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Public

Annual Telecommunications Monitoring Report 2013

Telecommunications monitoring report

Date: May 2014

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Executive Summary

This is the Commerce Commission's seventh annual telecommunications market monitoring report. It is produced as part of the Commission's on-going monitoring of the evolution of competition in the telecommunications sector in New Zealand.

We have included two infographics showing how the telecommunications market is delivering more to consumers and helping to drive the economy. Spending on telecommunications services is about the same in real terms as it was 10 years ago, yet consumers are getting far more for their money, particularly in the mobile market.

More and more data is being consumed, which is driving improvements in both personal and business communications as well as education, health, and entertainment.

Industry investment increased significantly to $1.58 billion in 2012/13 from its recent low of $1.24 billion in 2010/11, largely driven by the UFB fibre network roll-out.

Fixed broadband connections continued growing to reach 1.32 million as at 30 June 2013, up from 1.24 million in the prior year. This means that 85% of households with a fixed line also used that connection to receive a broadband service.

Fixed-line connections may be starting to slowly decline as mobile services become more attractive. However, the increasing availability of fibre services may be starting to counter any trend to disconnect fixed lines.

Fixed calling volumes continued to decline, and were 8.98 billion minutes, while mobile minutes started growing again in 2012/13, to reach 4.77 billion minutes.

Total retail telecommunications revenues suffered a slight fall in 2012/13 to drift back to $5.21 billion from $5.25 billion in the prior year. Data revenues continued to rise, while voice-related revenues continued to fall.

NZ telecommunications snapshot statistics	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total industry metrics								
Total telecommunications retail revenue ($bn)	4.92	4.9	4.92	4.93	4.96	5.03	5.25	5.21
Total telecommunications Investment ($bn)	0.92	1.07	1.18	1.69	1.55	1.24	1.27	1.58
Average monthly household telecommunications spend ($)		126	-	-	145	-	-	142
Fixed line metrics								
Fixed lines (mil)	1.85	1.85	1.86	1.87	1.88	1.88	1.88	1.85
Total fixed broadband connections (mil)	0.48	0.68	0.85	0.98	1.05[b]	1.14	1.24	1.32
Fixed line broadband connections per 100 pop	11.6	16.3	19.8	22.8	24.5	26	28	29.5
Residential broadband as % of residential lines	-	-	-	-	65	70	78	85
Number of unbundled lines (000's)	-	-	3	37	67	98	116	129
Resold Telecom phone lines (000's)	-	168	262	326	374	414	440	421
Wholesale broadband lines (not Telecom)(000's)	100	165	251	285	312	362	420	455
Chargeable fixed voice call minutes (bn)	7.29	6.91	6.71	6.67	6.25	6.12	5.71	5.47
Non-chargeable fixed voice call minutes (bn)	-	-	5.31	5.06	4.65	4.45	4.29	3.50
Total fixed line retail revenues ($bn)	2.99	2.93	2.93	2.88	2.89	2.89	2.83	2.77
Telecom share of fixed line retail revenues (%)	80	79	78	76	71	68	62	60
Mobile metrics								
Mobile connections (mil)	3.8	4.25	4.58	4.7	4.7[c]	4.8	4.9	4.8
Active mobile connections per 100 population	92	102	108	109	108	110	111	107
Share mobile pre-paid (%)	68.2	67.8	67.6	66.1	67.2	65.7	64.9	63.3
Mobile voice call minutes (bn)	2.76	3.17	3.66	4.24	4.44	4.40	4.42	4.77
SMS messages sent (bn)	-	-	-	11.4	12.8	13.6	13.9	13
Total mobile retail revenues ($bn)	1.93	1.97	2.00	2.05	2.07	2.14	2.38	2.44

[a] Data published every 3 years

[b] From this year onwards this measure no longer includes fixed wireless subscribers

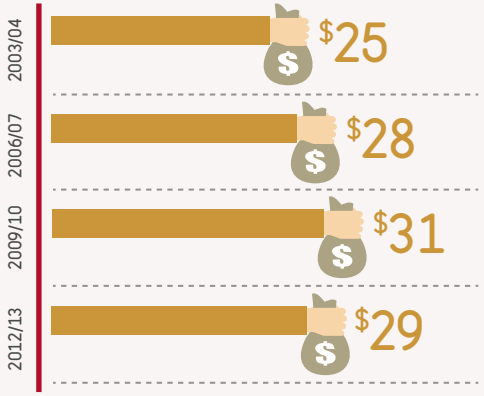
[c] From this year onwards this is connections active in the last 90 days rather than six months as was previously used

How telecommunications is changing our lives

Consumers get more for their money

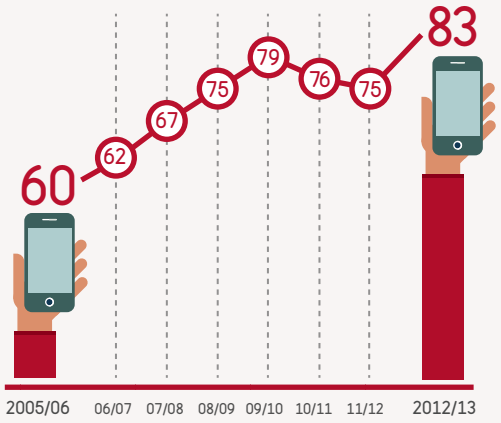
Mobile (Monthly)

Household expenditure (in $ 2013)

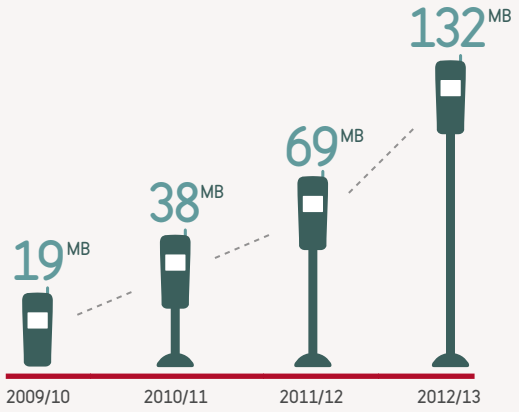


Source: Statistics NZ

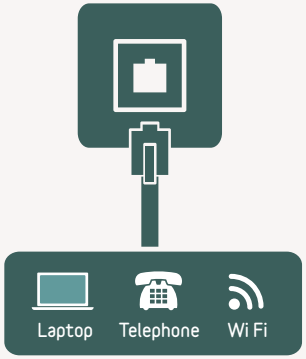
Call minutes (per connection)



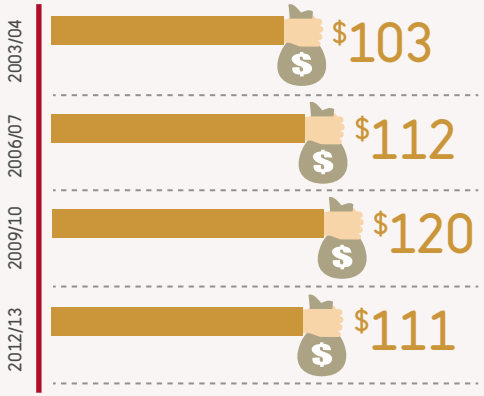
Data usage (per connection)



Fixed (Monthly)

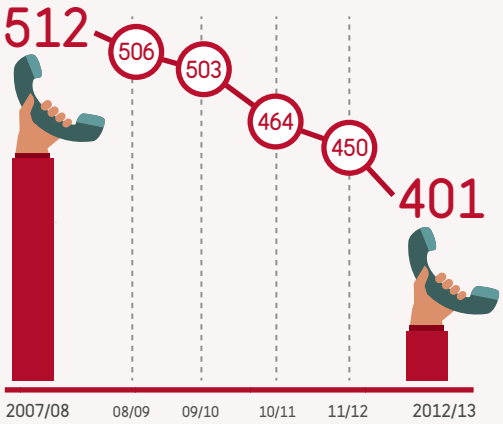


Household expenditure (in $ 2013)

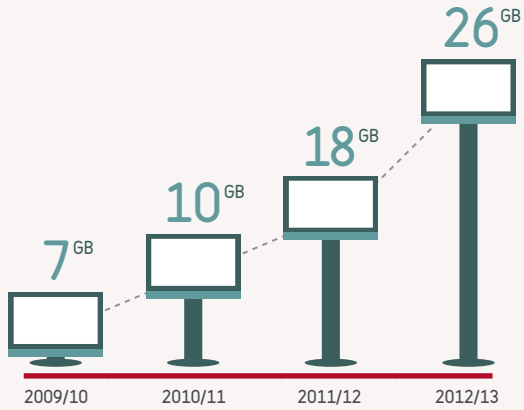


Source: Statistics NZ

Call minutes (per connection)



Data usage (per connection)

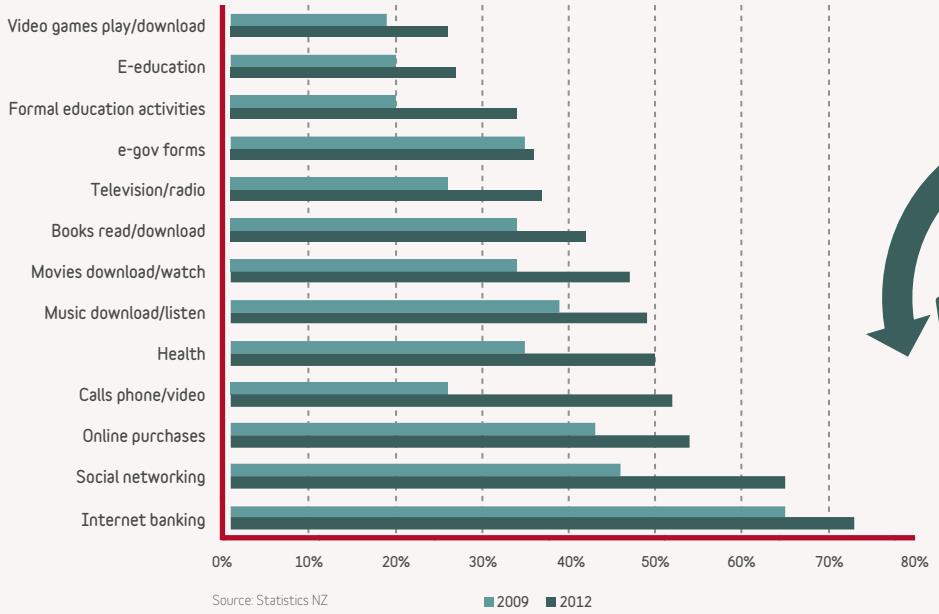


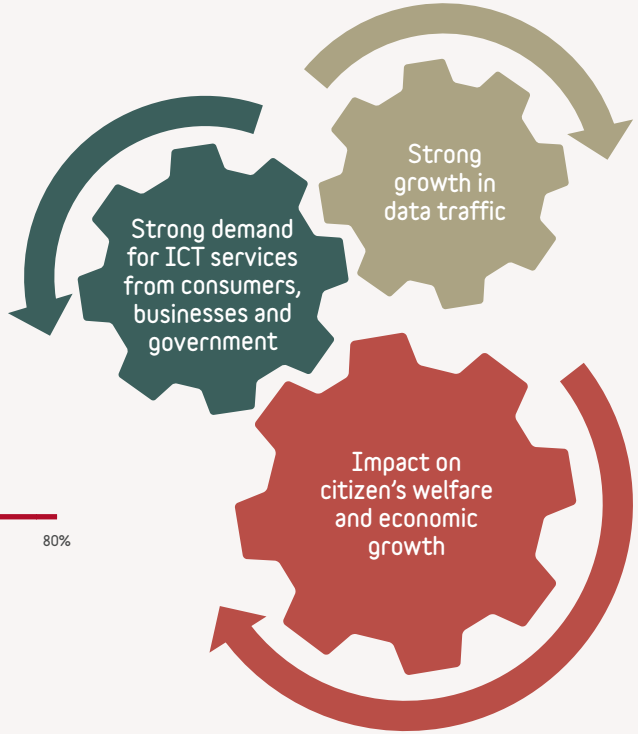
The telecommunications consumer

From smartphone to smart living

Strong demand for ICT services

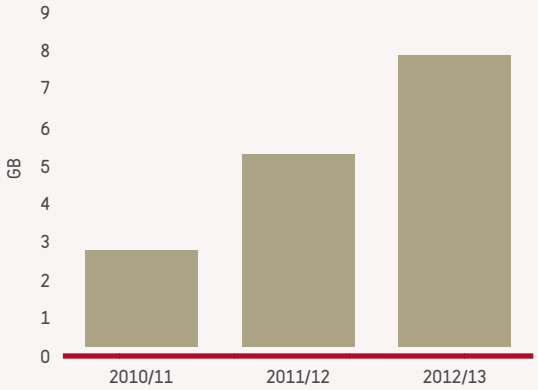
Percentage of recent internet users who engaged in internet activities





Strong growth in data traffic

GB per person per month (fixed and mobile)



Introduction

Purpose of this report

This is the Commerce Commission's seventh annual telecommunications market monitoring report. It looks at the state of telecommunications markets in New Zealand and developments that occurred largely during the 2013 calendar year. The report also examines trends in telecommunications markets for the period since the Commission started its monitoring in 2006.

The Commission is interested in the state of telecommunications markets because of its function of promoting competition in these markets by regulating some wholesale prices and conditions. Telecommunications markets are complex and a range of indicators have to be analysed to get an indication of the overall state of competition.

This report is released under section 9A of the Telecommunications Act 2001, which requires the Commission to monitor telecommunications markets and generally make available reports, summaries, and information resulting from the monitoring.

Data sources

Since the publication of its first annual telecommunications market monitoring report in March 2008, the Commission has continued to collect data from telecommunications operators to understand trends in the New Zealand telecommunications markets and to inform the industry and the public.[1]

The data in this report originates from various sources,[2] but mainly from the Commission's 2012/13 Telecommunications Industry Questionnaire and prior year questionnaires. The data from this industry questionnaire relates to the year ending 30 June 2013, but more recent industry data, including data as at 31 December 2013, is also used where available.

The data used is sometimes later revised by the respondents or the Commission when it appears inaccurate, an error has been made, or was an estimate. Consequently, some prior year figures used previously have been revised. Some of the data submitted by respondents for the current year was estimated.

The Commission would like to thank operators who submitted data for this report and looks forward to their continued cooperation.

The Commission welcomes any comments or feedback on any aspect of this report.

[1] Commerce Commission, 'Market Monitoring': comcom.govt.nz/IndustryRegulation/Telecommunications/MonitoringandReporting/DecisionsList.aspx.
[2] Where publicly available data has been used, for example from annual financial reports, its sources are indicated accordingly.

Market overview

This section gives an overview of telecommunications markets by observing levels of investment, changes in subscribers, call volumes, and industry revenues. It also notes significant industry events.

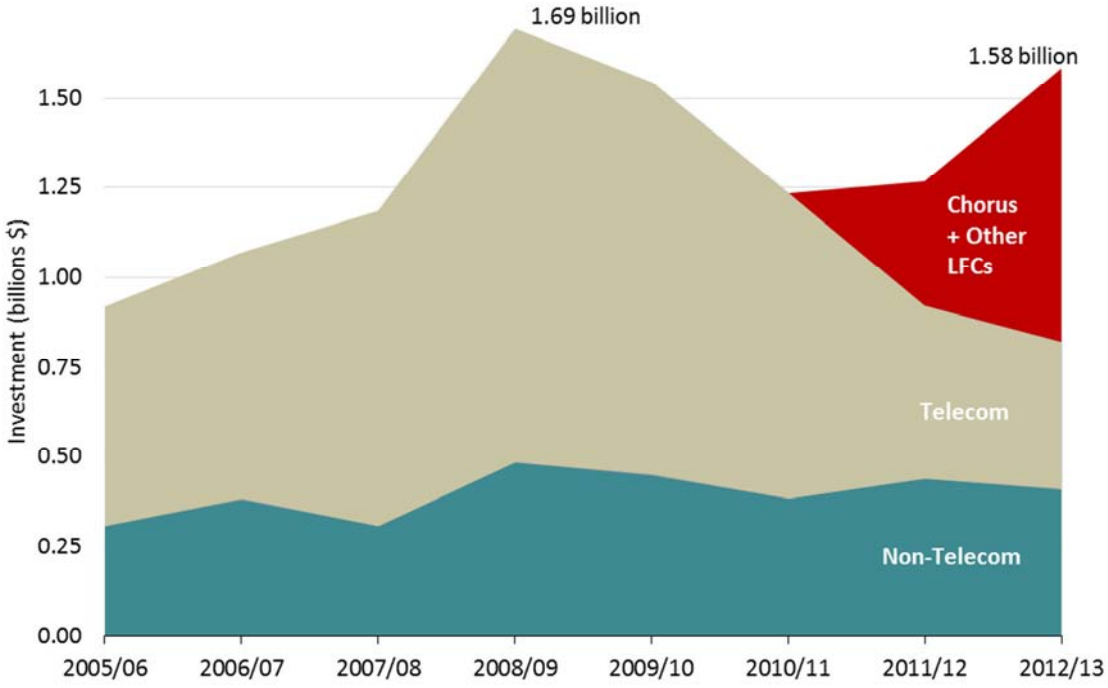
TelstraClear disappears

In late 2012, Vodafone New Zealand, New Zealand's largest mobile network operator, acquired TelstraClear, New Zealand's second-largest fixed network operator. The transaction was completed on 31 October 2012, and Vodafone stopped using the TelstraClear brand name from 1 April 2013.

For data collection, TelstraClear was treated as though it was owned by Vodafone for the whole 2012/13 year, so its questionnaire responses for the 2012/13 year up until the time of the merger were included in the aggregates provided by Vodafone.

UFB drives up telecommunications investment

Figure 1: Telecommunications investment



Industry investment increased significantly in 2012/13, largely driven by the Ultra-Fast Broadband (UFB) fibre roll-out being undertaken by Chorus and the other Local Fibre Companies (LFCs), as shown in Figure 1. Total reported investment by the telecommunications industry reached $1.58 billion in 2012/13, not far short of the peak of $1.69 billion reached in 2008/09.

The current high level of telecommunications investment includes much more 'hard' investment in physical network infrastructure compared to the 2008/09 peak when there

was a lot of 'soft' investment in IT, product development, and systems. This can be seen from Figure 2 below.

Figure 2: Investment by component

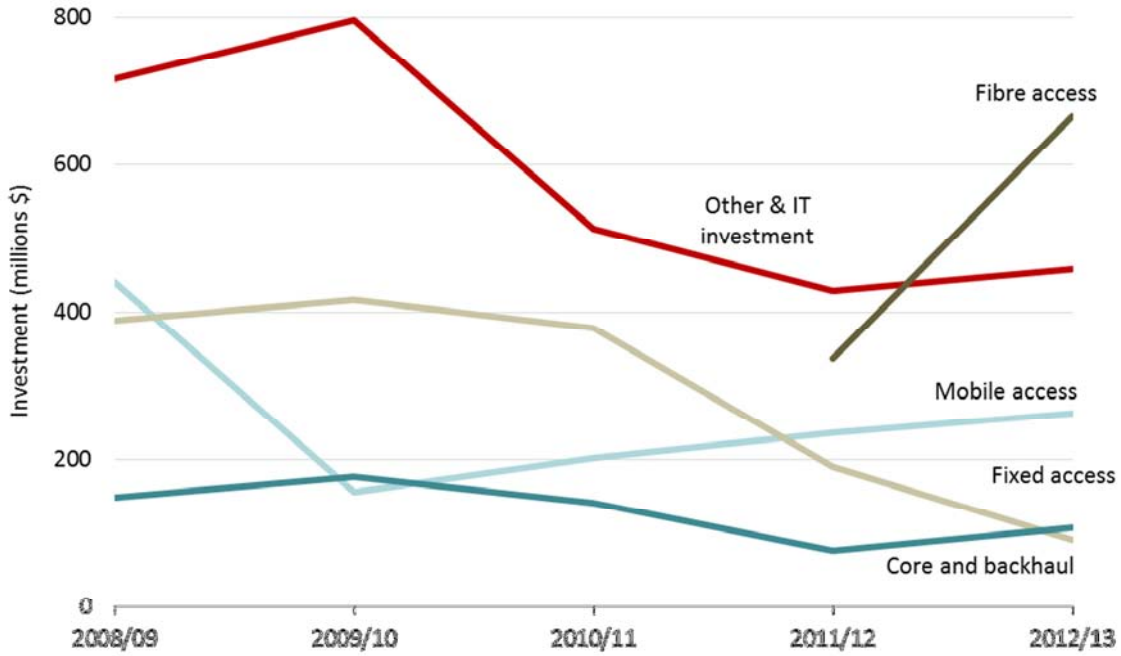


Figure 2 shows the various components of total telecommunications investment, with investment in the fixed access network split into copper and fibre investment from the 2011/12 year. There would have been negligible annual investment in fibre access before that date.

Investment in the fibre access network has increased dramatically on the back of the UFB project, as mentioned above. For the first time since investment components have been collected, investment in the fixed access network has surpassed 'soft' investment in IT and other largely intangible assets.

Broadband connections continue to grow

Telecommunications voice services are delivered over fixed-line connections and wireless connections. Both types of connection can also deliver broadband services. This requires an appropriate type of connection in the case of a fixed-line connection and an appropriate mobile phone or other wireless device in the case of a wireless connection.

