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High speed broadband services demand side study

Final report

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Executive summary

1. This report focuses on demand side issues associated with the roll out of what are often called Next Generation broadband services. As the supply side issues have been addressed in New Zealand through the Ultra Fast Broadband (UFB) and Rural Broadband (RBI) initiatives, introduced in the Telecommunications Amendment Act in 2011, the focus has now shifted to the demand side of the equation.

2. In June 2011 the Commerce Commission (Commission) initiated a demand side study, under Section 9A of the Telecommunications Act, to identify and inform on any factors that may affect the uptake of high speed broadband services in New Zealand, delivered over both fixed and wireless networks.

3. The purpose of this study is to raise awareness of issues which may affect the uptake of high speed broadband services in New Zealand.

4. The study includes the publication of three Issues Papers,[1] a two-day conference – The Future with High Speed Broadband: Opportunities for New Zealand[2] - the publication of a draft report, submissions by interested parties, and the publication of this final report.

5. The key points that have emerged in the course of this study are:

   - The costs related to connecting to the network, and using high speed broadband services, have been identified by many parties during our study as a critical factor. As these costs (non standard connections, re-wiring, upgrading equipment and subscribing to the services) appear to be significant, they are likely to reduce the initial uptake of high speed broadband services for both consumers and SMEs.
   - Video content is likely to be the primary driver of consumers' uptake of high speed broadband services over the next few years. The rate of uptake is likely to be higher if there is a diverse range of video on demand options available to consumers. Currently, there are limited online video on demand services in New Zealand compared with many other comparable countries.
   - Potential issues relating to data caps, backhaul capacity and IP interconnection are likely to be resolved by market forces.
   - Rural users have the same appetite for fast broadband as urban users, but have a more fundamental need, which is to be connected to basic broadband. They

[1] The Issues Papers covered: Technical issues, e-health and e-education, and Content and willingness to pay. Copies of the Issues Papers are at http://www.comcom.govt.nz/high-speed-broadband-services-demand-side-study/

[2] The conference website is http://www.futurebroadband.co.nz/. The videos from the conference are at https://www.youtube.com/user/FutureBroadband1/videos

are concerned that they could be left behind as New Zealand moves forward with high speed broadband services. This issue has been recognised in the RBI initiative and in the five point government action plan for faster broadband.

6. In this report the Commission identifies issues related to the uptake of high speed broadband services. Where these issues are currently being considered or planned to be considered by other parties as part of their future work programmes, the Commission has stated so in this report.

7. In submissions received on the draft report, some parties commented that the Commission was not explicit about what actions should be taken by which external parties, or that the Commission did not make specific recommendations. Policy decisions and regulatory recommendations fall outside the Commission's jurisdiction under section 9A of the Telecommunications Act. The purpose of the report is to raise public awareness of the issues, to enable the relevant parties to make informed decisions.

8. The Commission notes that submissions made by some parties commented on the need for this report to be updated in the future, and for the need to be more specific about the Commission's monitoring processes.

9. The Commission is currently reviewing its monitoring strategy and will take into account all the submissions received during the study in redesigning its future monitoring programme. The revised programme will include the monitoring of the rate of uptake of UFB services, changes in data caps, and the range and price of services offered over UFB. The Commission will consult on the scope and regularity of the monitoring reports.

Introduction

10. In June 2011 the Commission initiated a high speed broadband services demand side study (study) to identify and inform on any factors that may affect the uptake of high speed broadband services in New Zealand.[3]

11. This study is conducted under Section 9A of the Telecommunications Act 2001, which empowers the Commission to conduct inquiries, reviews and studies into any matter relating to the telecommunications industry or the long-term benefit of end-users of telecommunications services within New Zealand.[4]

12. The aim of the study is to raise awareness of demand side issues: what they are, how they may evolve, and how they might affect uptake.

13. This report follows the three Issues Papers,[5] The Future with High Speed Broadband: Opportunities for New Zealand[6] conference (Conference), a draft report issued post conference and submissions by interested parties. This report is the final step in the Commission's study. In this report, we have summarised the material included in Issues Papers 1 and 3, included feedback received on the Issues Papers, perspectives presented at the Conference and comments made in submissions received on the draft report.

