner of future revenues, and to that extent would underpin the business case for network investments, these benefits would come at the cost of higher prices paid by consumers and reduced competition from alternative access providers, such as fixed wireless.

Rather than a cost-based access price, such as the price the Commission will shortly be fixing for the use of Telecom's copper loops, Telecom wishes to reach an agreement with government on prices both for copper and fibre loops that would be higher than a regulated price. While Telecom has not been clear on how such an agreed price would be derived, it does say that the price should provide the network company both with a reasonable return for the use of existing assets and with an additional return for future investment needs.

The Commission does not support such an approach. It would inevitably result in higher prices than necessary. Just as in competitive markets, investments should only be remunerated once they have been made and not in advance. Indications are that the Government is not prepared to move away from its operational separation model, while being open to considering a possible future evolution to some undetermined form of structural separation.

Regulation and Investment

The debate around the role of regulation in investment is important, because network assets are expensive to maintain and upgrades are lumpy. Delays in technology upgrades are costly to consumers who wait longer for improved services. I've already referred to Telecom's estimate of \$1.5 billion to upgrade its fixed network to provide the type of high-bandwidth services required to meet the Digital Strategy targets. Telecom says that because of the current regulatory settings, it can only justify spending \$500 million and does not see a business case to spend more than that amount.

What Telecom means is that it feels that the regulator won't allow an adequate return on any more capital spending. It points to the unproven consumer demand for the upgraded services and says that it wouldn't be sensible in the interests of their shareholders to make the investment without confidence that the allowed return will compensate for the higher business risk.

While there is some truth in this position, it certainly isn't the whole story. It isn't enough to say that a higher price is more favourable to investment if that higher price would make competitive entry unviable. Without new entry, and the pricing discipline it brings, the incumbent will have reduced, rather than increased, incentives to invest where it means cannibalizing revenue from the existing network.

In other words, there are unlikely to be black and white answers. Economic regulation must strike a balance between investment incentives and competition. The Commission's experience with access pricing has underlined several factors that are important in the balancing exercise.

First, monopolies have weak incentives to make investments in upgrading assets where the effect is to cannibalize existing revenue streams. It makes more sense to ‘sweat’ existing assets even at the cost of declining standards of performance, rather than to replace obsolete assets. So a regulatory holiday without clear and enforceable investment undertakings is unlikely to result in efficient and timely investment.

Second, in principle a regulated price should be based on the costs incurred by an efficient network operator, using the most efficient available technology. In a competitive market, a service provider is not able to charge prices that give a return greater than that available to a new entrant that is able to shift immediately to the best available technology platform. Examples are easily found in competitive markets such as consumer electronics.

Third, investment risk is typically a combination of a number of risk elements, including demand risk, technology risk, and the risk that regulation will expropriate supra-competitive returns.

Fourth, regulators recognize that consumers benefit when service providers are able to anticipate receiving reasonable returns over the life of the investment. Generally speaking, consumers benefit more in the long run from greater investment than from lower retail prices in the short term.

Finally, the impact on investment incentives of new entry by competitors is ambiguous. If the access price is insufficient to compensate for investment risks, the incumbent may defer or delay new investment. On the other hand, competitors entering the market will themselves make investments to gain market share, which in turn may spur incumbent investment to counter that effect.

At the end of the day, the regulated access price must be higher for new, risky investments than would be the case for legacy investments that have already been largely or entirely depreciated. While there will be arguments around the correct cost of capital to be allowed, the parameters of this debate are already well understood. Arguments that regulators deliberately depress returns below the opportunity cost of capital are just that - arguments and not fact.

A similar debate around the fibre investment issue is unfolding across the Tasman. Telstra has suggested an A\$4 billion fibre-to-the-node national network plan, which would see extensive fibre build in major centres, though not in regional and rural areas. Telstra has been critical of the regulator’s initial response to this proposal, saying that the regulator is insisting on an uneconomic access price for competitors to use the network.

A consortium of Telstra’s competitors is pushing an alternative proposal that involves an infrastructure fund financed by private money. The fund would own fibre feeder cables to be laid in Telstra’s ducts between the exchanges and the street cabinets, and would rent from Telstra the copper loops from the cabinets to user premises. Telstra is strongly resisting this proposal, arguing that it is flawed and in any event relies on unrealistic pricing for the use of loops.

The Government has issued an open call for tenders for a city-based fibre network and has appointed an independent expert group to assess proposals.

Conclusion

It is difficult to imagine a similar situation in New Zealand of multiple competing fibre proposals. We do though have an opportunity to achieve a sensible outcome that will maximise the prospects for more people to get faster broadband.

Competitive markets will deliver the right incentives for investment and innovation. Where there is no realistic prospect of competition in the upstream market for network access, regulation is necessary to ensure outcomes similar to those in a competitive market. This is even more important where the upstream network owner is also a major player in the downstream retail markets that rely on network access, as is Telecom now.

The Telecom fixed network is a key national infrastructure asset. Though pockets of alternative infrastructure have been developed, the economies of scope are so compelling that there is no realistic chance of a national alternative emerging. For that reason, access for competitors to the network on a non-discriminatory basis is fundamental to the health of the telecommunications sector.

Later this year, the Commission will complete the process of setting the terms on which Telecom will be required to provide unbundled local loops to its competitors. Ultimately, Telecom Retail will be required to pay the same price and to use the same provisioning systems for the loops it needs to deliver broadband. At that point, the most efficient retailers should win in the marketplace, regardless of who owns or operates the fixed network.

The next step change will be the widespread availability of fibre loops to replace copper. If that change is to happen on a national basis, rather than in a few high density urban areas, large new investments will need to be made. The challenge is to find a business model that will justify those investments, and to decide whether there is a compelling case for public investment to complement private investment at the limits of commercial viability. There is a lot of work that needs to be done on these issues.

Thank you.