Figure 3: Fixed-line telephone and broadband connections

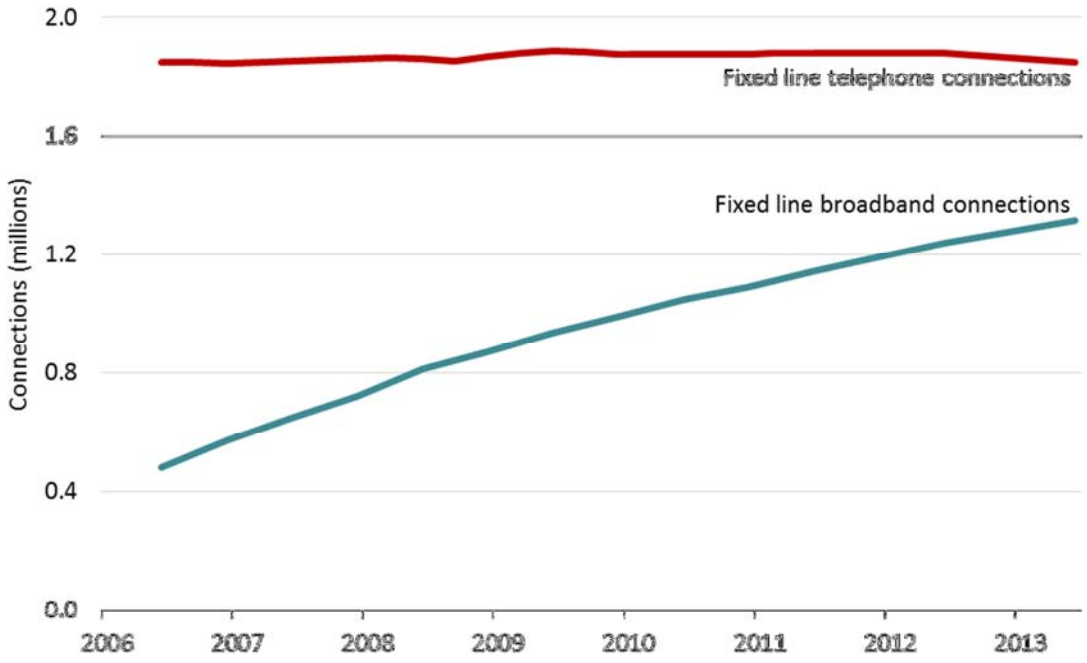


Figure 3 shows that the number of fixed-line telephone connections has remained static, while fixed-line broadband connections have continued to grow steadily and reached 1.32 million in mid-2013. Of these, 1.14 million were residential broadband connections, which meant 85% of households with a fixed-line connection also used that connection to receive a broadband service.

The total number of fixed-line connections may now be starting to slowly decline as the rate of growth in fixed-line broadband connections slows and mobile services become more attractive. However, the roll-out of fibre may be starting to counter any trend to disconnect fixed lines. The picture may become clearer over the next few years.

The OECD compares the rate of broadband penetration between countries by measuring connections per 100 of population. As at 30 June 2013, New Zealand had 29.5 fixed-line broadband subscriptions per 100 of population, compared with the OECD average of 26.7. New Zealand's fixed-line broadband penetration result gave it a ranking of 15 out of 34 OECD countries, an improvement of one placing from the prior year, with New Zealand moving a fraction ahead of the United States.

New Zealand was third equal together with Ireland in its rate of growth of fixed-line broadband penetration in the OECD for the six months to 30 June 2013, with 2.9% growth compared to the OECD average of 1.4%.[3]

Households need only one fixed-line connection, so the number of fixed-line connections is much less than the actual number of users served by those lines. This is in contrast to mobile connections, which tend to serve just one user, or even less than one user as many mobile users have more than one mobile device.

Mobile broadband is a newer service than fixed-line broadband and has become more accessible with the rapid growth in smartphone use in recent years.

Figure 4: Total mobile and mobile broadband connections

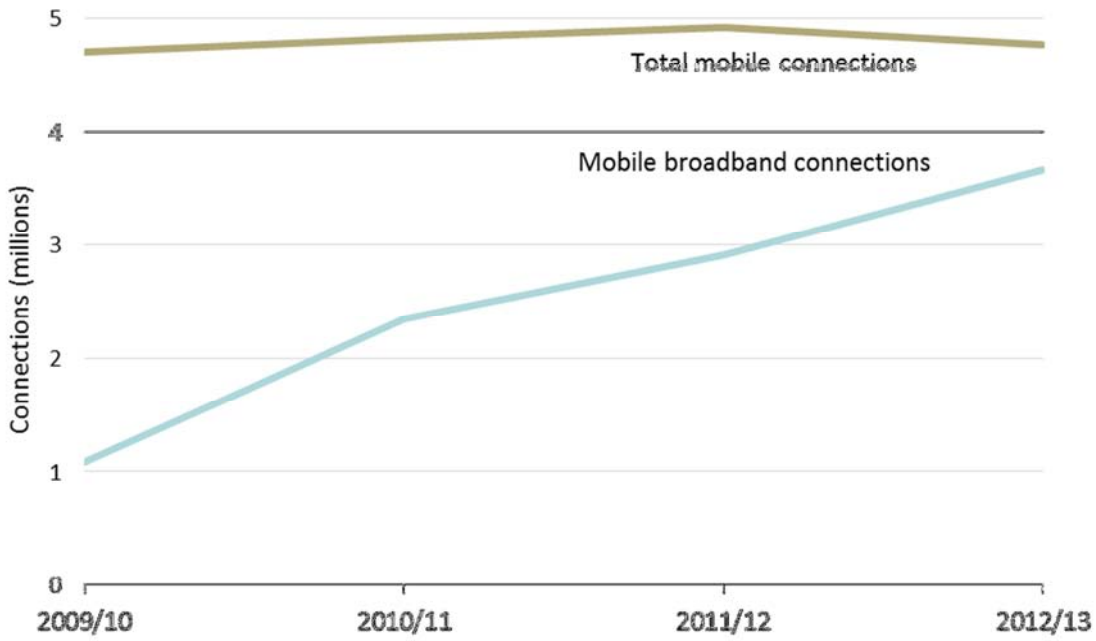


Figure 4 shows total mobile connections have been relatively static in recent years, while the number of mobile connections that are also mobile broadband connections[4] has risen rapidly and now makes up a high proportion (77%) of total mobile connections.

[3] Organisation for Economic Co-operation and Development, 'OECD broadband statistics update': www.oecd.org/sti/broadband/broadband-statistics-update.htm

[4] This is mobile broadband connections as defined by the OECD and includes dedicated data-only connections and add-ons as well as casual mobile broadband use by other mobile users in the prior three months.

Calling volumes converging

Figure 5: Fixed, mobile, and total calling minutes

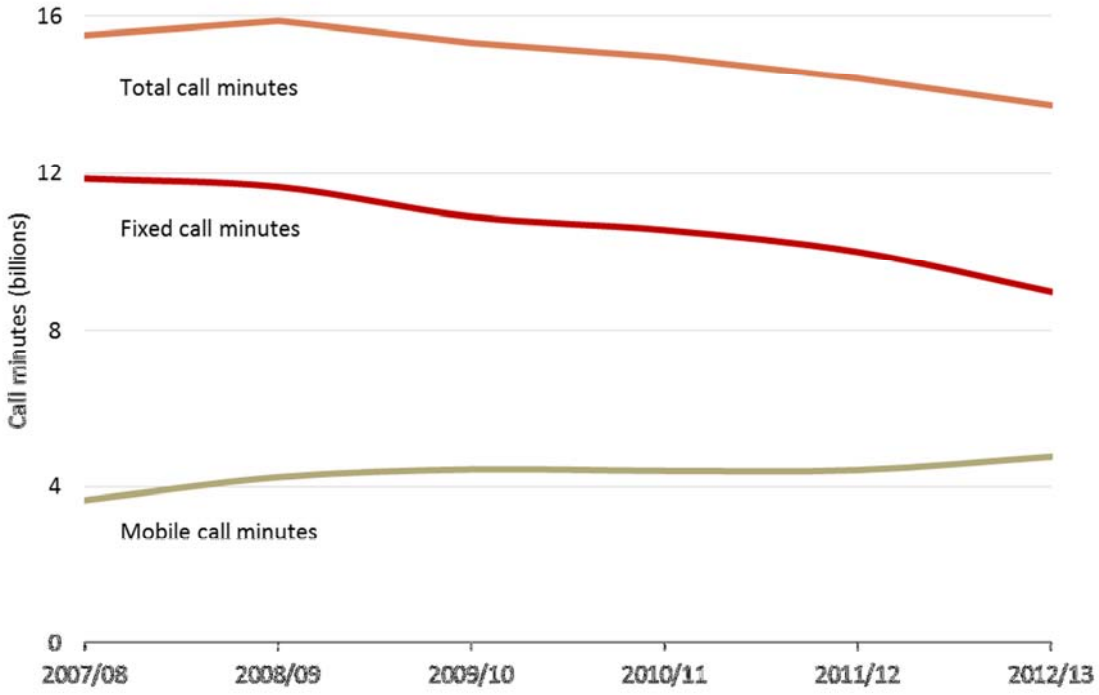
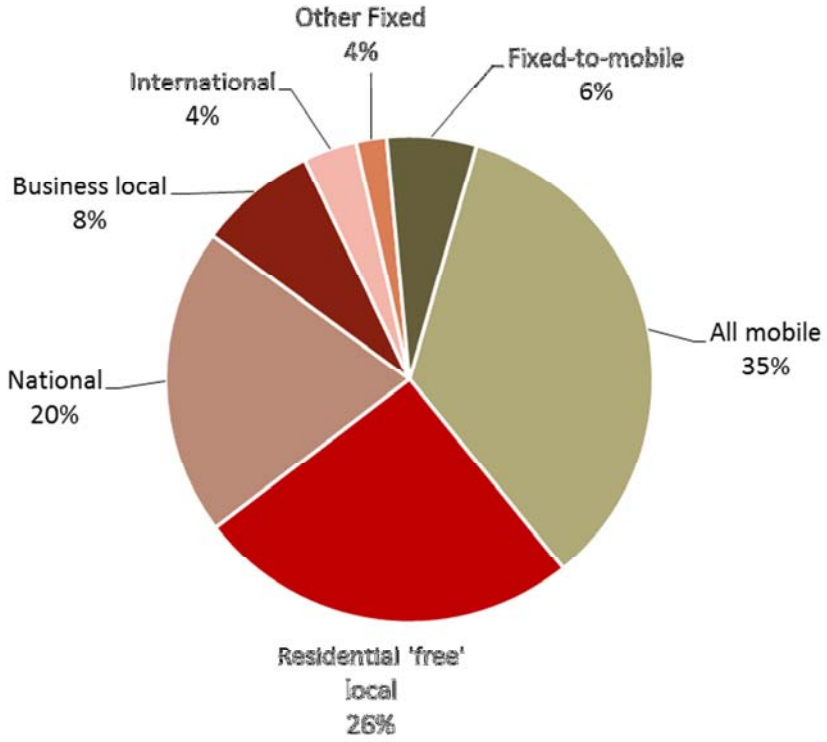


Figure 5 shows that while total calling minutes continues the gradual decline started after 2008/09, fixed and mobile calling minutes appear to be converging, with mobile minutes picking up again after appearing static for several years. Probable reasons for the mobile calling pattern are discussed in the retail mobile section.

Figure 6: 2012/13 calling minutes by call type



Residential ‘free’ local calling, at 26% of total calling minutes, now accounts for materially less calling than total mobile calling, at 35% of total calling minutes, as shown in Figure 6. The other proportions are nearly all the same as last year.

Total revenue rise not sustained

Surveyed telecommunications industry retail revenues picked up in 2011/12 but suffered a slight fall in 2012/13 to drift back to $5.21 billion. However, as was shown in the opening graphic, consumers continue to get more for their money.

Figure 7: Telecommunications retail revenues by service

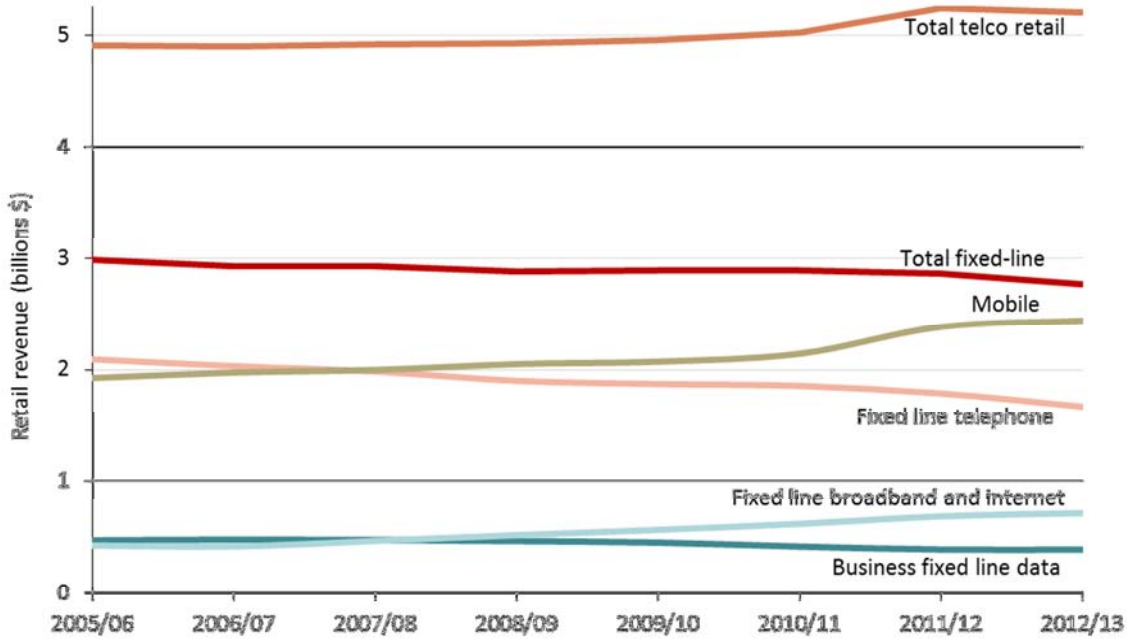


Figure 7 shows mobile revenues had a slight rise along with fixed-line broadband and internet revenues, with the other revenues flat or falling. This led to total fixed-line revenues falling at a faster rate than prior years. Total mobile revenues may surpass total fixed-line revenues within the next year or two.

Another way of looking at telecommunications industry trends is to split revenues into voice-related and data, although some revenue types such as mobile handset revenue are not easily split. Only revenue that was reported as either voice- or data-related was included in Figure 8 below.

Figure 8: Separating voice and data revenues

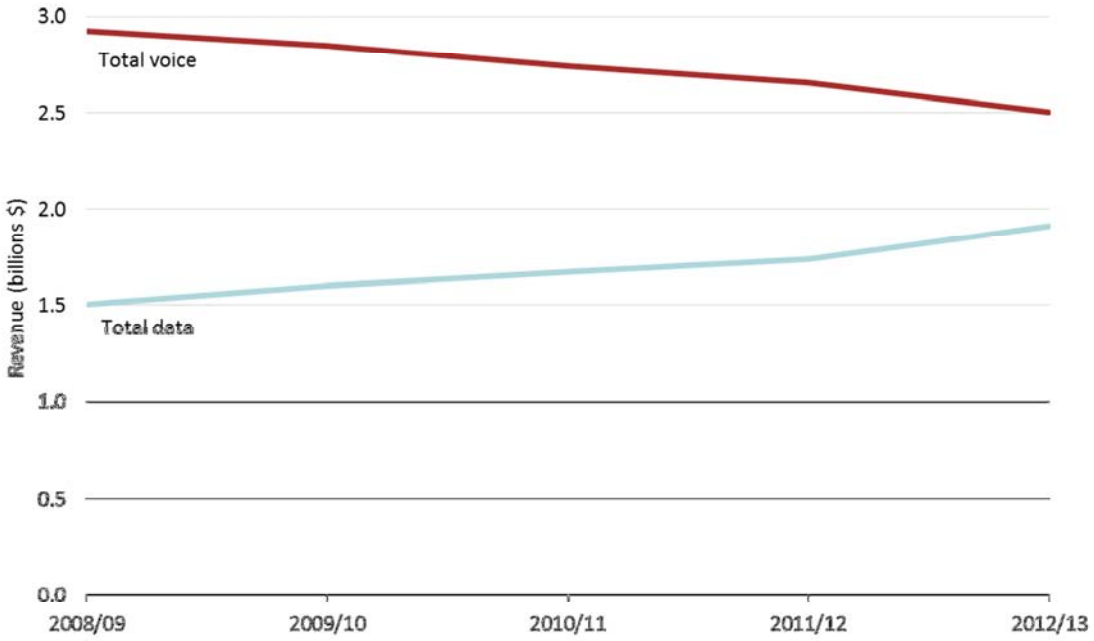


Figure 8 shows that voice and data revenues are converging at an increasing rate. Furthermore, as we have noted in prior years, the trend shown in Figure 8 could be even more pronounced than the figures indicate because of the way revenue from bundled services is allocated to the individual components of the bundle. For example, phone line use in most households is increasingly dominated by internet use, with the household typically spending a much smaller amount of time making voice calls than connecting to the internet. Yet for revenue purposes, it is likely around half the bundled price is allocated to voice-related services.

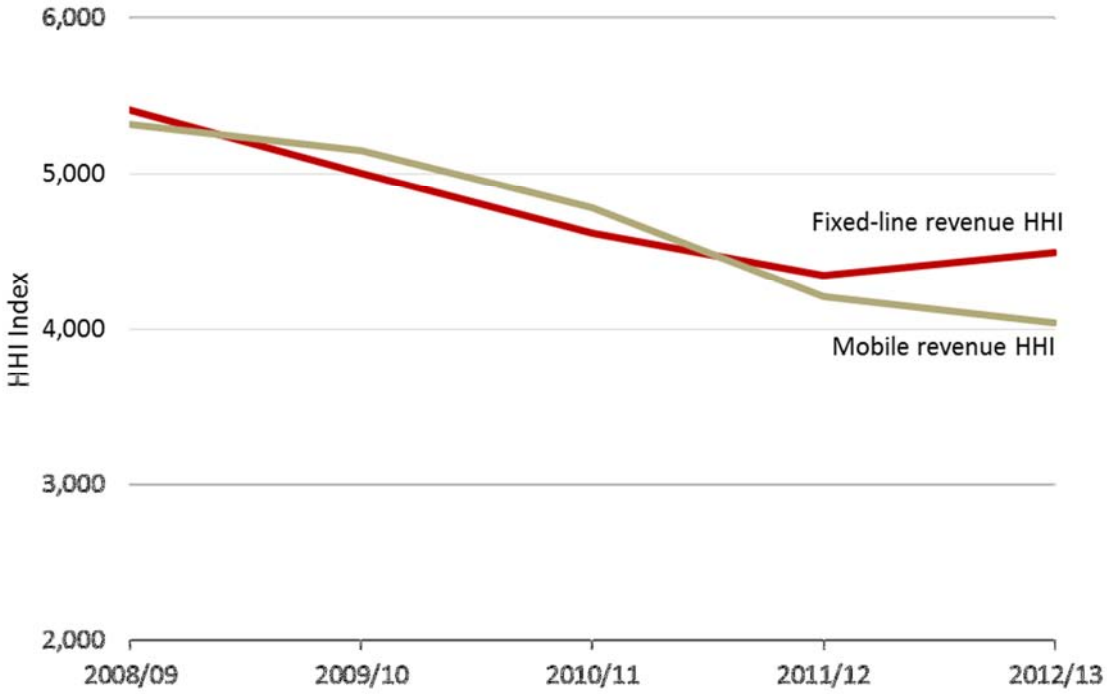
Fixed-line and mobile markets show similar levels of concentration

One method of measuring market concentration in a complex market is to use the shares of total retail revenue earned by the main participants to calculate a Herfindahl-Hirschman Index (HHI)[5] measure. The Commission has tended to calculate HHIs from subscriber shares to allow some international comparisons, but HHIs based on revenue shares give a better indication of market concentration.

Rather than looking at particular segments of the fixed-line market, the Commission has calculated a revenue-based HHI for the total fixed-line retail market and also the mobile retail market. The results for the five years to 2012/13 are shown in Figure 9 below.

[5] The Herfindahl-Hirschman Index (HHI) is a commonly accepted measure of market concentration and is calculated by squaring the market share of each market participant that has a material number of subscribers and adding these together. The maximum possible score is 10,000. The analysis of the HHI indicator in this report does not necessarily indicate that the Commission will use it for measuring competition in any other area.

Figure 9: Retail revenue HHIs for fixed-line and mobile markets



The market concentrations measured by retail revenue shares have been remarkably similar for fixed-line and mobile markets, falling steadily from 2008/09 through to 2011/12. There were, however, differing reasons for the similarity.

The fixed-line retail market has plenty of competitors but the largest provider, Telecom, had a retail revenue market share of about 70% in 2008/09. The mobile market essentially had only two players in 2008/09 but the largest player, Vodafone, had a market share somewhat lower than 70% of retail revenues. This combination meant both markets had very similar HHI scores.

A gradual decrease in the revenue shares of the incumbents in both the fixed-line and mobile markets from 2008/09 to 2011/12 meant market concentration continued to fall.

Market concentration in the fixed-line market increased in 2012/13 because of Vodafone's acquisition of TelstraClear. The fixed-line retail revenue HHI measure is not expected to rise again in 2013/14.

Market concentration in the mobile market continued to decrease in 2012/13, although at a lower rate as 2degrees' revenue growth slowed.

Retail fixed-line market

This section examines the fixed-line market. It starts with an overview of the market and then looks at the fixed-line voice market, followed by the fixed-line broadband market, before concluding with a brief look at broadband quality.

Market overview

After lots of changes in 2011/12 period, the 2013 year was relatively uneventful in terms of changes to the size and structure of participants in the retail fixed-line market.

Telecom continues to be the largest retailer. While it is no longer vertically integrated because Chorus owns the copper access network, it continues to provide a nationwide voice service for its own customers and also for many customers served by its competitors.

Vodafone now owns the cable broadband network that covers much of Wellington and Christchurch. It also makes extensive use of Unbundled Copper Local Loops (UCLL) and resale services to provide fixed-line retail services in other locations around New Zealand.

UCLL requires retailers to install their own infrastructure in exchanges, which gives them more control over the quality of the service and a cost-based price. Apart from Vodafone, other retailers using UCLL to provide broadband and voice services around the country include Orcon, Slingshot/Flip/CallPlus, and Compass. Nearly all exchanges with a reasonable number of lines have now been unbundled, although many exchanges have only one or two retailers providing an unbundled service.