High speed broadband definition

14. For the purpose of this study the Commission has defined high speed broadband as a broadband service capable of a peak speed of at least 50/50 Mbps[7] with sufficient other technical characteristics to deliver the applications and content in the following table.

15. High speed broadband is not a static concept; it will evolve over time as applications, content, and needs change.

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3 A copy of the terms of reference for the study is at http://www.comcom.govt.nz/high-speed-broadband-services-demand-side-study/

4 Telecommunications Act 2001, subpart 2, section 9A.

5 The Issues Papers covered: Technical issues, e-health and e-education, and content and willingness to pay. Copies of the Issues Papers are at http://www.comcom.govt.nz/high-speed-broadband-services-demand-side-study/

6 Visit http://www.futurebroadband.co.nz/ for more details.

7 The speed of a broadband service is generally described in terms of peak downstream and upstream speeds – for example, a 100/50 Mbps service would have peak speeds of 100 Mbps downstream and 50 Mbps upstream. Downstream refers to data transmitted from the remote server to the user's computer and upstream from the user's computer to the remote server. Peak speed refers to the fastest theoretical transmission of data over that connection.

Table 1: High speed broadband applications and content

Bandwidth (symmetrical[8] upstream and downstream)	Example applications and content delivered in real-time
500 kbps – 1 Mbps	• Voice over IP • Email • Basic web browsing • Streaming music (cached) • Low quality video
1 Mbps – 5 Mbps	• Email with large attachments • File sharing (small – medium) • Remote surveillance • IPTV Standard Definition (SD) • Streaming music
5 Mbps – 10 Mbps	• Telecommuting (converged services) • IPTV SD (multiple channels) • HD video streaming • Gaming • Medical – file sharing and remote diagnosis (basic) • Remote education • Building control
10 Mbps – 50 Mbps	• Telemedicine • Education services • IPTV – HD (2-3 channels) • Gaming (complex) • Telecommuting with HD video • HD surveillance • Smart building control

16. While most individual applications or content listed in the table do not require high speed connectivity, the combination of various content or applications being used simultaneously in a work or home environment will create a demand for higher speed/capacity connectivity.

Home and workplace networking

17. Our definition of home and workplace networking includes lead-ins (to the workplace or home), home and business wiring and customer premises equipment.

18. There are costs related to home and workplace networking for both consumers and businesses. These costs are likely to be related to:

[8] Symmetrical refers to a broadband service with the same peak speed downstream and upstream.

- non-standard residential connections[9] and business connections, where the connection costs might not be covered by Chorus and the Local Fibre Companies (LFCs)
- premises re-wiring, which may be required to experience the full benefits of high speed broadband
- customer premises equipment upgrades or replacements, which may include equipment such as phones, security systems, alarms, TVs and set top boxes.

19. All high speed broadband services related costs falling on consumers and businesses are likely to slow uptake of such services. This was confirmed by the submissions made by retail service providers on the draft report. A number of parties, including the Ministry of Economic Development (MED) and Crown Fibre Holdings (CFH), are aware of this issue.

Residential and business connections

20. Under the Ultra Fast Broadband (UFB) contracts, the cost of connecting 'standard' residential customer premises to the network will be met by Chorus and the LFCs. A standard connection is defined as one where the lead-in[10] is either:

- overhead, either single (Chorus) or double (the LFCs) span of aerial drop lead, (as illustrated in the picture below)

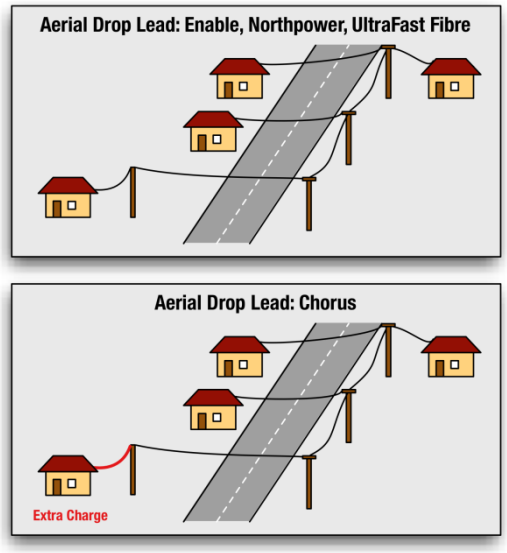

Figure 1: Aerial drop lead (source http://nztelco.com/)

or

[9] See Attachment 1 for standard residential connection definition.