The alternative to unbundling is for retailers to buy Unbundled Bitstream Access (UBA), a wholesale broadband service, from Chorus. This requires less investment in infrastructure but gives less control over the service and, in the interim, has a price based on a modest discount to an historic Telecom retail price.

Where lines have been cabinetised – meaning broadband is supplied from a fibre-fed cabinet closer to end-user premises – unbundling line from the cabinet is generally not economic for retailers. Instead, they purchase UBA from the cabinet (Sub-Loop UBA or SLUBA), but may provide voice from the exchange using their own equipment by buying a Sub-Loop Extension Service (SLES). This means nearly all retailers using UCLL also use UBA services to provide broadband to both cabinetised lines and lines served by exchanges that have not been unbundled.

Some retailers use only UBA to provide broadband services. These retailers include WorldxChange, Woosh, TrustPower, and Snap.[6] Retailers using UBA often bundle a conventional dedicated voice service with broadband to allow consumers to have all their fixed-line services on one bill from that retailer.

Where a line is not unbundled, retailers usually purchase a conventional service from Telecom, but in some areas a Baseband service can be purchased from Chorus that allows

[6] A number of other very small telecommunications retailers also operate in New Zealand.

the retailer to offer a conventional voice service directly. The other option for delivering a voice service is to deliver voice as data using VoIP, like Orcon does with its Genius service, to avoid the need to buy a conventional dedicated voice service.

A growing number of end-users now have a fibre access network running past their homes or businesses, with fibre progressively being rolled out by the winners of the UFB tender. The wholesalers of fibre are Chorus, for most of the country; NorthPower in Whangarei; Ultra Fast Fibre led by WEL Networks in Hamilton, Tauranga, Tokoroa, New Plymouth, Hawera, and Whanganui; and Enable Networks in Christchurch.

Consumers have to purchase telecommunications services delivered by fibre from an independent retailer. Fibre retailers now include Telecom, Vodafone, Orcon, Slingshot/ CallPlus, and Snap.

The number of consumers purchasing fibre-based services is now increasing rapidly from a small base. The government recently reported that over the first quarter of 2014, the number of customers signing up to a service under the UFB programme jumped by nearly 40%, taking the total to more than 27,000.

Fall in local calling accelerates

Figure 10: Fixed-line retail call minutes by call type

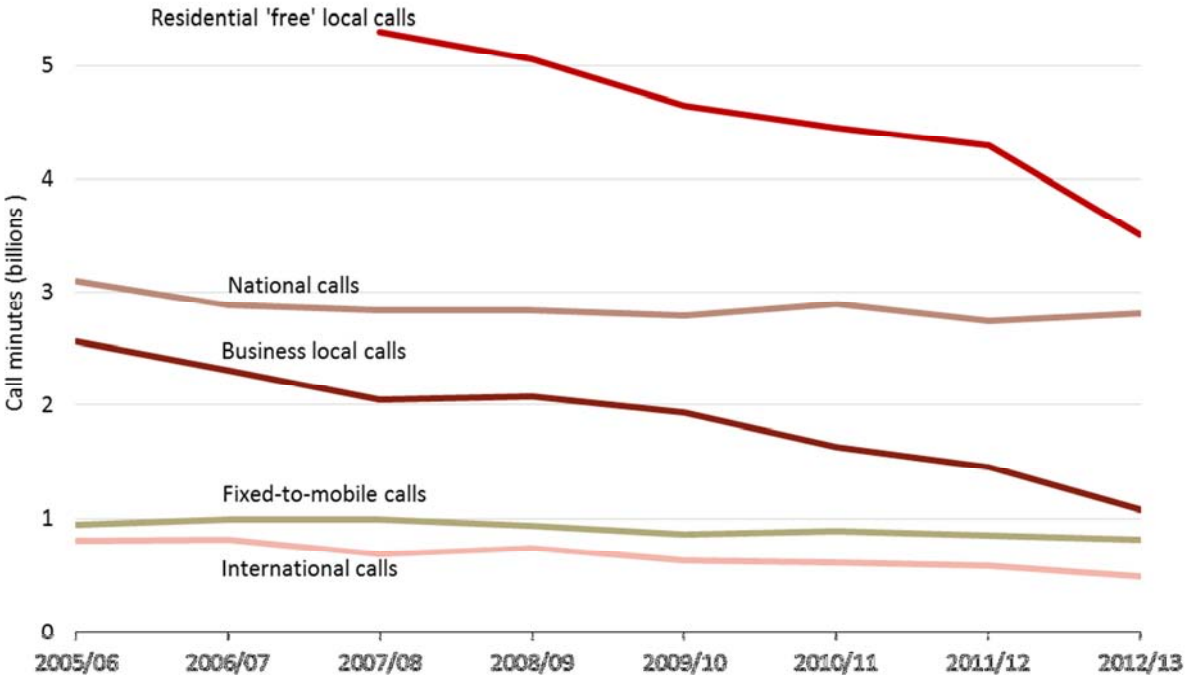


Figure 11: Average fixed-line calling prices by type

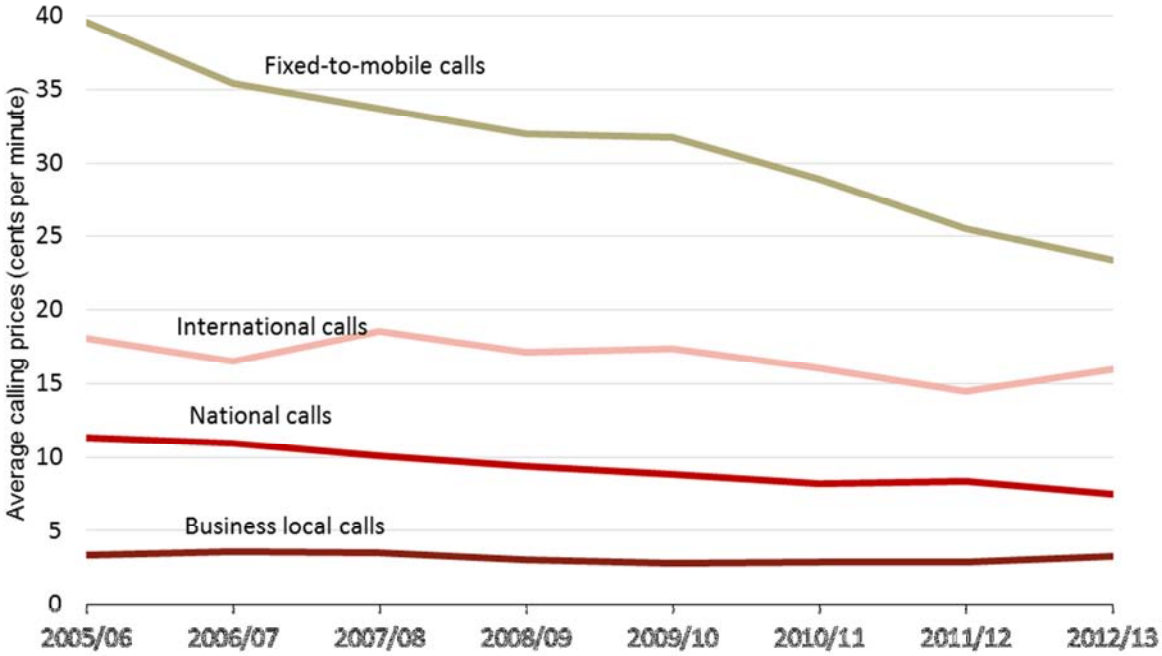


Figure 10 shows most forms of fixed-line calling continue to decline, with the biggest falls coming in local calling volumes.[7] National calling appeared to have bucked the trend, with national calling minutes rising slightly in 2012/13. This rise could have been encouraged by various national calling offers like free national calling included in the monthly bundle price. The effect of these national calling offers may also behind the drop in the average price of national calls shown in Figure 11.

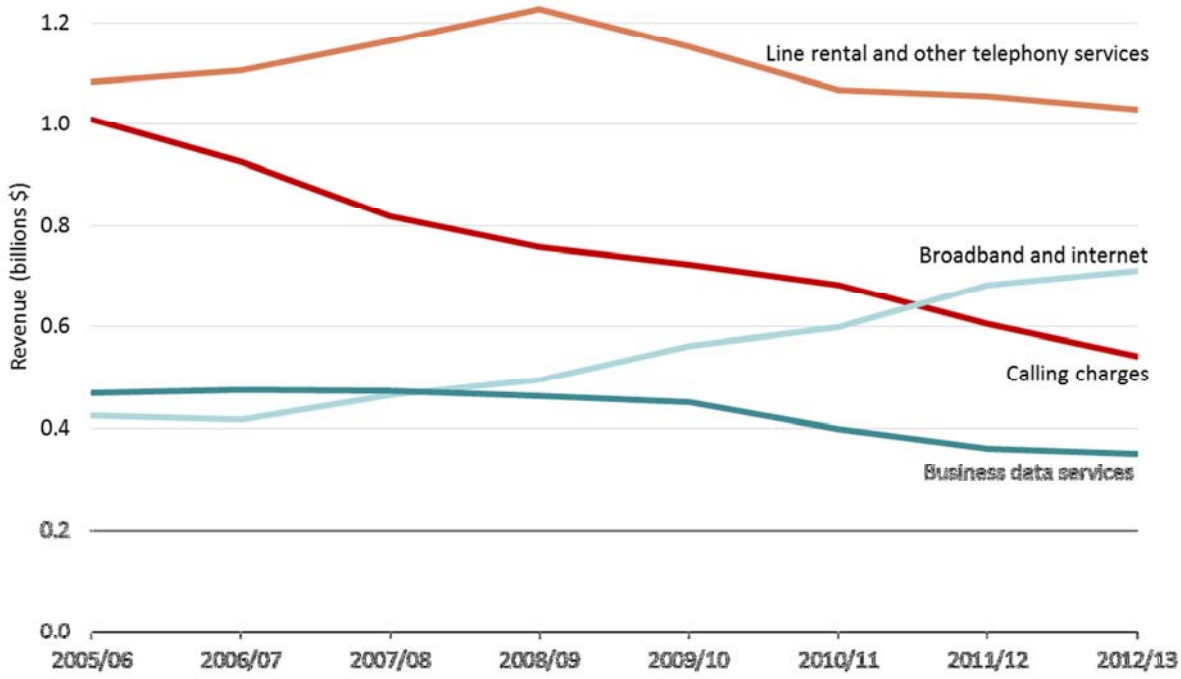
The only other fall in average calling price was for fixed-to-mobile calling, where the average price decreased to 23 cents per minute (excluding GST). The margin on fixed-to-mobile calls remains high, however, with the main cost input, the regulated mobile termination rate, falling from 3.97 cents per minute to 3.72 cents per minute on 1 April 2013.

The number of consumers and businesses using Voice over Internet Protocol (VoIP) rather than conventional Public Switched Telephone Network (PSTN) voice requiring a dedicated low-frequency service continues to increase. However, where VoIP calls connect to the PSTN and the VoIP operator charges for the service, the minutes and revenues are required to be included in the data captured for this report.

[7] Residential local calling is largely driven by Telecom customers, and Telecom disclosed that the number it has been supplying the Commission in recent years is an estimate.

Most fixed-line revenues continue to fall

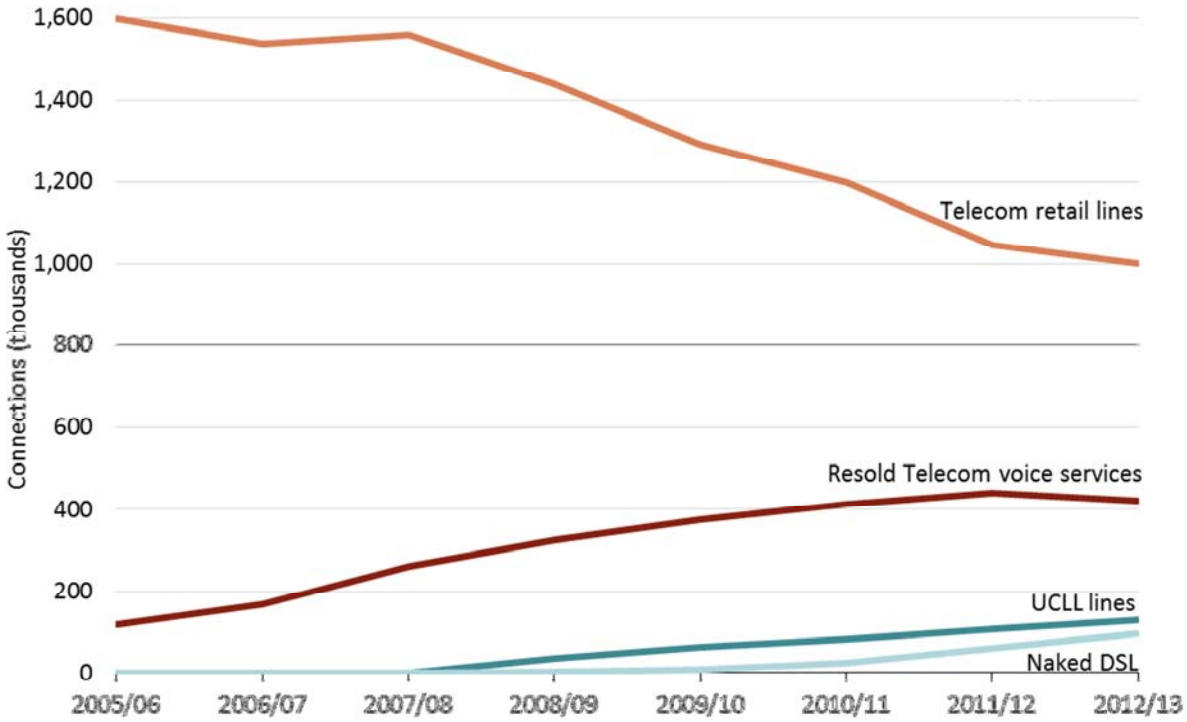
Figure 12: Fixed-line retail revenues by type



All forms of fixed-line revenue apart from broadband and internet revenues continued to fall in 2012/13, as can be seen in Figure 12. Keen competition in bundled broadband pricing is probably responsible for broadband and internet revenues showing a smaller rise than prior years.

Telecom's retail voice share continues to slip, including wholesale

Figure 13: Telecom and fixed-line services



The number of fixed voice lines retailed by Telecom continues to decrease, although the rate of decrease appears to be slowing, as can be seen in Figure 13. Telecom continues to wholesale its analogue voice service to help its competitors serve most of the non-Telecom retail lines, but this number is now starting to drop too. The drop is likely to be from its competitors buying a Baseband service from Chorus to allow them to provide analogue voice directly.

The number of unbundled lines where Telecom's competitors provide their own broadband and voice service continues to increase, but only slowly, and reached 129,000 in June 2013. There is also a growing number of naked DSL broadband lines (just under 100,000 as at 30 June 2013), where voice is delivered as data using VoIP or no voice service is provided at all.[8]

The other fixed-line technology by which customers can be served is fibre, in areas where this has been rolled out. For fibre customers, the voice service is VoIP except for Telecom residential fibre customers who, in the meantime, retain a copper connection as well for their voice service.

Looking beyond 2012/13, the number of the retail customers being served by fibre is becoming material and appears to have started to reduce the number of broadband customers being served by DSL.

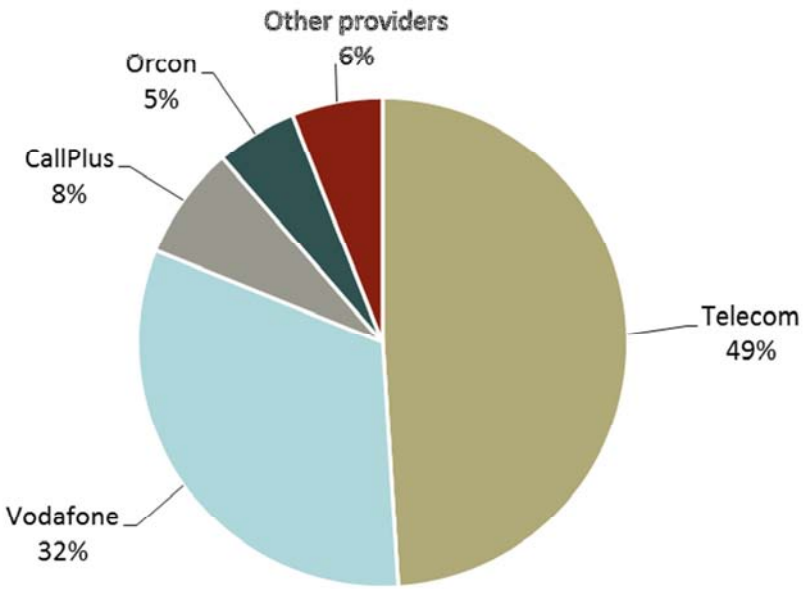
[8] An error in a prior year response means the naked broadband connections for 2011/12 were overstated in the 2012 annual monitoring report.

Consolidation in broadband market

The retail fixed-line broadband market, which reached 1.32 million connections by 30 June 2013, continues to be one of the most competitive telecommunications markets.

The Commission has estimated the main ISPs' fixed-line broadband market shares by connection because it often gets asked for this information. We took the survey results from the World Internet Project,[9] adjusting these for the fact that Telecom's competitors had a 51% share of the retail fixed-line broadband market as at 30 June 2013.[10] The resulting estimated market share estimates are shown in Figure 14.

Figure 14: Estimated ISP market share

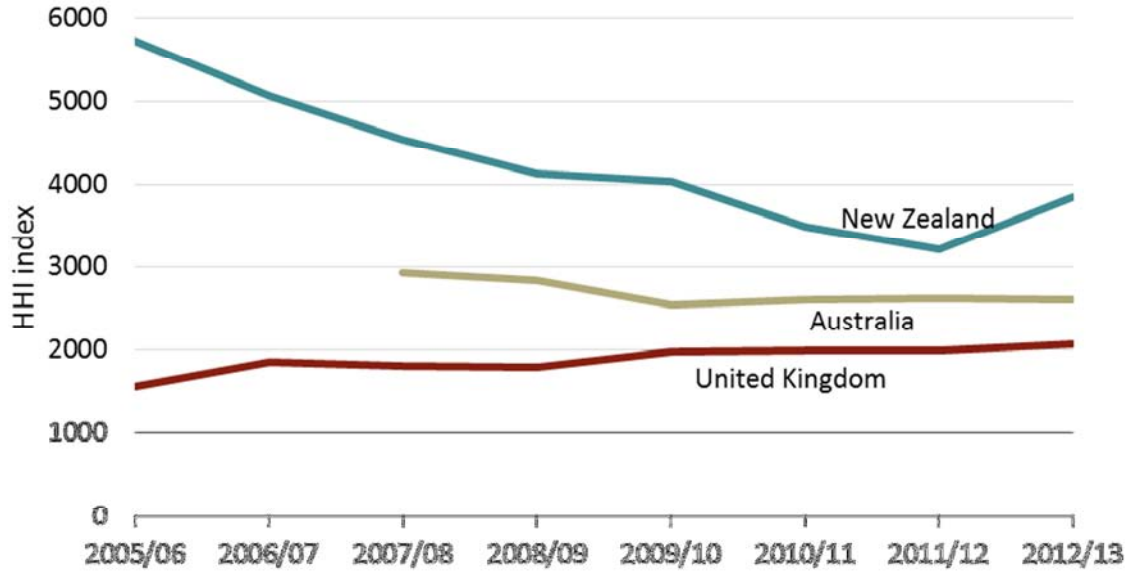


After its acquisition of TelstraClear, Vodafone now retails around one-third of all fixed-line broadband connections. CallPlus under its various brands of Slingshot, CallPlus, and Flip is some way behind, but clearly the third player in the broadband market with an estimated 8% market share. Orcon is clearly the fourth player with an estimated market share of 5%. All the remaining retailers have an estimated market share totalling 6%.

[9] Gibson, A., Miller, M., Smith, P., Bell, A., Crothers, C. (2013). The Internet in New Zealand 2013. Auckland, New Zealand: Institute of Culture, Discourse & Communication, AUT University.

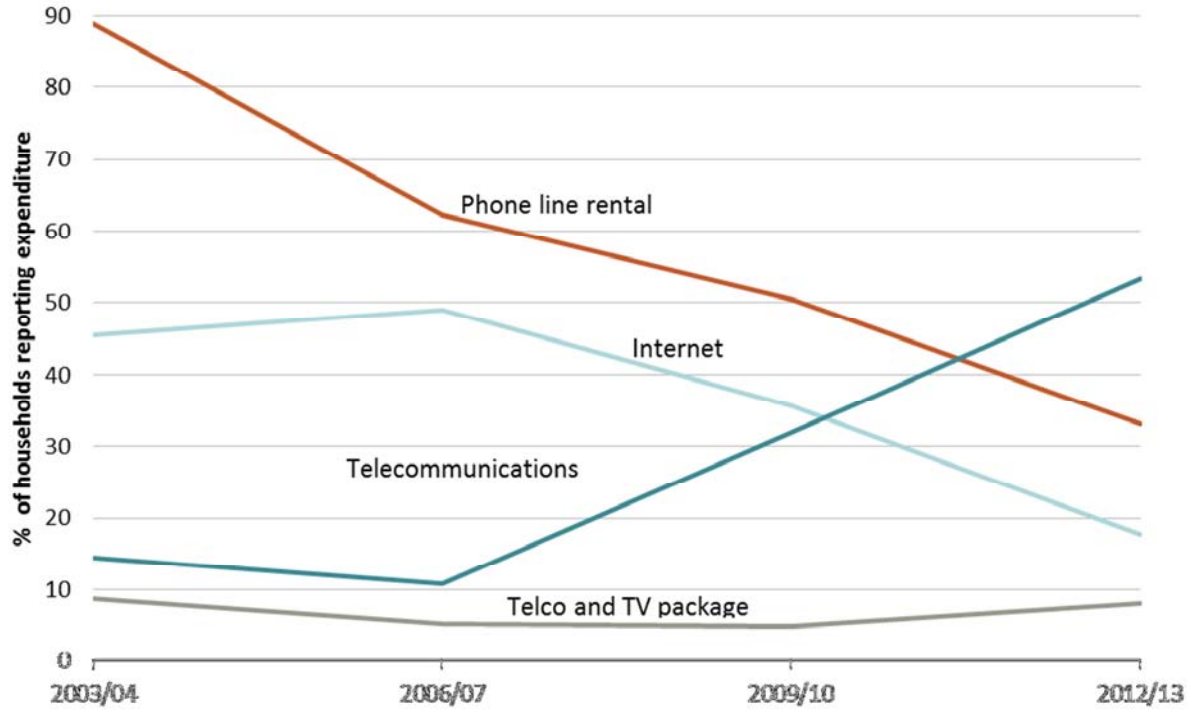
[10] Telecom's market share was increased to 49% while the share of Other was reduced by the same amount. 2degrees, not being a fixed-line ISP, was removed and had its market share distributed among the other ISPs.

Figure 15: Retail broadband market HHI index



As signalled in last year's report, Vodafone's acquisition of TelstraClear increased market concentration in the retail broadband market as measured by the HHI calculated by share of connections. As shown in Figure 15, this takes the HHI back to a little under the level recorded 2009/10. However, the market has changed significantly since that time, with the consumer landscape continuing to evolve.

Figure 16: Household fixed-line purchasing trends



Source: Household Economic Survey, Statistics New Zealand

More and more households are purchasing their fixed-line telecommunications services as a bundle of services for one price, as shown in Figure 16. Back in 2004, nearly 90% of households reported purchasing phone line rental as a separate service. By 2013, it was only about a third of all households purchasing phone line rental as a separate service and 61% were purchasing a multi-service telecommunications package, with or without TV included.

The amount of data traffic used by each household is continuing to increase rapidly. The Commission's survey data indicates that the average amount of data used by each fixed-line broadband subscriber rose from around 10GB per month in 2010/11 to 26GB per month in 2012/13.

Some fixed-line data is used to service mobile devices via WiFi, both in the home and out and about, with many offices, shops, and public facilities offering a WiFi service. Telecom is now using most of its public phone call boxes as WiFi transmitters for its mobile customers. This increasing use of fixed-line data by mobile devices is known as mobile data offloading.

Lift in average broadband speed

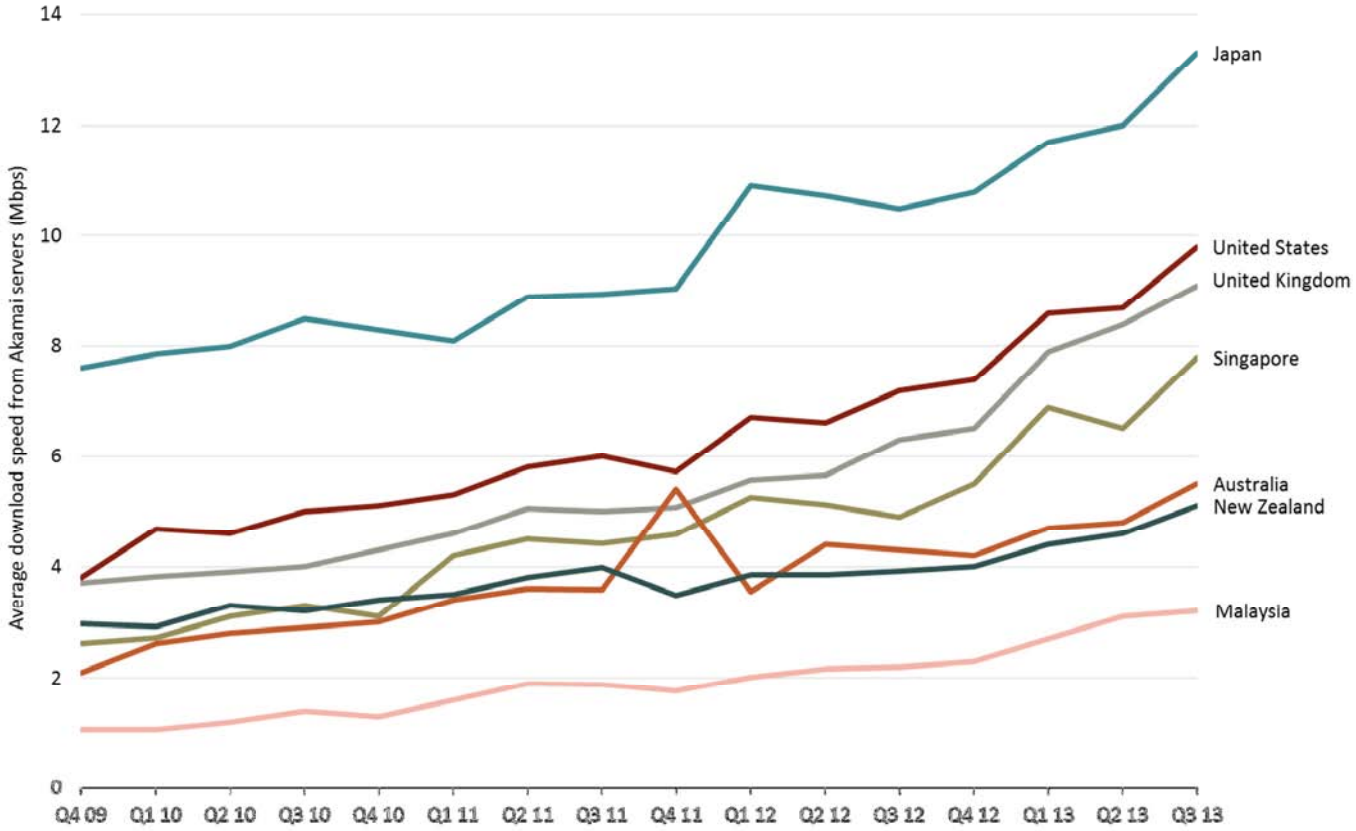
An indication of broadband quality is the average download speed being achieved by end-users. It is difficult to track this measure over time on a consistent basis, especially when the speed of plans being purchased and typical consumption is rising.

Data distribution company Akamai[11] provides data about average throughput speeds achieved by internet users (from delivery of large content files such as operating system updates from a distributed system of servers typically located at ISPs).[12]

[11] Akamai website: www.akamai.com

[12] The testing carried out by Akamai has been described as 'in the network, third party testing'. Akamai measures speeds locally so speeds are not affected by international backhaul, and measured as delivering a real service unlikely to be influenced by specific ISPs or users. Akamai measures a significant number of individual downloads because it delivers data to virtually every broadband connection in the country (including connections that do not use DSL technology).

Figure 17: Average download speeds by country



Source: Akamai

New Zealand's average broadband speed as measured by Akamai improved significantly over the 2013 year to 5.1 Mbps for the third quarter of 2013, as did the average download speed for most of the countries shown in Figure 17. The widespread rise in speed was likely driven by upgrades to existing broadband networks and customer migration to new, very high-speed fibre networks.

Actual broadband speeds, like those measured by Akamai, are generally lower than those given by speed test applications because such applications generally give the maximum possible speed that could be achieved when downloading a large file. Networks also tend to be configured to maximise the results of speed-testing applications.

Retail mobile market

This section examines the mobile market. It begins with an overview of the market and then looks at the mobile revenues, mobile voice traffic, and mobile data. It concludes with a closer look at what is happening in each of the prepay, on-account, and business market segments.

Market overview

New Zealand has three mobile network operators: Telecom, Vodafone, and 2degrees. The first two have been operating in New Zealand since the 1990s, while 2degrees started only in 2009.

Vodafone and 2degrees operate 2G GSM networks, and all three mobile providers operate 3G UMTS[13] networks that allow mobile broadband to be provided in addition to voice and text messages. Vodafone and Telecom started rolling out 4G networks in 2013, and 2degrees is expected to follow later in 2014. 4G can provide much higher data speeds to customers, similar to what can be achieved with fixed-line copper connections.

Vodafone and Telecom's mobile networks are both nationwide, reaching around 97% of the population. 2degrees now has its own infrastructure in most major towns and cities, reaching around 88% of the population. It relies on a national roaming agreement with Vodafone to provide coverage outside those areas.

The three mobile network operators in New Zealand are also the only significant mobile retailers. While there is a handful of mobile virtual network operators (MVNOs), who rely on reselling services purchased from the mobile network operators, none have a significant number of customers. TelstraClear had built up the largest MVNO business (although still had only around 50,000 subscribers) before it was purchased by Vodafone in October 2012.

Just under two-thirds of mobile subscribers in New Zealand use prepay plans. This puts New Zealanders among the higher users of prepay plans in the OECD. In 2011, the percentage of mobile prepay subscribers in OECD countries ranged from 1% to 85%, while the average was 41% and New Zealand had 66%.

Telecom switch-off causes dip

Telecom switched off its CDMA mobile network on 31 July 2012. Although this network was able to offer 3G services, it used a standard that, outside of North America, was much less popular than the UMTS 3G standard, which Telecom adopted in 2009 for what it called its XT mobile network. Virtually all Telecom's active customers had moved to the XT network by the time of the switch-off. However, the switch-off did result in Telecom's reported mobile subscriber numbers for 2012/13 dipping by over 200,000 from what was reported for the prior year, and bringing the industry total down to 4.77 million.

[13] Universal Mobile Telecommunications System (UMTS) is the 3G successor to the 2G Global System for Mobile (GSM) standard. The most common form of UMTS uses W-CDMA as the underlying air interface.

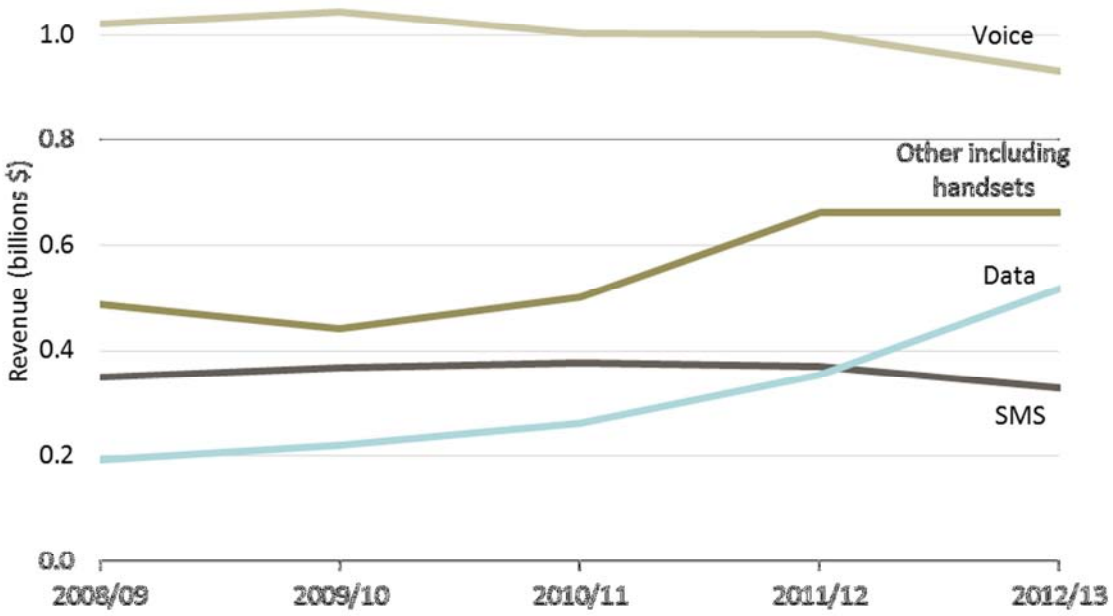
The dip in Telecom's reported subscriber numbers meant that as at 30 June 2013, Telecom's market share was down to a third of total mobile connections, while 2degrees had increased to a quarter and Vodafone remained at 42%.

Despite the dip in total reported subscriber numbers in 2012/13, Telecom's mobile revenue remained stable and its XT network continued to gain market share. While 2degrees continued to gain market share, albeit at a lower rate than previous years, its share of industry revenue remained much less than its share of connections given its smaller share of higher-value customers. This issue is explored further at the end of the mobile section.

Rising data revenues underpin modest growth

Mobile retail revenues grew a little in 2012/13 to reach $2.44 billion, up from $2.38 billion in 2011/12.

Figure 18: Mobile retail revenues by type

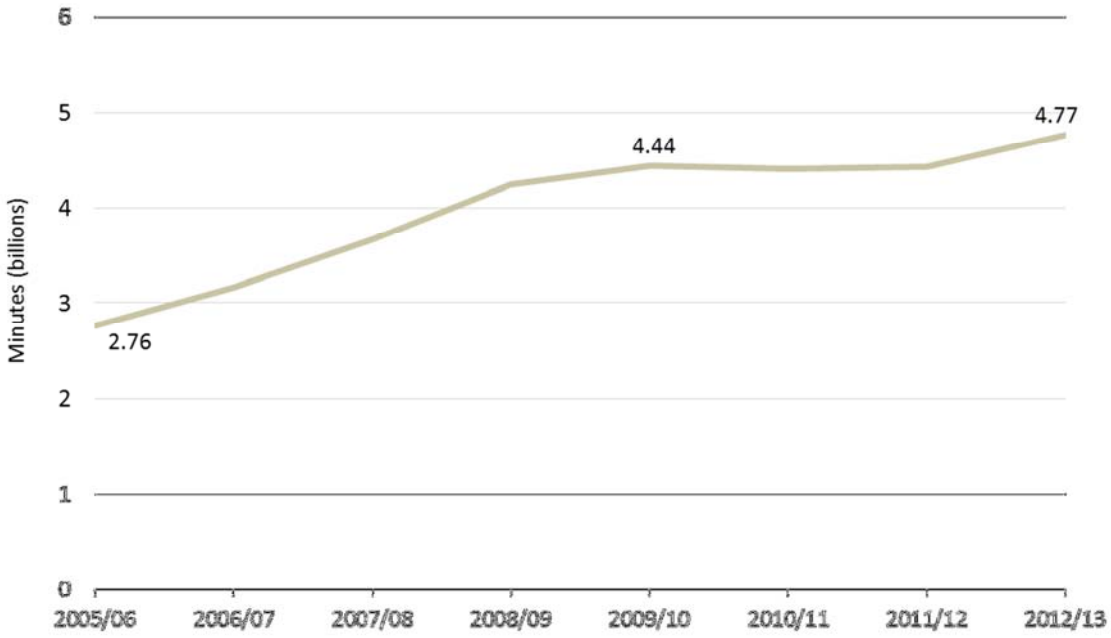


Data revenues increased significantly in 2012/13, with the other mobile revenue categories illustrated in Figure 18 staying flat or falling. Handset sales made up the bulk of the 'Other including handsets' revenue category (including so-called 'free' handsets sold with a monthly plan). Handset sales have only been collected separately for the last two years and also increased, from $417 million in 2011/12 to $449 million in 2012/13.

The uptake and usage of smartphones is continuing to increase, which is likely to be a key factor in driving increasing data revenues.

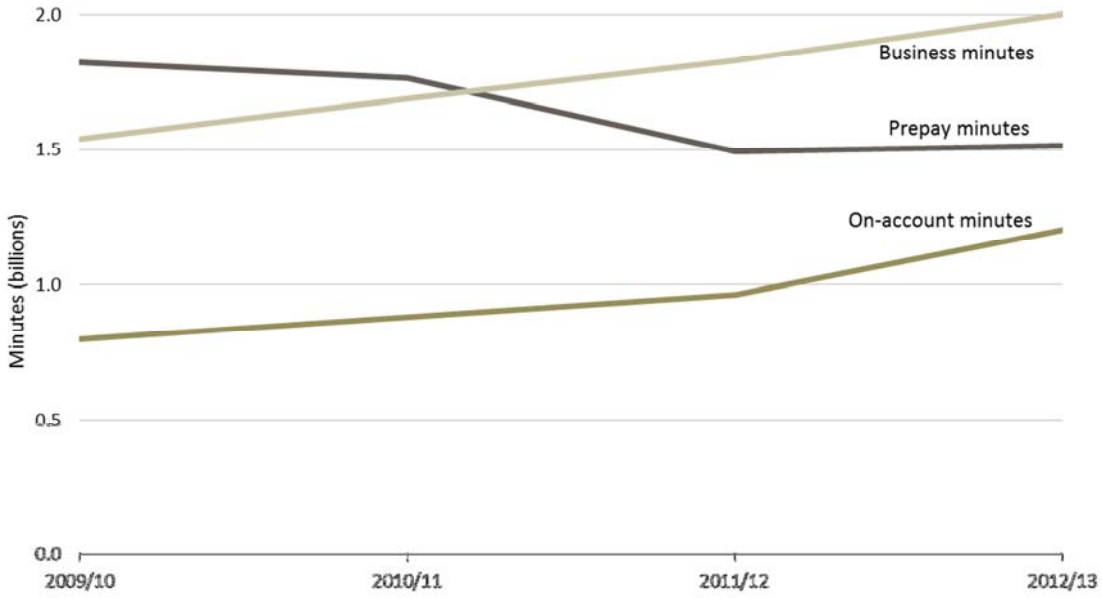
Mobile voice minutes resume upward trend

Figure 19: Retail mobile voice minutes



After appearing to flatten off in the two years to 2011/12, mobile minutes have begun growing again, as shown by Figure 19. The prior trend was unexpected given mobile voice use in New Zealand was and still is low compared with most other countries.

Figure 20: Mobile voice minutes by market segment



Last year we noted mobile operators were continuing to try to encourage more voice use by providing larger buckets of ‘free’ minutes in competitively priced bundles. It appears this has

been successful despite the increase in alternative forms of communication made easy by smartphones.

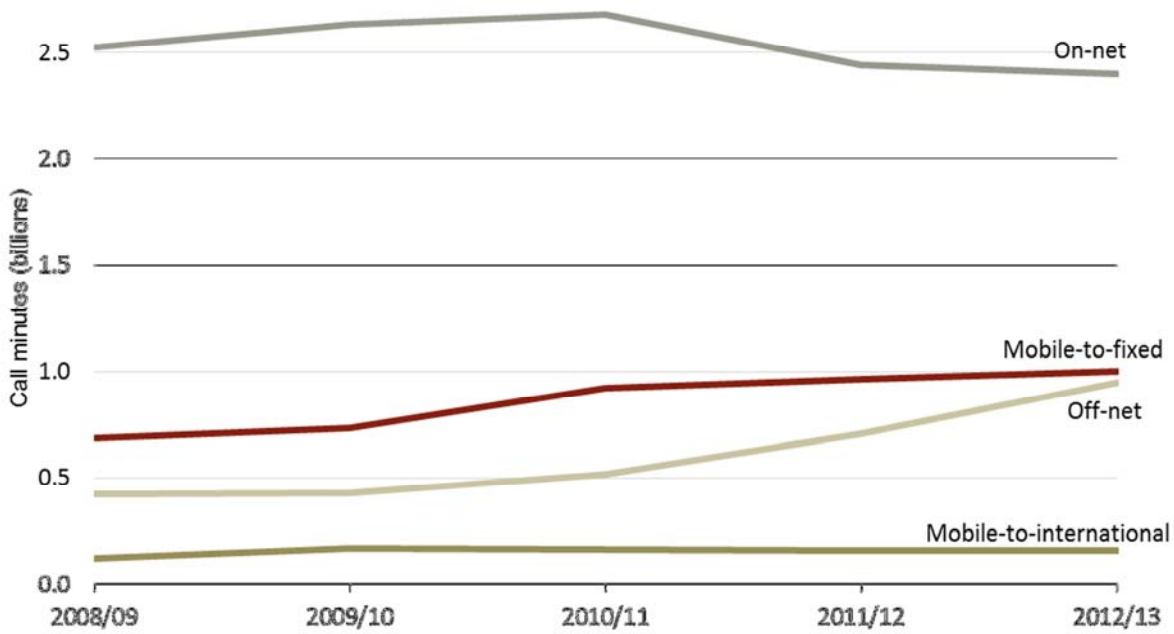
Breaking down mobile minutes into prepay, on-account, and business (which we have been capturing from mobile operators for the last four years) shows some conflicting trends. Figure 20 shows only prepay minutes have come down in recent years, with a slight rebound in 2012/13, while on-account and business minutes have risen every year.

As we speculated last year, it appears that prepay minutes came down in 2011/12 and grew only modestly in 2012/13 because of the gradual unwinding of the huge amount of voice traffic driven by Vodafone's BestMate add-on. Back in February 2011, Vodafone stated in its MTAS cross-submission that BestMate take-up and usage was the single biggest influence on its on-net traffic, and that BestMate accounted for around 40% of its total on-net minutes in January 2011, and a third of all its minutes.

It is likely that Vodafone BestMate users have gradually been migrating to newer plans and changing providers, and so talking less to their selected best mates and probably a little more to everyone else. Vodafone's current plans appear to offer only a NZBestMate add-on, which costs more at $10 a month (vs $6 for BestMate) for up to 1,000 minutes of calling and 1,000 texts to any other New Zealand number. We understand there is still a substantial rump of users on the old Supa Prepay plan who still have a BestMate.