[10] The lead-in cable is the cable that runs between the fibre access point (on the street) and the external termination point (on the customer's premises).

- underground and either 15 (Chorus) or 30 (the LFCs) metres in length (as illustrated in the picture below)

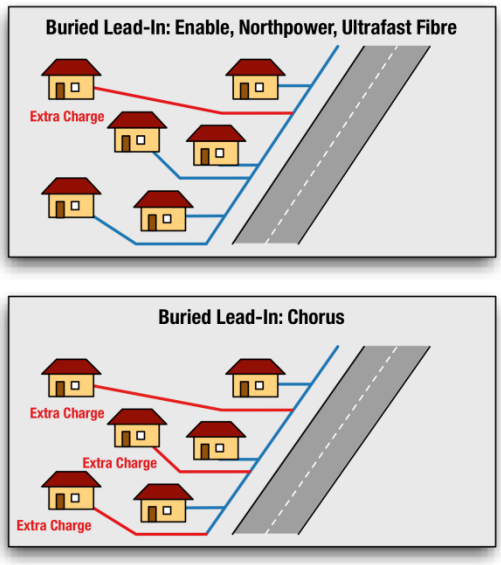

Figure 2: Buried lead-in (source http://nztelco.com/)

from the fibre access point (the access point for connecting and maintaining the lead-in to the distribution network fibre) to the External Termination Point (ETP) on the premises agreed with the customer. The standard connection also includes an extension of the fibre lead of up to either 5 (Chorus) or 10 (the LFCs) metres from the ETP to a suitable location inside the premises (standard residential connection details for Chorus and the LFCs are included in Attachment 1).

21. It is possible that some customers with non-standard connections might not have to pay a connection fee. For example Ultrafast Fibre's CEO has stated that, for their customers, connections will be free.[11]

22. There is no data available on the number of customers who are likely to require non-standard connections. Vodafone commented - in its submission - that less than half of customers in its trial of UFB services have been standard connections.

23. If the number of non standard connections is as high as Vodafone suggests, the impact will be substantial. If residential customers with non-standard connections and business customers have to bear the connection cost,[12] the uptake of high speed broadband services might be hindered, especially as there is a perception that residential connections will be free.[13]

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11 http://www.stuff.co.nz/waikato-times/business/technology/6261317/No-connection-fee-for-ultrafast-broadband

12 As stated in the UFB Services Agreement Price Lists on the CFH website.

13 Refer to Issues Paper 1 and also http://www.med.govt.nz/sectors-industries/technology-communication/fast-broadband/ultra-fast-broadband-initiative/faqs#costs

24. Customers may also face reinstatement costs (eg, costs for reinstating the garden/driveway to the satisfaction of the householder). It is not clear which party may pay for these costs, if they fall on the end users, uptake is likely to be reduced.

Home and workplace wiring

25. Premises re-wiring may be required to enable users to experience the full benefits of high speed broadband. For both consumers and businesses the cost of premises re-wiring may hinder uptake of high speed broadband services. This was confirmed by the Consumer and SME surveys carried out for the Commission.[14]

26. Submissions received on this issue suggested that a possible solution to the issues posed by home wiring is IEEE 1901 / HomePlug.[15] HomePlug uses the electrical wires in the house to provide a network connection. Recent HomePlug products are marketed as providing a network connection of up to 500Mbps. However, this is a maximum speed and actual speeds that users experience are likely to be lower.

27. Submissions have also suggested that re-wiring of premises could be avoided by using wireless network solutions. Wifi issues are discussed in the mobile section. The current standard, 802.11n, may not provide sufficient average speeds in 'real world' situations to provide reliable services over high speed broadband services. However, the next standard, 802.11ac, which will be finalised next year, delivers a much higher maximum data speed. Equipment using the draft standard has recently become available.

28. To encourage uptake it is important that Chorus, the LFCs and the retail service providers provide consumers and businesses with relevant information.

Customer Premises Equipment

29. Customer premises equipment (CPE) is the telecommunication equipment (phones, security systems, faxes, alarms TVs, set top boxes, game consoles etc) that end-users have in their homes or businesses. Most of this equipment is designed to run over copper based networks. Adapters are available that allow this equipment to be used over IP networks; however this approach may not work reliably.

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[14] 66% of the consumers surveyed thought that the cost of rewiring premises was a significant barrier to the uptake of faster broadband. For almost half of the SMEs surveyed, rewiring would be a definite barrier if it meant that they were unable to work while the rewiring took place. The percentage dropped to 32% if only some inconvenience was caused by the re-wiring work.

[15] See https://www.homeplug.org/home/

30. Telecom has estimated[16] that 1.6-1.7 million customers may incur costs from moving to an IP environment. Telecom also estimated[17] that replacing the impacted CPE equipment would cost $811m, (or an average of over $500 per user) as shown in Figure 3 below.[18,19]

Application	No. of users	Unit cost	Replacement cost ($ x Vol)	Comments
Fax	447,000	$250[31]	$112m	Newer faxes supporting V.34 suffer greater degradation
Sky (for video on demand)	557,000	$225[32]	$125m	MySky STB supports native IP, other STBs do not
Security alarms	100-200,000	$1650[33]	$248m	IP solutions not widely supported by industry
Medical alarms	50,000	$1293[34]	$65m	No IP solutions currently available
EFT-POS	60,000[35]	$1500[35]	$90m	Many terminals recently replaced to support smart cards[35] and which don't support IP
Deaf Relay Service (TTY)	~900	-	-	Not quantified
Dial-up Internet access	350-400,000	$455[36]	$171m	IP alternatives readily available
Totals	1.6-1.7m		$811m	

[31] Average of three options on dse website: http://www.dse.co.nz/dse.shop/en/catalog/CTG0000048_lp
[32] Average of three cheapest Freeview HD receivers (as proxy for Sky receiver with Ethernet port) on http://www.freeviewnz.tv/products_and_retailers/listing/hd/digital_receivers
[33] Mid point of NZ Police estimates: http://www.police.govt.nz/safety/home.burglar.alarms.html
[34] Assumes: $20 weekly cost, 50% hardware, 3 year lifecycle, discount rate of 10% (for NPV)
[35] See "All NZ Eftpos terminals to get upgrade before 2011", NZ Herald Tuesday May 25, http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=10647300
[36] Assumes: $10 monthly broadband cost and 5 year NPV (10% discount rate)

Figure 3: Telecom estimation of selected copper to fibre migration costs

31. Costs are still uncertain and may be significant. It is not clear where they will fall. If these costs fall on consumers, the uptake of high speed broadband services is likely to reduce. This may be a particular issue for lower socio economic groups.

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16 In a document provided to the Minister of Communications and Information Technology on 31 March 2011 to support its Variation to the Undertakings request 4 (http://www.med.govt.nz/sectors-industries/technology-communication/pdf-docs-library/communications/telecom-separation/variations-4-subsections/variation-4-pstn-migration-white-paper.pdf)

17 These figures are likely to be overstated, as some upgrades would occur independently from the move to an IP environment (eg, old or broken equipment being upgraded). In addition upgrades typically are not just a cost but also include some benefits, such as enhanced quality and longer life.

18 http://www.med.govt.nz/sectors-industries/technology-communication/pdf-docs-library/communications/telecom-separation/variations-4-subsections/variation-4-pstn-migration-white-paper.pdf

19 The Commission received feedback from AlarmNZ that some of the figures could be overstated and that other costs, eg, UPS power supply, fire alarms, have not been included. All feedback received on the Issues Papers is on the Commission's website, http://www.comcom.govt.nz/high-speed-broadband-services-demand-side-study/)

Network

32. The simplified network map below serves as a guide for this section of the report. The map shows the components of a broadband internet service from the end-user to the IP interconnect point: home network and wiring, local access network, exchange facilities, domestic and international transit and the Internet. The map is technology neutral, eg, the local access components could be either fixed or wireless.