Off-net calling becomes more popular

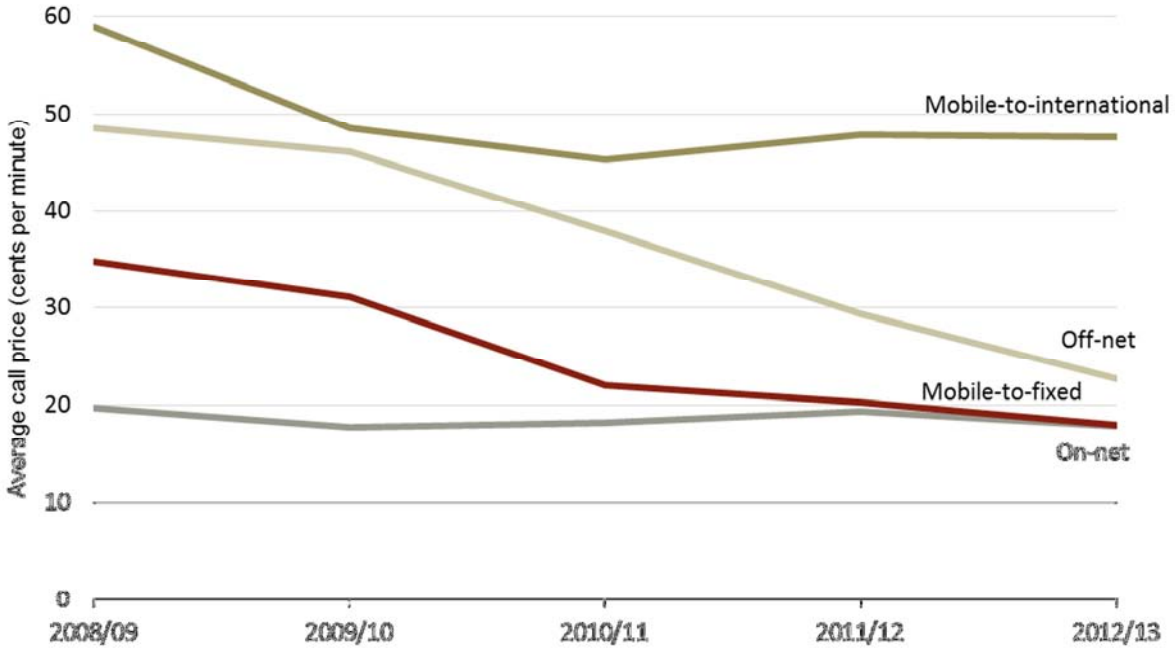
Figure 21: Mobile call volumes by call type



It can be seen from Figure 21 that all the growth in mobile calling has been coming from increased off-net calling (calling between users on different mobile networks) while on-net calling (calling between users on the same mobile network) was almost static, as was mobile-to-fixed calling and mobile-to-international calling. As discussed above, the likely

decrease in the number of BestMate add-ons probably exerted some downward pressure on on-net calling.

Figure 22: Mobile call average price by call type

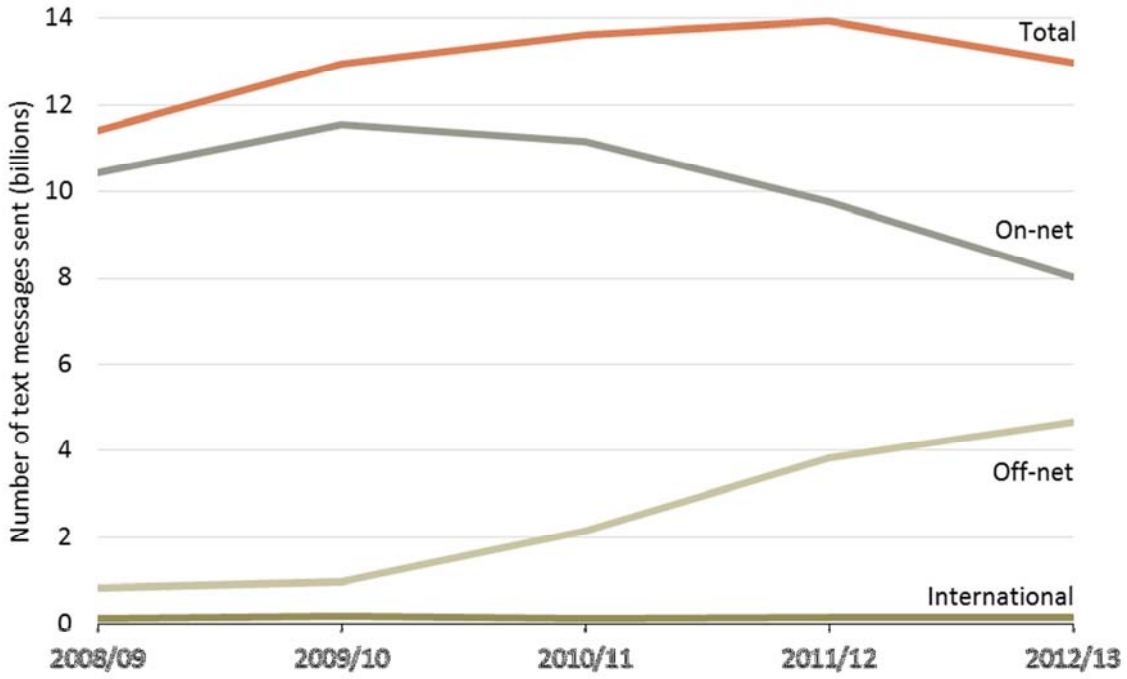


The trend towards giving mobile users larger buckets of 'any-net' minutes and turning on-net offers into any-net offers has also led to a converging trend in the price of on-net and off-net mobile calling, with the price of off-net calls falling faster than the price of on-net calls, as shown in Figure 22.[14] Other types of mobile calling had modest falls in price.

[14]There was an error in the original calculation of 2011/12 average calling prices.

Texting appears to have peaked

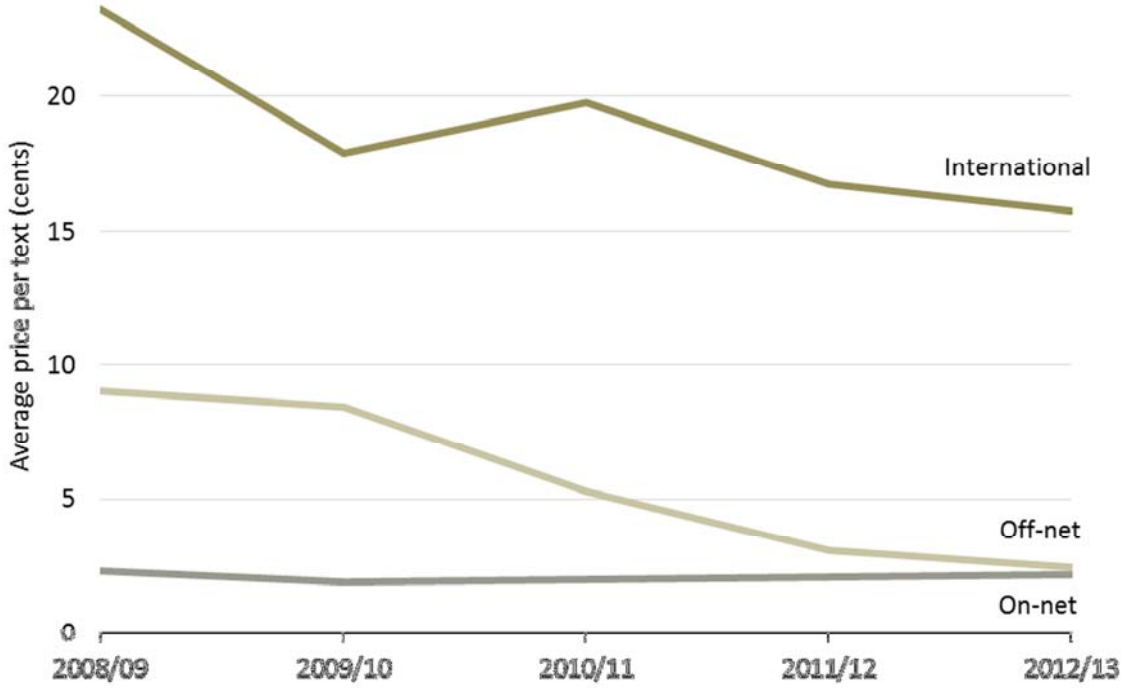
Figure 23: Text volumes by type



The demand for text messaging appears to have been dented by the increasing popularity of alternative forms of mobile communications using mobile data connections, like that facilitated automatically between iPhones by the iMessage system. Figure 23 shows text message volumes appeared to peak in 2011/12 at nearly 14 billion (236 texts per connection per month) before falling back to about 13 billion in 2012/13.

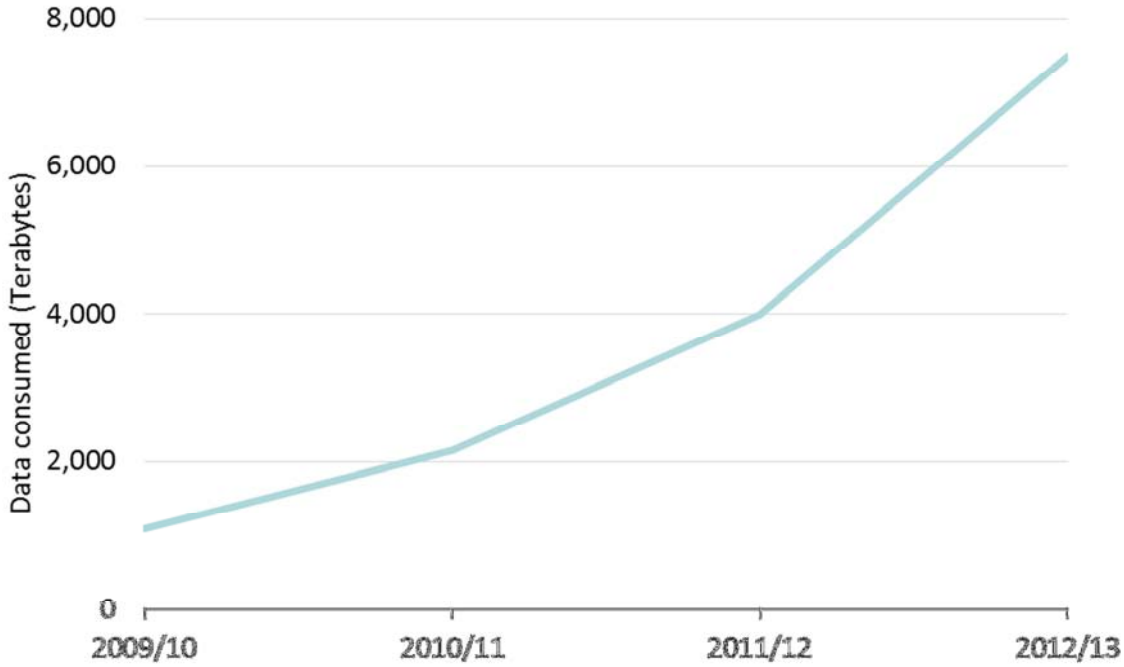
Text messaging has converging on-net and off-net traffic volumes, as shown in Figure 23, and also converging on-net and off-net pricing, as shown in Figure 24. The trends are more than with voice calling. This is not surprising given the disappearance of the once popular on-net text bundles and the move to bundling unlimited any-net texts (within reason) with many prepay and on-account mobile plans.

Figure 24: SMS average price by type



Mobile data consumption nearly doubles again

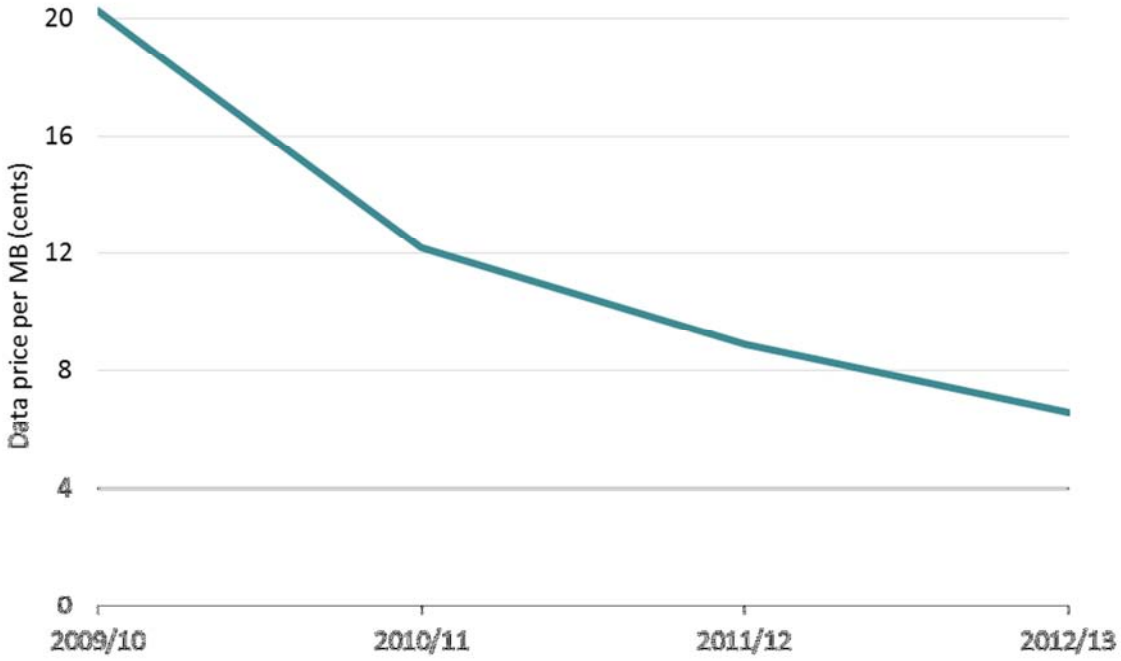
Figure 25: Mobile data retail consumption



The amount of mobile data consumed by retail customers has again nearly doubled from the previous year, as shown in Figure 25. The amount of data consumed per mobile connection at 132MB is still only a fraction of the 26GB consumed per fixed-line connection,

so there is the potential for continued very strong growth in mobile data consumption for at least the next five years.

Figure 26: Mobile data average price



The average retail price of mobile data has fallen again too, to 7 cents per MB, although the rate of decrease has slowed from prior years, as shown in Figure 26.

Competition progressing in prepay but not much in business

As at 30 June 2013, 2degrees had a quarter of the total mobile connections, Telecom had one third, and Vodafone the remaining 42%. However, looking only at each operator's share of total connections in the mobile market can be misleading in terms of the likely profitability of that particular operator, because the different segments of the mobile market exhibit markedly different characteristics.

The prepay segment of the market has substantially lower revenues per customer than the on-account segment, and the business segment has higher per-customer revenues again. We have put together some aggregate data showing the characteristics of the three different mobile market segments to illustrate the points mentioned above.

Figure 27: Mobile market segment's share of subscribers and revenue

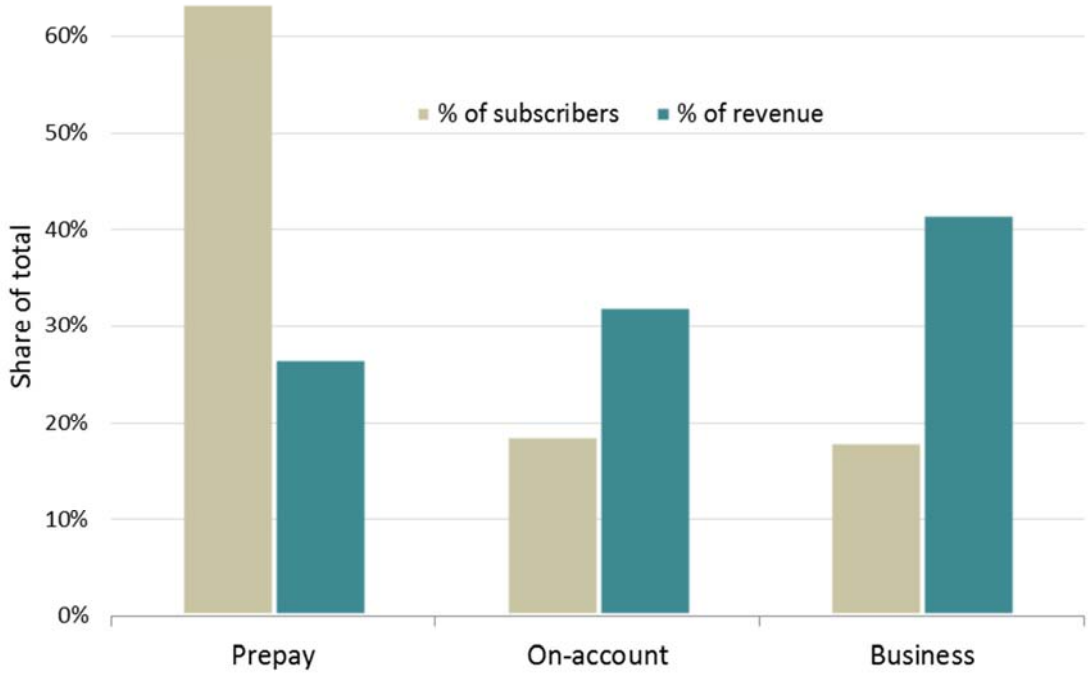


Figure 27 shows that while prepay customers make up 63% of total mobile subscribers, they generate only 27% of total mobile revenues. On-account customers make up 19% of subscribers and generate 32% of revenues, while business customers make up 18% of subscribers and generate a whopping 42% of revenues. While there are different costs associated with serving these different market segments, given network costs are largely fixed, profitability may depend on the share of revenue from the higher end of the market.

Public subscriber figures show Vodafone has the largest number of prepay subscribers, significantly ahead of 2degrees and Telecom. Things are roughly equal between Vodafone and Telecom in the other market segments.

The precise details of the progress 2degrees has made in gaining customers in the on-account and business market segments is commercially sensitive. However, the Commission has calculated HHIs based on market shares by revenue for each of the three market segments discussed. This gives an indication of the impact 2degrees has had on reducing market concentration in each market segment.

Figure 28: Revenue share HHI by market segment

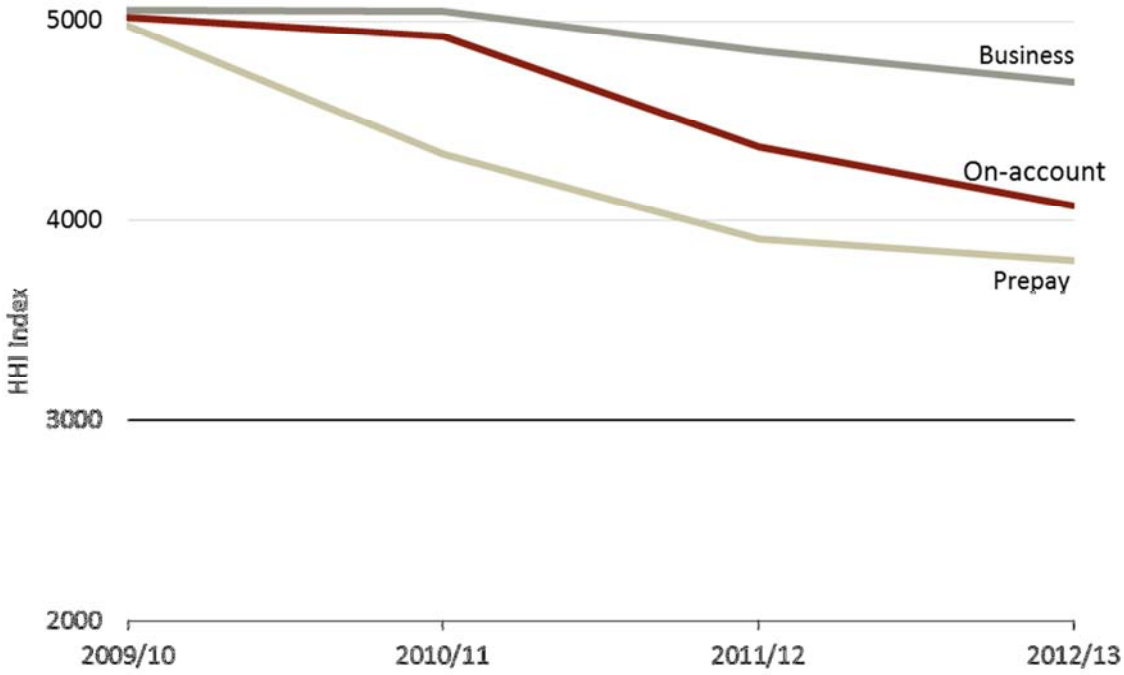


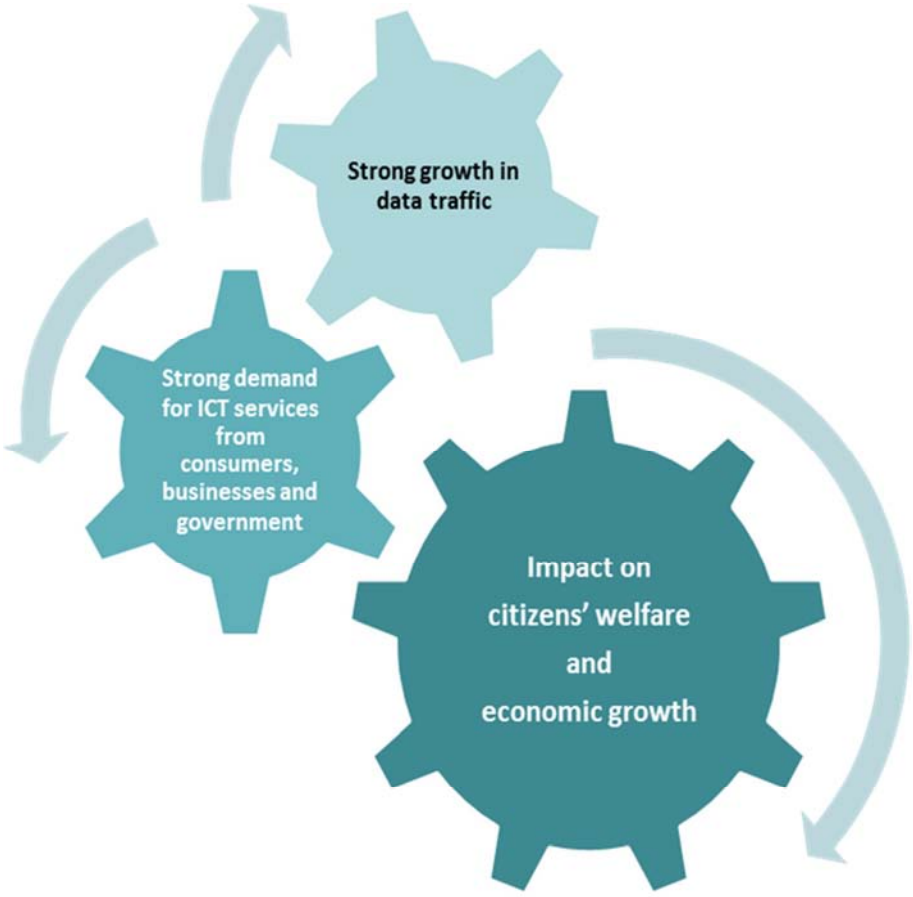
Figure 28 shows that 2degrees' expansion in the market since 2009 has reduced market concentration significantly in the prepay market, somewhat less in the on-account market, and hardly at all in the more lucrative business market.

The telecommunications consumer

– from smartphone to smart living

In the previous chapters we have presented the trends in the telecommunications market, and highlighted the consumer's appetite for data. In this chapter, we explore recent and forecast usage trends from a national and international perspective. We also consider the factors that drive data consumption up, and the impact of Information and Communication Technology (ICT) on the way we live as individuals and as a society.

The telecommunications sector consolidates its position as a major influence on the development of our economy. New services are being taken up, including some very data-intensive services, enabled by healthy competition, better quality, and lower prices. This take-up drives the strong growth in data traffic. Together, these tendencies are having a significant impact on citizens' welfare and economic growth.

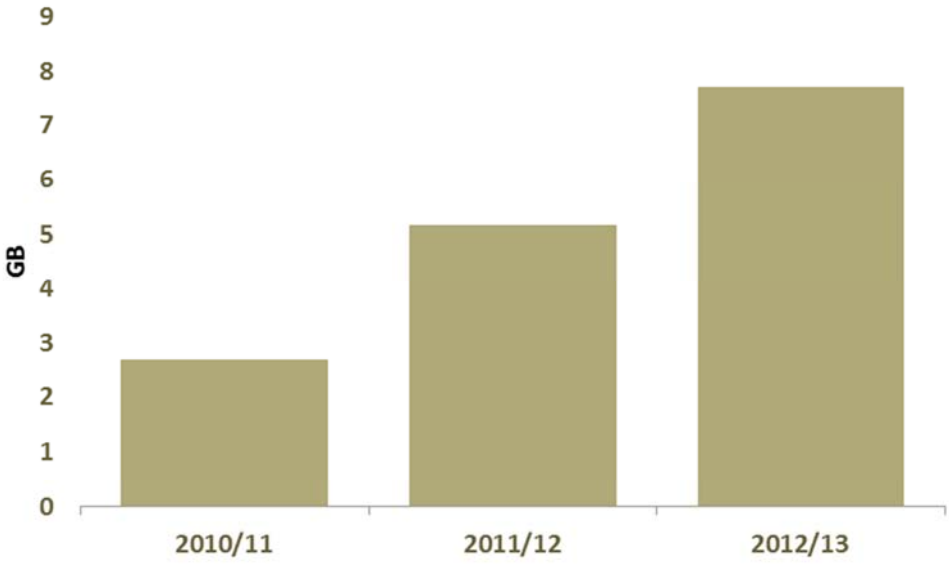


How much appetite do users have for data and speed?

Trends in New Zealand

In New Zealand, the consumption of data is growing rapidly. The average amount of data usage (fixed and mobile) per person has been going up markedly year after year: +91% in the year to June 2012 and +49% in the year to June 2013.

Figure 29: Average internet traffic per person per month (fixed and mobile)



Smartphone functionality is improving and internet access through WiFi, 3G, and 4G networks enables higher data downloads and faster speeds. Against this backdrop, we observe that consumers prefer these all-in-one computing devices. Smartphones already exceed 50% of mobile device connections in New Zealand and 74% of total mobile traffic.[15]

Average mobile data traffic per month per subscriber has reached 132MB per month, as mentioned in our previous section on retail mobile data. But if we look at traffic originating from mobile-connected devices excluding Machine-to-Machine (M2M), the average usage was 427MB per month in 2013, according to Cisco.

Cisco follows a device-centric approach rather than a network approach, which means traffic from mobile-connected devices includes mobile traffic originated from mobile devices but offloaded to WiFi. Cisco's global forecast says that by 2018 more traffic will be offloaded from cellular networks onto WiFi than that remaining on cellular networks.

According to Cisco, we can expect traffic originated from mobile-connected devices to grow at 44% per year. At this rate, the average usage would reach 2,607MB per month by 2018.

[15] Cisco VNI Mobile forecasts highlights, 2013-2018, NZ device growth traffic profiles, available at: http://www.cisco.com/assets/sol/sp/vni/forecast_highlights_mobile/index.html#~Country. This traffic includes mobile data and internet traffic generated by handsets, notebook cards, and mobile broadband gateways.

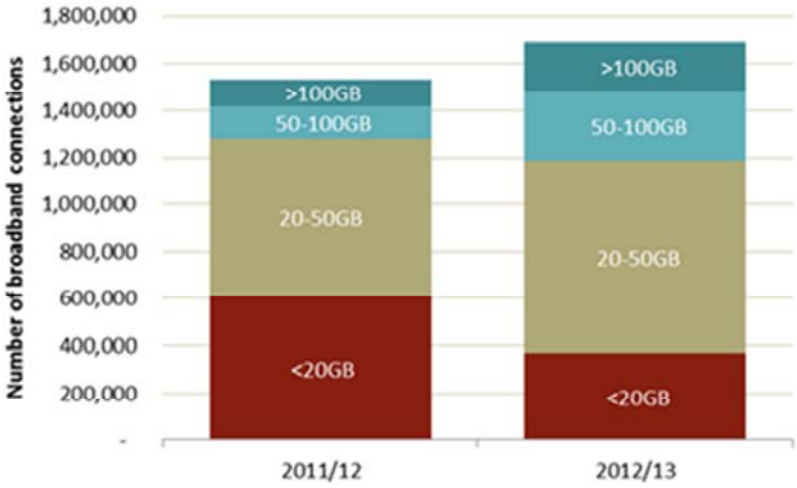
At the same time, the average smartphone connection speed,[16] which was 9.6Mbps in 2013, is expected to reach more than 16.2Mbps by 2018: see Table 1 below. [17]

Table 1: Mobile traffic and speed

	2013	2018 Forecast
Data traffic – Mb per month per subscriber	427	2,607
Average smartphone connection speed Mbps	9.6	16.2

The Statistics New Zealand Internet Service Provider Survey 2013 shows that consumers are switching to plans with higher data caps. Broadband connections with a data-cap of 50–100GB more than doubled from 2012 to 2013 (+117%), and the number of connections with a data-cap of 100GB or more rose by 75%.[18]

Figure 30: Number of broadband connections by data-cap

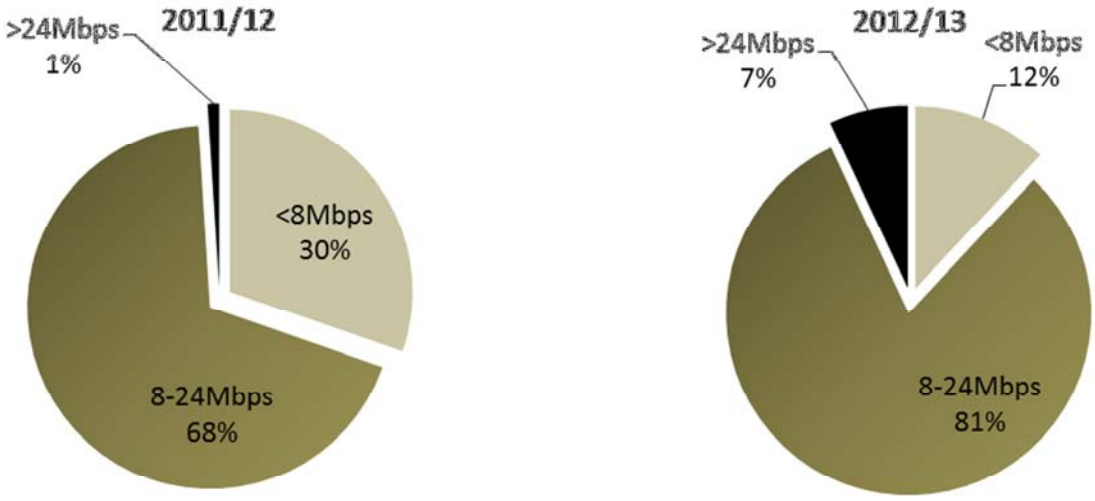


Source: Internet Provider Survey, Statistics New Zealand

Customers require both higher data allowances and faster speed. The percentage of broadband connections with a download speed of 8–24Mbps rose 19 percentage points between 2012 and 2013. The segment of broadband connections with a download speed of 24Mbps or more rose 6 percentage points during the same period: see Figure 31 below.[19]

[16] Speed depends not only on the network connection but also on the applications used in each sort of device
[17] See footnote 15
[18] Statistics NZ, Internet Service Provider Survey, 2013, available at: http://www.stats.govt.nz/browse_for_stats/industry_sectors/information_technology_and_communications/ISPSurvey_HOTP2013.aspx Data is licensed by Statistics New Zealand for re-use under the Creative Commons Attribution 3.0 New Zealand licence.
[19] Ibid

Figure 31: % of broadband connections by download speeds



Source: Internet Provider Survey, Statistics New Zealand

We expect this tendency towards higher data-caps and faster speed to continue, especially due to the introduction, in January 2014, of Very High Bitrate Digital Subscriber Line (VDSL) as part of Chorus' wholesale bundle. VDSL enables download speeds of up to 30Mbps and upload speeds of 10Mbps on copper, so this is an ideal solution where fibre is not available.

The traffic increase is generated not only by individuals but also by an increasing number of machines and sensors connected to the internet and in constant communication between them. Cisco says that in New Zealand, M2M traffic is expected to double between 2013 and 2018.[20] According to the same source, M2M traffic will reach 2.1 petabytes (PB)[21] per month by 2018, with each M2M module generating 382MB of mobile data traffic per month by 2018. This figure is up from 46MB per month in 2013.

Internationally we see the same trends as in New Zealand

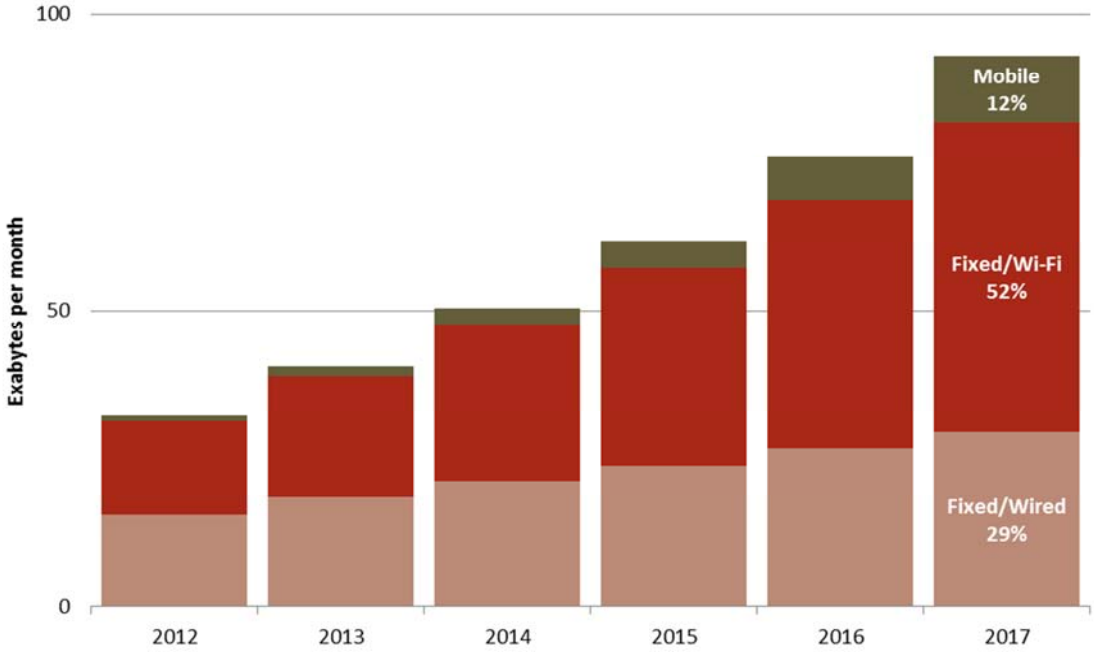
According to Cisco's Visual Network Index 2012–2017 (Figure 32 below), this growing appetite for data and internet traffic is expected to continue globally. Data traffic originated in mobile devices is expected to grow 66% per year from 2012 to 2017. Fixed internet will grow 21% per year over the same period.[22]

[20] Cisco VNI Mobile Forecast Highlights, 2013–2018, available at: http://www.cisco.com/assets/sol/sp/vni/forecast_highlights_mobile/index.html#~Country

[21] 1 Petabyte = 1048576 Gigabytes; 1 Gigabyte = 1024 Megabytes

[22] Managed Internet Protocol (Managed IP) traffic, which corresponds to data transported within a corporate Wide Area Network (WAN) that does not cross the internet backbone, such as IP transport of TV and video on demand and corporate IP WAN traffic, is also expected to grow by 20% over the same period.

Figure 32: Forecast of global internet traffic



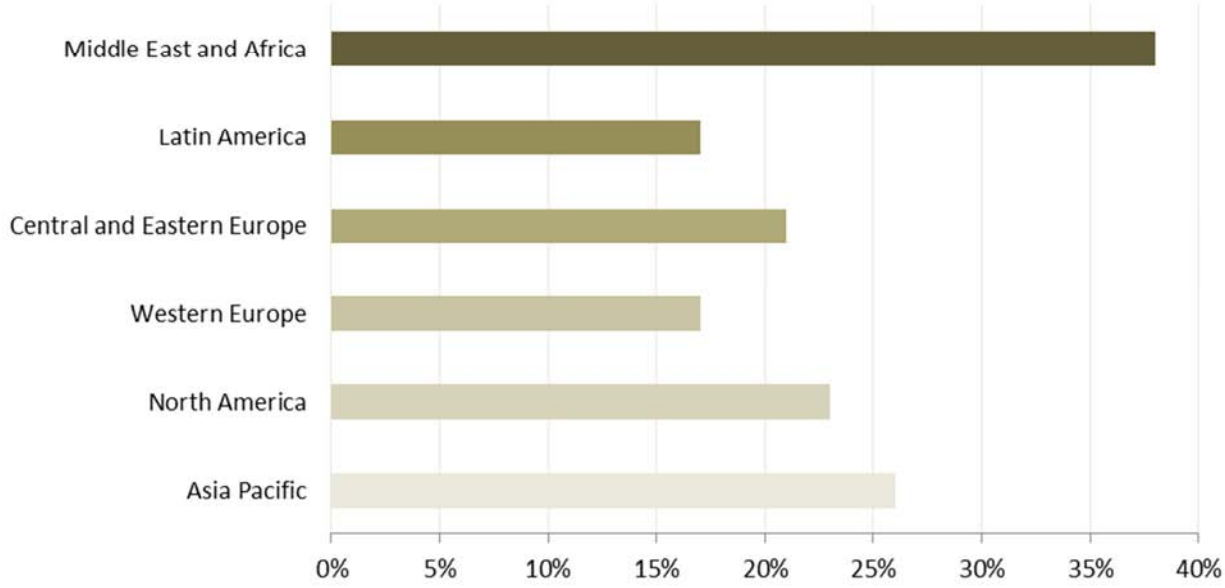
Source: Cisco research, The Zettabyte Era – Trends and analysis, May 29, 2013[23]

Figure 32 shows that, despite the impressive growth of mobile data, fixed internet traffic (Internet Protocol [IP] traffic that crosses an internet backbone) has and will continue to have the largest share of total internet traffic.

Geographically, the Asia Pacific region is expected to have the highest share of global traffic in absolute terms. But globally the high growth rates are expected to continue (see Figure **33**).

[23] Available at: http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/VNI_Hyperconnectivity_WP.html

Figure 33: Forecast of IP usage growth by region, 2012–2017



Source: Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2013–2018[24]

According to Cisco's forecast, total global IP traffic will continue to grow worldwide, almost tripling from 2012 to 2017.

What drives consumption?

We believe that consumers are enjoying the benefits of enhanced data services because of a combination of factors:

- better quality of broadband services at affordable prices, moderated by
- consumers' individual characteristics and digital skills, but building with
- the value perceived by users of the services provided over the internet.

The following section contains a brief analysis of these factors.

Competition: Quality of service at affordable prices

More traffic, higher data-caps, and faster speeds are all indicators of a better quality of service, but consumers will only take advantage of them if prices are affordable.

Table 2 shows that total spending on telecommunications services, in real terms, increased up to 2009/10 and has been dropping since then. Spending on telecommunications services as a percentage of total household expenditure has also dropped from 2009/10.

[24] Cisco Visual Networking Index: forecast and methodology, 2012–2017, available at http://www.cisco.com/c/en/us/solutions/collateral/service-provider/ip-ngn-ip-next-generation-network/white_paper_c11-481360.pdf

Table 2: Household expenditure on telecommunications

	2003/4	2006/7	2009/10	2012/13
Telecommunications services expenditure in real terms[25] (Monthly)	$133	$145	$155	$142
Telecommunications services expenditure as percent total household expenditure	2.74%	3.02%	3.30%	2.94%

Source: Household Economic Survey, Statistics New Zealand

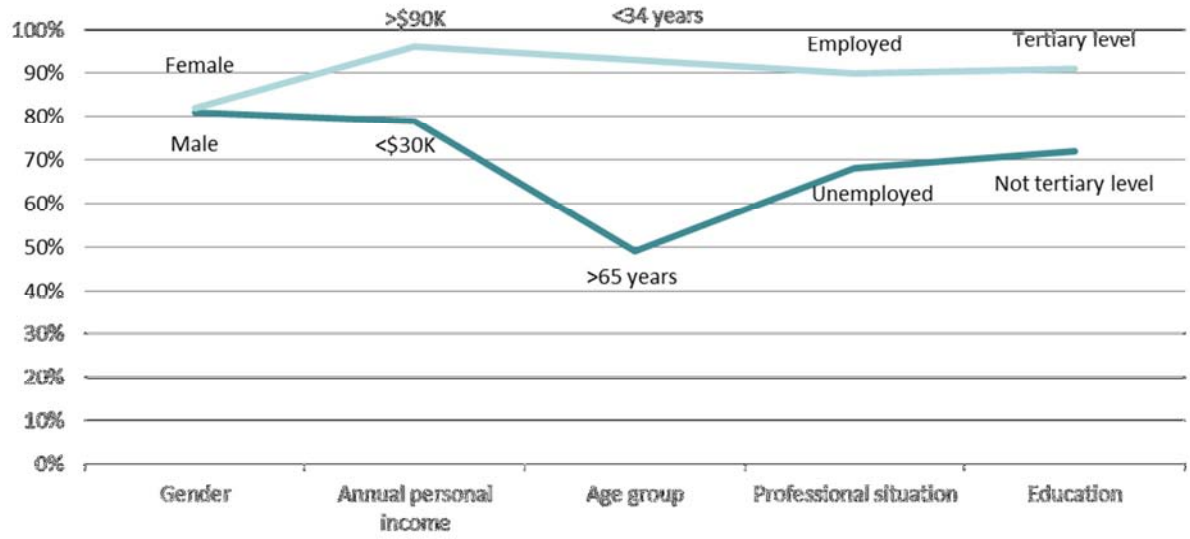
At the same time as spending on telecommunications has dropped, data traffic has increased. We can conclude that consumers are getting more value out of their telecommunications spending, especially if we take download speed into consideration.

Dropping prices and an improved quality of service are more likely to occur in a sustainable competitive environment. We will continue to monitor the state of competition in broadband markets in case regulatory intervention is needed.

Individual characteristics and digital skills

By analysing the levels of internet usage according to individual characteristics, we can understand what encourages or limits broadband uptake. Age is the factor where we find the largest gap between groups at 44%. Gender has no influence, but income accounts for about 17%. Professional situation accounts for 22% and tertiary education for 19%: see Figure 34 below.

Figure 34: Internet access by individual characteristics



Source: Household Use of Information and Communication Technology: 2012, Statistics New Zealand

[25] Figures produced using the inflation calculator of the Reserve Bank of New Zealand.

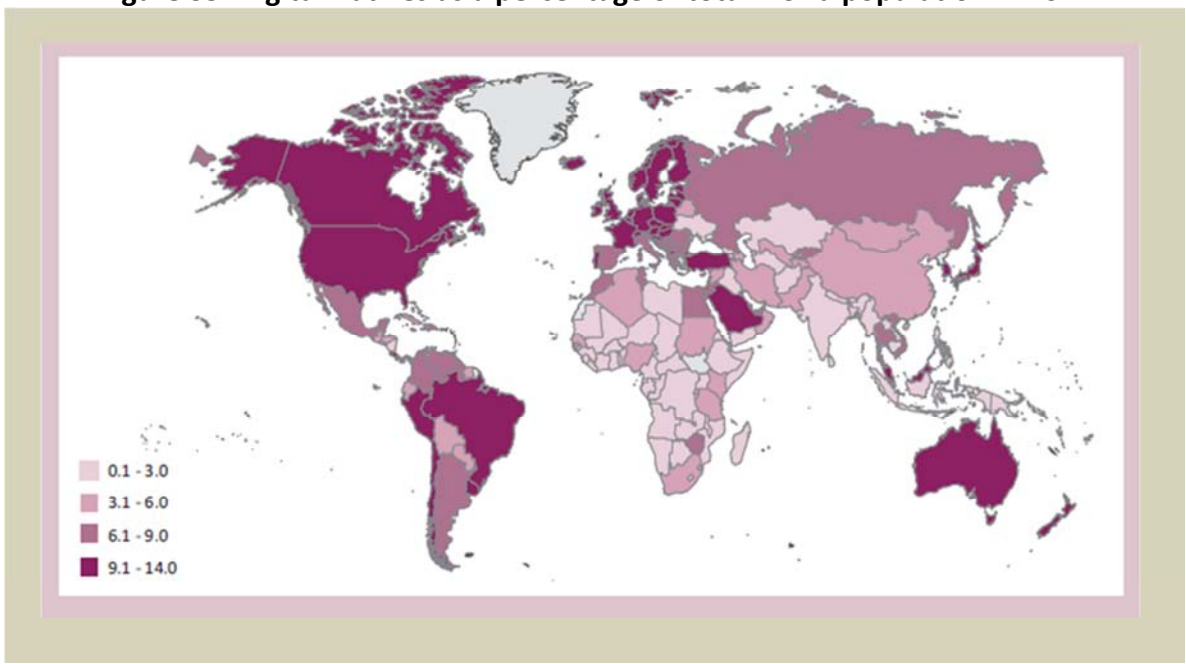
New Zealand stands out among the high-income and developed countries (second position after Iceland), with 13.6% of its population qualifying as digital-natives in the report 'Measuring Information Society', produced by ITU in 2013.[26] This is driving ICT uptake. According to the IDI ranking, New Zealand is among the countries with highest household internet access penetration (87.4%) and internet usage penetration (89.5%).[27] The young population group in New Zealand is proportionately larger than in other top digital countries (14.3% aged 15–24). These factors mean that New Zealand has a higher position in the ranking.

Figure 35 below shows how the world's population is distributed in terms of digital-natives in percentage terms.

The elderly group often combines other characteristics that lead to lower internet usage, such as lower average levels of digital skills and lower annual income.

Young people generally show more intensive internet usage. They are the demographic that can promote internet usage among older age groups at home and in the work environment. Young people also contribute to a workforce with greater skills in ICT.

Figure 35: Digital-natives as a percentage of total world population in 2012



Source: ITU

The reasons for not having internet or broadband reveal the factors capable of pushing broadband uptake even higher: cost, availability of service, and digital skills.

[26] The model, developed by ITU (the leading United Nations agency for information and communication technology) defines digital-natives as networked youth (aged 15–24 years) born during the digital age and growing up using ICT, who have been active online for at least five years.

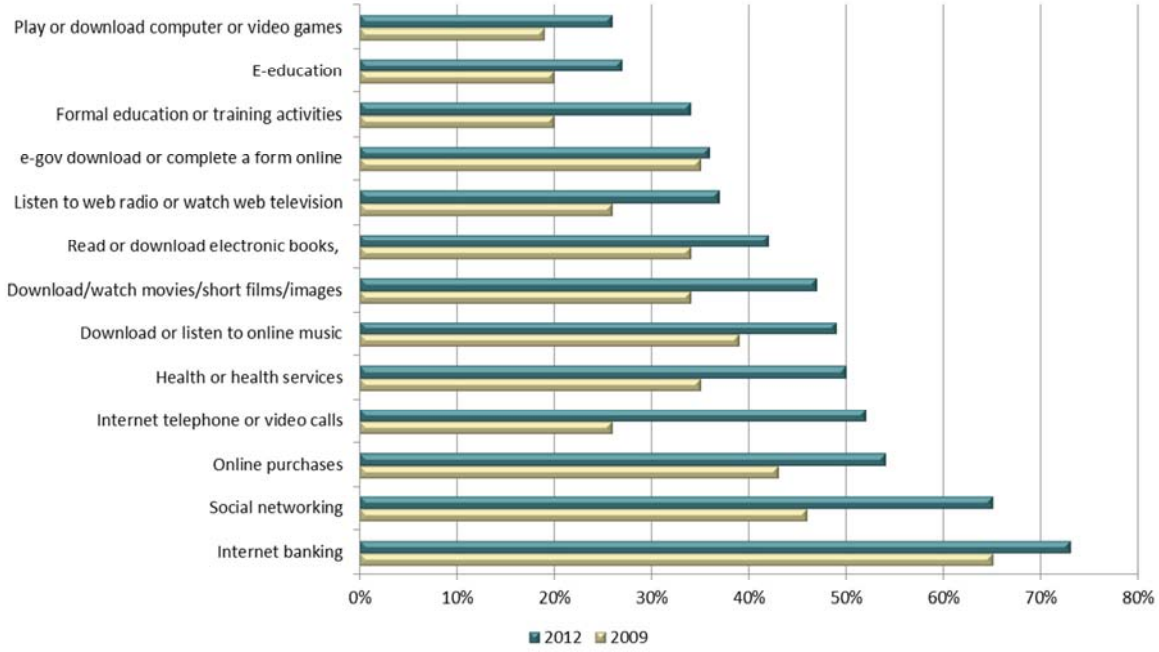
[27] The IDI ranking is a function of internet household penetration, and internet usage penetration among young people, available at www.itu.int/net/pressoffice/press_releases/2013/41.aspx#.UucaCCeBrcs.

The main reasons given in the 2012 Household Use of ICT Survey for not having internet were: not interested (46%), costs are too high (36%), and lack of confidence or skills (14%). For those who have internet but not broadband, the main reasons indicated were: cost (48%), broadband connection not available (24%), and happy with the dial-up connection (20%).

Perceived value of services

New Zealanders rely more and more on the internet to satisfy their needs, from the most complex to the simplest daily activities. An increasing number of e-services are capable of adding convenience, efficiency, and entertainment to our lives, as Figure 36 illustrates.

Figure 36: Percentage of recent* internet users who engaged in internet activities

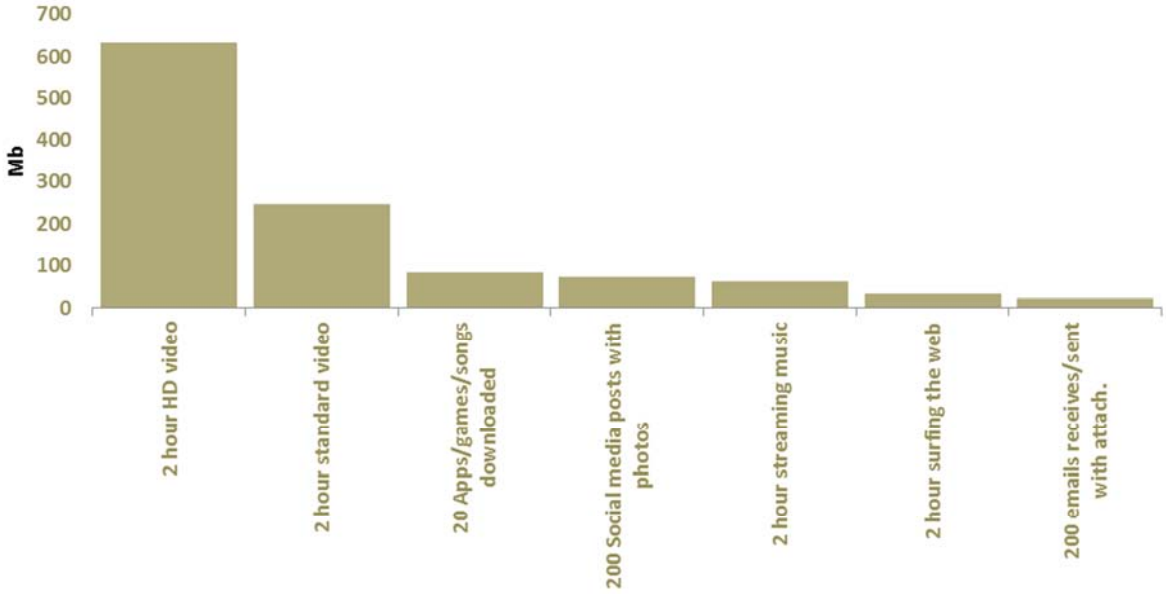


Source: Household Use of Information and Communication Technology: 2012, Statistics New Zealand
*Population that used the internet in the last 12 months

The recent offers of on-demand TV in New Zealand, such as ShowmeTV (Spark), Sky Go, 3NOW, and TVNZ Ondemand, will most likely contribute to the next growth of internet usage in New Zealand.

A good internet connection contributes to a good consumer experience in each of the common tasks performed online. However, traffic usage varies widely among the tasks, as Figure 37 indicates. This information implies that, although data caps are consumed mainly by video streaming, video streaming is not necessarily the most popular activity performed online.

Figure 37: Average Mb consumption by type of activity performed online



Source: AT&T data calculator

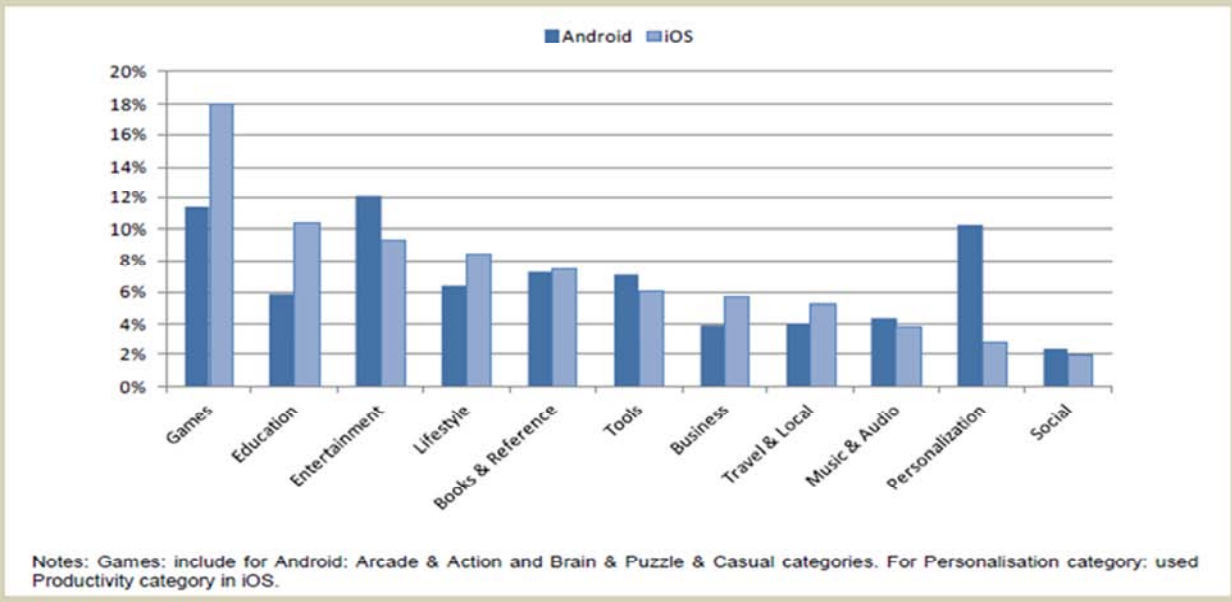
This diversity of activities is clearly related to the growth in number, diversity, and quality of applications (apps).[28]

Some apps are designed for professional use or academic learning. Others are common everyday tools, such as the traditional weather forecast apps or the more recent taxi apps that inform you of where to find a taxi and how to keep track of the journey to your destination. A third emerging group is apps used by connected devices, from the already common smart meters and home security systems to the more sophisticated fitness devices that record biometric data; all are part of the 'internet-of-things'.

Figure 38 gives a snapshot of the most popular apps for smartphones (from the number of active apps).

[28] 'The term "app" has recently entered the global lexicon and is short for the word "application". An app is a standardised piece of software that runs on a computing platform. The term app originally referred only to applications for mobile devices and tablets but now also includes software for a wide range of devices including desktop computers, as Apple now uses the term "app" to refer to desktop software in its Mac App Store.' In OECD (2013), 'The App Economy', OECD Digital Economy Papers, No. 230, OECD Publishing. http://dx.doi.org/10.1787/5k3ttftlv95k-en. A key characteristic of apps is that they are delivered over an internet connection rather than through traditional retail channels.

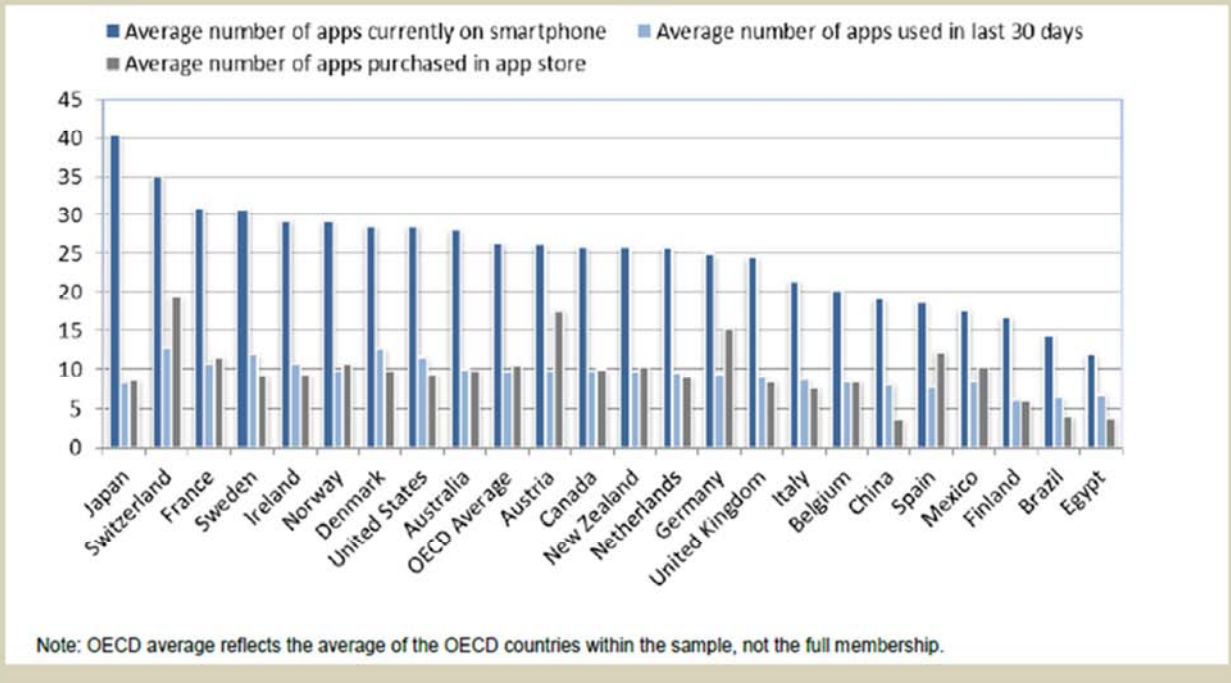
Figure 38: Share of apps by category and platform



Source: OECD (2013), 'The App Economy', OECD Digital Economy Papers, No. 230, OECD Publishing. http://dx.doi.org/10.1787/5k3ttftlv95k-en

In terms of apps usage, according to OECD statistics New Zealand follows an average pattern, as can be concluded from Figure 39 below.

Figure 39: Average number of apps currently on smartphone (2012)



Source: OECD (2013), 'The App Economy', OECD Digital Economy Papers, No. 230, OECD Publishing. http://dx.doi.org/10.1787/5k3ttftlv95k-en

Given the characteristics of the New Zealand telecommunications market and the individual characteristics and digital skills of our population, we expect to see a growing number of people using the internet to perform everyday tasks. We also expect apps to grow in number and relevance, especially those that are New Zealand designed and made.

What is the impact on citizens' welfare and New Zealand's economic growth?

Reports on traffic trends usually tend to focus on potential changes within the sector, rather than the changes that affect the way we live as a society and our participation in the economy. In this section, we discuss the wider impacts of broadband usage.

Impact on citizens' welfare

In developed countries, a range of policies are being developed to stimulate the development and usage of e-services and apps capable of improving quality of life. Factors include the following:

Inclusion of disadvantaged groups – support for citizens with special needs that help them to participate on an equal footing in the digital society and to have equal opportunities in terms of daily life, social ***interaction*** and employability.

Ageing well – digital assistance for older adults that help them to live in their own homes independently.

Integrated healthcare – access to medical data everywhere and coordinated delivery of health services from health promotion to diagnosis, ambulances, clinical assistance, and homecare.

IT-supported education – platforms, equipment, and applications for personalised learning at any time and any place.

Diverse ways to communicate – social media applications, instant messaging, voice-over-IP calls, and video calls that allow for alternative ways of communicating.

Telecommuting and increased online shopping – options that allow time that would have been spent commuting or shopping to be used for other purposes.

Convenience – simplified tasks, improved accessibility to learning materials and general information.

Entertainment – from gaming to online quizzes, smart devices and apps provide easy and cheap entertainment.

The following paragraphs discuss the effect of government and sector-specific working streams that aim to explore and promote the benefits of digital services.

<u>e-government – moving public services to the cloud</u>

e-government (e-gov) means using digital tools and systems to provide better public services to citizens and businesses. From a governmental perspective, e-gov generally means less expenditure. From the users' point of view, e-gov essentially means

convenience, at least for those who are comfortable with using online services and have internet access.

In recent years government has been increasing the range and number of e-gov services. Consequently, an increasing number of citizens are interacting with government agencies online. For example, 58% of respondents to Kiwis Count completed the survey online in 2012. In that survey, 66% said they had looked for information about public services online at least once in the past year or had used the internet at least once in the past year to do transactions or deal with public services.[29] Another example is the 35% of forms in the 2013 Census that were completed online.[30]

On the other hand, 83% of New Zealanders would feel encouraged to use e-services more often if public services over the internet were simpler and more user-friendly.

Around the world, e-gov initiatives provide examples of how much can be achieved. In rural areas of Mexico, citizens can receive government welfare payments in community-owned stores, gas stations, and telecommunications offices. In Denmark, savings of up to 70% are expected by moving public service transactions from face-to-face service delivery to online self-service channels only.[31]

e-health

New Zealanders are increasingly obtaining information on health or health services online (41% of the population in 2012). And an increasing number of patients log on to online portals to book medical appointments with their GPs, request repeat prescriptions, check when an immunisation is due, and ask questions of their doctor or nurse.[32]

But we can expect more in terms of e-health. Local health centres situated in remote areas are only just starting to provide medical consultations through video connection on the days the designated GP is not available.[33]

In Europe, the use of e-health is developing, although not yet on a large scale. Telemedicine is expected to deliver affordable personalised care for chronic patients. Other potential benefits are home hospitalisation and early discharge, as well as remote support to primary care.[34]

e-education

IT-supported education is transforming the way learning occurs in New Zealand, allowing students to acquire the relevant skills for the 21st century workplace and society. Students

[29] Kiwis Count Channels 2013 report, available at: http://www.ssc.govt.nz/sites/all/files/kiwis-count-channels-report-2013.pdf
[30] Beehive.govt.nz, available at http://www.beehive.govt.nz/release/2013-census-online-option-success
[31] OECD observatory of public sector innovation
[32] Ministry of Health, Sharing Health Information: Toward better, safer care
[33] http://www.ithealthboard.health.nz/tv-one-news-new-technology-helping-overcome-tyranny-distance-nz-west-coast
[34] More detailed information in: 'Digital agenda for Europe – e-Health and Aging', available at http://ec.europa.eu/digital-agenda/en/telemedicine

are encouraged to use the internet to continue learning and explore new topics beyond the classroom.

e-learning is no longer associated just with distance learning, but is about using relevant technologies as part of a suite of approaches to provide ways of supporting learners' engagement and achievement. e-learning lends itself to creating learning programmes that focus on individual needs and to including disabled students. e-learning allows for more flexibility in terms of where, when, and how learning occurs.

In New Zealand, the 'Network for Learning' portal (N4L) was created to establish an online community for teachers, students, and education professionals. The N4L is meant to provide schools' communities a collaborative environment where educational content can be shared safely. The portal will become available to schools throughout 2014. Schools will not need to be connected to the N4L's managed network to be able to access the portal.

Another project of note is the low-decile Point England School in Auckland. The school provides online learning and reports very good effects on children's achievement.

Digital learning is now a major initiative around the world. In OECD countries, as IT is a common element of the work environment, schools are committed to developing the required skills.[35] The challenge is how to teach students to use this new literacy safely and effectively.

Smart living and smart cities

From 'machine-to-machine' communications to the 'internet-of-things', smart devices lead to smart products and services, and these are transforming the way we live and work.

The development of smart devices enables efficiencies in different sorts of activities. Examples are:

- smart appliances, which lead to fewer hours of operation and more energy efficiency
- smart buildings, which lead to more systematic use of renewable energy on-site
- smart work, which involves teleconferencing and telecommuting
- smart traffic, which means more efficient traffic and fleet management, or e-services that reduce inefficiencies in terms of transport and storage.

Around the world, people are increasingly moving into cities. More than 50% of the world's population now lives in a city. By 2050 city dwellers will comprise 70% of the global population.[36] And city population growth brings new challenges, in terms of energy efficiency and sustainability.

[35] OECD, Trends Shaping Education 2013, available at: http://www.keepeek.com/Digital-Asset-Management/oecd/education/trends-shaping-education-2013_trends_edu-2013-en#page94

[36] Ericsson, Redefining Urban life, available at: //www.ericsson.com/thecompany/press/mediakits/redefining_urban_life

In New Zealand too, according to the 2013 Census, the population is growing faster in the larger cities.[37] The overall population growth in New Zealand was 5.3% from the 2006 census to 2013, but most large cities registered a significantly higher population growth rate, as can be seen in Table 3 below.

Table 3: Resident population in New Zealand

	2006 Census, census usually resident population count	2013 Census, census usually resident population count	Var 2006-2013
Total New Zealand	**4,027,947**	**4,242,048**	**5.3%**
Total Cities with growth rate > national average	**1,809,330**	**1,961,064**	**8.4%**
Auckland	1,304,958	1,415,550	8.5%
Hamilton City	129,591	141,612	9.3%
Tauranga City	103,881	114,789	10.5%
Porirua City	48,546	51,717	6.5%
Wellington City	179,463	190,959	6.4%
Nelson City	42,891	46,437	8.3%
Rest of the country	**2,218,617**	**2,280,984**	**2.8%**

Source: Statistics New Zealand

The growth of population in big cities brings significant challenges. The telecommunications industry has the opportunity to help ensure a better quality of living, either by supporting urban life or by bringing remote communities closer together.

Impact on economic growth

In the previous chapters, we have analysed trends in investment and revenue within the telecommunications sector. However, as the world moves towards an internet-enhanced economy, a developed and competitive market for network access and web services brings significant investment opportunities. Potential economic gains exist across all economic sectors, from services to industrial production and agriculture sectors.

Understanding the value chain of broadband

Businesses in most economic sectors need seamless connectivity across their multiple sites, at affordable prices. Seamless connectivity significantly contributes to improved processes and productivity without constraining profitability.

Furthermore, ubiquitous infrastructure and faster speed encourages the development of new services. These, in turn, stimulate investment in existing companies and start-ups, creating new job opportunities.

[37] Statistics New Zealand, available at http://www.stats.govt.nz/browse_for_stats/population/census_counts/2013CensusUsuallyResidentPopulationCounts_HOTP2013Census.aspx; http://www.stats.govt.nz/Census/2013-census/data-tables/meshblock-dataset.aspx

The impact of broadband usage on the economy is documented in several international research papers. As an example, the OECD publication, 'Measuring the Internet Economy',[38] and the World Bank publication, '2009 Information and Communications for Development: Extending Reach and Increasing Impact',[39] provide detailed evidence on the value of broadband to economic development in developed and developing countries.

Recent research conducted by Sapere-Google-INZ on the value of internet to New Zealand businesses also shows that companies are highly connected: "96% of firms say they have access to the internet. Even in the agriculture sector, one of the least connected, 91% of firms say they use internet services." The same research puts together evidence that shows the impact of extensive use of the internet on productivity: "We estimate that if firms currently making low use of internet services became more like high-using firms, it could be worth an additional $34 billion in productivity impacts, initially for those firms and through them for the nation's economy as a whole."[40] A good example was provided by farmers who cite a 30% reduction in fertiliser usage from precise information on application and soil makeup, or a 40% increase in the area under irrigation through more careful measurement of soil moisture and precise allocation of water.

Better infrastructure leads to development of improved platforms and a wider range of new apps. This development stimulates demand for new labour skills to use and develop technology, and to generate and analyse data.

The apps economy is developing particularly quickly. Plum Consulting research demonstrates that the app economy, which includes telco operators, IT developers, marketeers, and professionals of different sectors, has the potential to multiply and accelerate economic development.[41]

[38] OECD (2013), 'Measuring the Internet Economy: A Contribution to the Research Agenda', OECD Digital Economy Papers, No. 226, OECD Publishing. doi: 10.1787/5k43gjg6r8jf-en

[39] 'Economic impacts of broadband' by Christine Zhen-Wei Qiang and Carlo M Rossoto with Kaoro Kimura in World Bank (2009) *Information and Communications for Development: Extending Reach and Increasing Impact* http://books.google.co.nz/books?hl=en&lr=&id=_5DL8RXJUbgC&oi=fnd&pg=PA35&dq=economic+impacts+of+broadband+rossotto&ots=KB6i2kWNYN&sig=auJL66YHzf_y5a0Lw7vFt-aqzes#v=onepage&q=economic%20impacts%20of%20broadband%20rossotto&f=false

[40] Sapere-Google-INZ, 31 March 2014, 'The value of internet services to New Zealand businesses'

[41] Plum Consulting, September 2013, 'The European App economy'.

Figure 40 shows the virtuous circle of apps. Enhanced devices enable the use of new apps that meet businesses' and individual needs. The increase in data usage is the right incentive for investment in connectivity. In turn, good network service is a key driver for the development of better devices.

Figure 40: The virtuous circle of apps

Source: 'The European App Economy: Creating Jobs and Driving Growth: A report prepared by VisionMobile and Plum Consulting'. Sponsored by ACT4Apps, 4 September 2013

The same Plum Consulting research also shows that the major benefit of apps, as in the case of ICT, comes from their use rather than their development. That is, the benefits of apps go well beyond the technology sector, providing a competitive advantage across all industries. The rural sector has some good examples. With sensors placed across fields, farmers can now have a real-time view of conditions across their planting (moisture, nutrients), helping them to optimise crop yields. And the dairy industry uses telemetry[42] to continuously monitor cows' condition.

In Europe, the European Commission is paying close attention to the impact that the developing telecommunications industry can have on the economy in general.

> Europeans are struggling with the effects of economic crisis. It is essential to take every enabling action possible to create jobs – and no sector offers better opportunities for employment growth (especially for young people) than the digital sector. It is also essential that citizens have full access to the internet, which they value highly, and that they are protected from unfair charges and practices such as roaming rip-offs and opaque contracts. [43]

In the EU, the apps economy alone employs 1 million developers, and 800,000 people in marketing and support roles. The European Commission expects these numbers to rise to 2.7 million developers and 2.1 million support staff by 2018. EU buyers and advertisers spent €6.1 billion on apps in 2013, 30% of total global app spending, projected to grow to €18.7 billion in 2018.

[42] Communications process by which measurements are made and data is collected at one location and transmitted to receiving equipment located somewhere else.
[43] European Commission memo, 11 September 2013, 'Commission adopts regulatory proposals for a Connected Continent', available at: http://europa.eu/rapid/press-release_MEMO-13-779_en.htm

A Statistics New Zealand study suggests that there is a strong link between ICT and business growth: "…businesses that use the internet to collect sales orders have higher rates of exporting, innovation, and entering new export markets."[44]

Challenges of digital life

Digital life also brings challenges. Below is a summary of the main challenges and the measures taken or under way to address them.

Safety – promoting digital literacy among children requires raising societal awareness of risks of digital use, such as access to inappropriate content, uncontrolled disclosure of personal information, or cyber-bullying.

As part of the measures taken to address this problem, the Wellbeing@School website provides schools, teachers, and parents with self-review tools to build a safe and caring climate that encourages positive behaviour and deters bullying. The Wellbeing@School is managed by the New Zealand Council for Educational Research (NZCER) and commissioned by the Ministry of Education as a part of Positive Behaviour for Learning (PB4L).

Equally important, the new proposed laws against cyber-bullying, promoted by the Ministry of Justice (the Harmful Digital Communication Bill), will introduce tough penalties for those who seek to harm others using a communications device: up to three months in jail or a $2000 fine.

Inclusion – even in remote areas school-aged children need to have some sort of broadband access and the necessary digital literacy.

Good examples of what is being achieved in this area come from the 'Computers in Homes' programme. This initiative, which works via low-decile schools, has the purpose of helping families in greatest need to use the internet, email, and computer in their everyday lives, to enhance their performance at school and at work. The Digital Literacy and Connection (DLC) programme provided support to over 1500 families during the fiscal year 2013–14.

'Computers in Homes' is an initiative of the 2020 Communications Trust, supported by the Government's DLC Fund (administered by the Department of Internal Affairs) and the Ministry of Education, as well as numerous business and community partners.

Skills – in a digital economy the education system must provide the required skills for application developers, content creators and users, addressing the mismatch between demand and supply of ICT graduates and ICT skills in general.

New Zealand's digital education strategy aims to assist schools and educators in preparing students with digital skills. The education strategy goals include providing 97.7% of schools and 99.9% of students with ultra-fast broadband capability by 2016; the remaining 2.3% of schools in areas too remote for fibre will have access to improved broadband services via wireless. Three schools will receive satellite services. The digital education strategy will also provide state and state-integrated schools with fully-funded connection to the fibre being rolled out in their area. Furthermore, state and state-integrated schools will be offered a

[44] Statistics New Zealand, 'Strong connection between ICT and business-growth activities', 2013, available at: http://www.stats.govt.nz/browse_for_stats/businesses/business_growth_and_innovation/ict-use-business-characteristics.aspx

fully-funded connection to the Network for Learning (N4L) managed network as it is rolled out across the country.

Security – it is important to raise awareness of safety procedures to improve online privacy and network security, and to coordinate cooperation and information exchange to minimise cyber-crime and cyber-attacks.

New Zealand's cyber security strategy, released in June 2011 by the then Ministry for Communications and Information Technology, builds on existing government and non-government efforts to help providing a safe digital environment for businesses and individuals to operate in. The cyber security strategy has the purpose of helping New Zealanders and businesses to be more aware of cyber threats and to take measures to protect themselves. The strategy also aims to establish appropriate organisational and legal frameworks.

A key element of New Zealand's cyber security strategy is the National Cyber Security Centre (NCSC) within the Government Communications Security Bureau. The purpose of the NCSC is to protect government systems and information, to plan for and respond to cyber incidents, and to work with providers of critical national infrastructure to improve the protection and computer security of such infrastructure against cyber-borne threats.

The 2013 year in review

The following is a month-by-month snapshot of some of the more important and interesting telecommunications market developments that occurred in New Zealand during 2013.

January 2013

- Southern Cross reduced capacity prices by 20%. The price reduction marked the second stage of the eighth major capacity expansion programme since 2001, and was due for completion in February. The expansion was based on Ciena 40Gbps transmission equipment and took total lit capacity on the Southern Cross Network to 2 Tbps.
- Statistics New Zealand announced that the CPI fell by 0.2% in the December 2012 quarter, with a fall in communications costs of 2% one of the contributors to the reduction.
- A TeleGeography presentation speculated that international voice – while still a business worth tens of billions of dollars – may have peaked, with global revenues largely stable. Meanwhile, over-the-top VoIP competitors are continuing to surge in popularity and threaten telco revenues, with Skype alone registering 450 billion minutes of total traffic in 2012 – up 40% year-on-year – with smartphones only accelerating the rise of VoIP.

February 2013

- Vodafone concluded the upgrade of 300 of cell sites in Auckland so they could run on both the 900MHz and 2100MHz spectrum, to enable mobile signals to penetrate deeper into built-up areas.
- 2degrees research showed that 85% of customers with smartphones were regularly watching videos, engaging in social networking, and researching products and services; 73% admitted they never leave home without their smartphone.
- Telecom, Vodafone, and Telstra signed a memorandum of understanding to build the 'Tasman Global Access' cable, a submarine fibre optic cable between Auckland and Sydney. The cable would be New Zealand's second major broadband link with the outside world, after the Southern Cross Cable, and is expected to cost around US$70 million and be completed by late 2014.
- 2degrees announced it had bought a block of 1800MHz spectrum from Telstra for $15 million.
- Telecom formally launched a 4G mobile trial utilising 1800MHz and 2100MHz spectrum.
- Vodafone launched its 4G mobile network with service available initially in parts of Auckland.

March 2013

- Telecom launched its Ultra Fibre services, fibre broadband plans aimed at providing next generation broadband, initially to customers living within the Chorus footprint.

April 2013

- TelstraClear (trading as Vodafone) started offering new cable customers price reductions of up to 30% or increased data caps for the price charged to existing customers.
- Kordia confirmed it sold its ISP business, Orcon, to a consortium of private investors led by Warren Hurst. Greg McAlister was named the new CEO of Orcon on 18 April.
- 2degrees launched Carryover Data, which allowed on-account Carryover Plan customers to carry over their unused data every month for up to a year.

May 2013

- Igloo, the joint venture between Sky Television and Television New Zealand, slashed the price of its set-top boxes from $199 to $99 due to lower-than-expected sales.
- 2degrees launched Prepay Plus, which allows prepay customers to carry over their unused minutes every month for up to a year.

June 2013

- 2degrees' acting CEO said the company had been profitable for the past three quarters on an EBITDA basis (earnings before interest, taxes, depreciation and amortisation).
- Orcon launched Genius Go, an innovative smartphone app for its home broadband users that fully integrates landlines and smartphones. Key benefits of this app are that it allows:
    - home phone calls from anywhere to be received on a smartphone (optionally turn this off)
    - local landline calls to be made from up to five smartphones linked to your home account, simultaneously
    - calls to be made (via data) on your smartphone that use your home calling bundle
    - free calls and messages (via data) to be sent between smartphones that have the app.
- Coliseum Sports Media announced its plan to offer all 380 of the 2013–14 season games of the English Premier League soccer via the internet for $149. Coliseum will offer live games, plus on-demand viewing games that can be watched on a PC or Mac, or on a smartphone or tablet via Android, iPhone, and iPad apps.

- Slingshot launched a new product called Global Mode, aimed at providing overseas visitors with internet accessibility similar to what they would have in their home country. Global Mode is available free on all Slingshot broadband connections.
- 2degrees started treating calls and texts to Australia like they were New Zealand calls and texts for billing purposes for most of its plans and bundles.
- Telecom's submission on the Telecommunications (Interception Capability and Security) Act revealed the following facts about Telecom mobile customers during May 2013:
    - 150,000 used Apple's iMessage service
    - 140,000 used Facebook messenger
    - 78,000 used Viber
    - 35,000 used Microsoft live messenger
    - 32,000 used Microsoft Skype
    - 25,000 used Google Talk
    - 23,000 used WhatsApp messenger

  These so-called over-the-top (OTT) services let customers message or call each other from a mobile phone using data. Numbers are growing fast as Telecom said the number of its customers using Viber had jumped 25% since December, and Skype usage had increased by 50%.
- Google launched the Loon Project with a pilot test in New Zealand. Thirty balloons were launched from the South Island with the goal of establishing a ring of uninterrupted connectivity around the 40th southern parallel, so that pilot testers at this latitude could receive continuous service via balloon-powered internet.

July 2013

- Telecom offered its existing broadband customers a 15% discount on the PremierLeaguePass.com Season Pass (or the possibility to enter a draw to win one of 1,000 free season passes). Telecom also revised its range of home phone and broadband packages to deliver more generous data allowances.
- Telecom launched Ultra VDSL services that could download and upload files and online content significantly faster than conventional (ADSL) broadband. The price was $10 a month more than ADSL for larger bundles. VDSL is available to about two-thirds of customers, with installation fees of $99 to residential customers and $199 to business customers.
- Slingshot launched a $69 phone and broadband bundle that offered 40GB per month of rollover data, a free modem, and a 200GB bonus data block that also rolled over from month to month if unused.
- Vodafone launched 4G in parts of Wellington.

August 2013

- Skinny Mobile launched a $16 combo. The new 30-day prepay bundle provided 90 mins talk-time, unlimited texts to New Zealand and Australia, and 500MB of data.
- Vodafone launched its Red plans, plans that combined unlimited calls and texts to standard numbers in New Zealand and Australia with varying amounts of data. Prices ranged from $99 for 1GB of data per month to $169 for 4GB of data.

September 2013

- Telecom raised its Homeline line rental for Wellington and Christchurch for existing customers, from $41.60 to $45.75 per month. New customers in these areas had been paying $46 since September 2012. New customers in other areas pay $51 a month.

October 2013

- The Government announced it would invest NZ$150,000 towards building a microwave link to South Westland. The link will allow copper-based broadband to be provided with speeds similar to urban users.
- The initial allocation round of the 700 MHz spectrum auction resulted in 2degrees, Telecom, and Vodafone each acquiring management rights to spectrum in the 700 MHz band. Both Telecom and Vodafone bid the $66 million (plus GST) reserve price for 2x15 MHz (three lots) of spectrum, while 2degrees bid $44 million for 2x10 MHz (two lots), leaving 2x5 MHz (one lot) of 700MHz spectrum unsold after the initial round.
- The Commission decided that there were not reasonable grounds to commence a Schedule 3 investigation into whether to omit the National Roaming service from Schedule 1 of the Telecommunications Act (the Act). The decision fulfilled the requisite to consider, at intervals of no more than five years after the date on which a specified service came into force, whether there are reasonable grounds to commence an investigation into whether the service should be omitted from the list of specified services in Schedule 1 of the Act.
- Telecom started offering its mobile customers, on pay-monthly plans or $19 and $29 prepaid packs, free access to its WiFi service for up to 1GB per day. The service is beamed out from phone boxes to the public spaces where they are located, and is available to non-Telecom customers for $9.95 per month.

November 2013

- Vodafone launched HD (high definition) Voice, a service enhancement claiming to bring crystal clear clarity to mobile voice calls. All calls between compatible Vodafone mobiles on the Vodafone network became HD, which was technically achieved by imposing a higher sample rate.

- Telecom launched its 4G service for customers in 4G coverage areas with 4G phones, for no extra charge. Telecom's 4G network initially covered parts of Auckland, Wellington, and Christchurch.
- The Commerce Commission announced a final Unbundled Bitstream Access (UBA) price for wholesale broadband of $10.92 per month, an increase from the draft price of $8.93. If a retailer wants a naked broadband service then they have to add the UCLL price for copper access, which gives a combined wholesale copper price of $34.44. This compares to the price until December 2014 of $44.98 and the entry level fibre price of $37.50 to $42.50. If an analogue voice service from Telecom is also required, then the combined wholesale copper price can currently be as high as $63.59 (excluding GST).
- New legislation to ensure all electronic communications can be intercepted where there is a warrant or other lawful authority to do so was passed into law. The Telecommunications (Interception Capability and Security) Act ensures that it is technically and practically possible for surveillance agencies to intercept communications when investigating serious crime, and also introduces a formal framework to ensure the security of telecommunications networks.

December 2013

- Vodafone removed the surcharge it was charging prepay customers to access its 4G service.
- 2degrees launched a new range of shared data mobile plans that let customers make unlimited calls and texts (with a reasonable use limitation) to mobiles and fixed lines in New Zealand and Australia for $69 a month.
- The New Zealand Telecommunications Forum (TCF) launched a blacklisting system for lost or stolen mobile devices. The blacklisting system gives each operator the ability to block the IMEI number (unique identification code) of a mobile device that has been reported as stolen. This initiative is expected to help prevent crime by making mobiles less attractive to thieves.
- The Commerce Commission released its third report benchmarking New Zealand retail prices for fixed-line phone and broadband services against international prices. The report showed that:
    - Most customers buy broadband together with phone services in a bundle.
    - Prices for a bundle with 60GB of data had dropped 14% over two years. However, these bundles were still priced 30% higher than the OECD average.
    - Prices for a 60GB naked broadband plan had dropped 41% in two years and were 4% less than the OECD average. However, these prices were available only to subscribers with an on-account mobile plan with the same provider.
    - Prices for fixed-line voice services purchased without broadband continued to be considerably higher than the OECD average for an average customer, but lower than average for heavy users of voice services.

List of defined terms and abbreviations

ADSL	Asymmetric Digital Subscriber Line – is a type of DSL.
App	Application – an app is a standardised piece of software that runs on a computing platform. The term app originally referred only to applications for mobile devices and tablets is now also used when referring to a wide range of devices including desktop computers.
CDMA	Code division multiple access is a wireless technology alternative to GSM.
CPI	Consumers Price Index – provides information on the price change of goods and services purchased by private New Zealand households.
DSL	Digital Subscriber Line – method of transmitting high-speed data and voice simultaneously over a copper phone line.
DLC	Digital Literacy and Connection.
GB	Gigabyte. One Gigabyte = 1024 Megabytes
GSM	Global System for Mobile communications – a widely used digital, second-generation mobile phone standard.
GST	Goods and Services Tax
HD	High Definition.
HHI	Herfindahl-Hirschman Index – a commonly accepted measure of market concentration. The maximum possible score is 10,000 which would be one seller with 100% market share. A low market concentration might be a score of 2,000.
ICT	Information and Communication Technology
IDI	ICT Development Index – the IDI ranking is a function of internet household penetration and internet usage penetration among young people
IMEI	International Mobile Station Equipment Identity – is a unique identification code of the mobile device.
IoT	Internet-of-Things – the network of physical and virtual objects accessed through the Internet
IP	Internet Protocol – a method that computers use to communicate over the internet.

ISP	Internet Services Provider.
ITU	The leading United Nations agency for information and communication technology.
LFC	Local Fibre Company
LTE	Long Term Evolution – a name given to the fourth generation of mobile technology that can provide high-speed mobile broadband.
M2M	Machine-to-machine – refers to the use of network resources to communicate with remote application infrastructure for the purposes of monitoring and control (provides the connectivity for the IoT)
MB	Megabyte - The megabyte is a multiple of the unit byte for measuring the quantity of digital information
Mbps	Megabits per second - Mbps is used to measure data transfer speeds of high bandwidth connections, such as fibre, ethernet and cable modems.
MTAS	Mobile Termination Access Services – the standard terms determination where the Commission has determined the price and non-price terms for the services that provide for the termination on a cellular mobile telephone network of voice calls and SMS.
MVNO	Mobile virtual network operator – an operator that provides mobile phone services but does not generally have its own licensed frequency allocation of radio spectrum or much of the infrastructure required to provide mobile telephone service. It therefore relies on buying services from an operator with a full mobile network. The amount of control it has over the services it offers will vary according to the nature of its agreement.
NCSC	National Cyber Security Centre.
NZCER	New Zealand Council for Educational Research.
OECD	Organisation for Economic Co-operation and Development.
OTT	Over-the-top - OTT refers to content and applications provided from a third party and delivered to an end user device, leaving the ISP responsible only for transporting IP packets.
PB	Petabyte. 1 Petabyte = 1048576 Gigabytes; 1 Gigabyte = 1024 Megabytes
PPP	Purchasing Power Parity – an exchange rate designed to equalise standard-of-living differences between countries, and is therefore generally accepted as an appropriate conversion method for non-tradable goods and services.

PSTN	Public Switched Telephone Network – the publicly available telephone network designed for delivering voice services over dedicated voice channels.
SIM	Subscriber Identity Module – commonly known as a SIM card that contains a microchip that stores data that identifies the user, for use in GSM and compatible 3G mobile phones.
SLES	Sub-Loop Extension Service
SLUBA	Sub-Loop UBA
SMS	Short Message Service – commonly known as a text messaging, is a service for sending short messages between mobile devices.
TCF	Telecommunications Carriers' Forum
Telecom	Telecom Corporation of New Zealand Limited and Telecom New Zealand Limited.
UBA	Unbundled Bitstream Access – a regulated wholesale service that gives access to a full-speed DSL broadband service on lines on Chorus' access network.
UCLL	Unbundled Copper Local Loop – a Chorus copper line that connects a phone user to the local exchange that can be accessed by retail telecommunications providers to provide a voice and broadband service.
UFB	Ultra-Fast Broadband – the name given to the Government's initiative to roll out a fibre-to-the-home access network to give households access to high speed broadband.
UMTS	Universal Mobile Telecommunications System (UMTS) – the 3G successor to the 2G GSM standard which allows voice telephony, mobile Internet access, fixed wireless Internet access, video calls and mobile TV.
VoIP	Voice over Internet Protocol – a way to send voice calls over a data connection such as a broadband connection.
VDSL	Very High Bitrate (high speed) DSL
WiFi	Wireless Fidelity Standard –a series of standards for a popular technology that allows electronic devices to exchange data wirelessly (using radio waves), including allowing mobile devices to connect to high-speed internet connections. The distance over which a WiFi connection will operate can vary from 20 metres indoors to tens of kilometres outdoors.