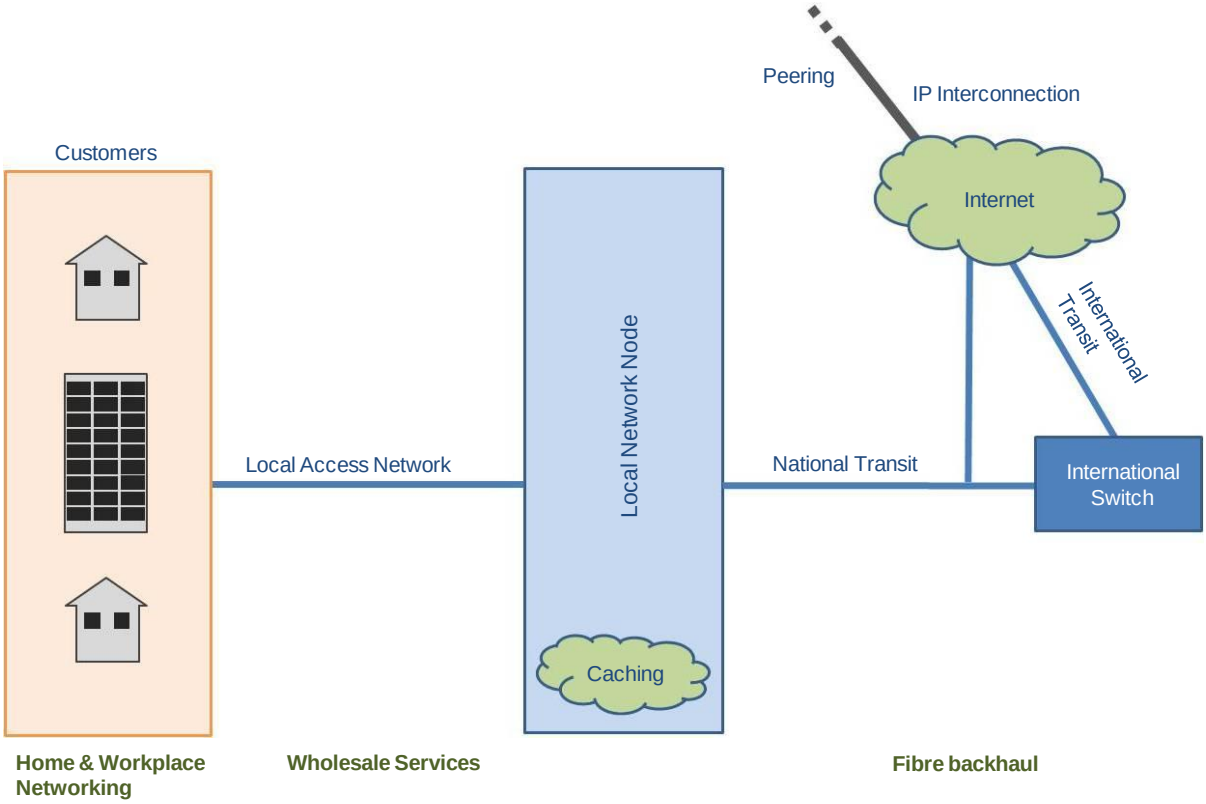

Figure 4: Network map

Local access network

33. The local access network includes the connection by a transmission medium (such as copper wire, optical fibre, mobile, wireless or satellite) between each subscriber and a local network node, commonly known as an exchange or central office.

34. The local access network is the infrastructure that enables the delivery of high speed broadband services to customers. The delivery of high speed broadband services requires other components, such as sufficient national and international capacity. So, for example, a retail broadband service using a 50/50 Mbps fibre to the premises (FTTP) local access component would not provide high speed broadband to a customer if the retail service provider provisioned insufficient capacity for national and international transit.

35. Key quality of service characteristics, such as the extent that national and international backhaul may be contended,[20] are not readily available to consumers or generally understood. Without transparency about these characteristics, there is a risk that high speed broadband retail services might not live up to end users' expectations.

36. This is an issue for retail service providers to address. The Commission believes that competitive markets will ensure that retail service providers provide services that meet consumers' expectations.

National transit

37. National transit refers to the data transmission between local network nodes within New Zealand using the network components in Figure 4 above.

38. National transit services that support UCLL and UBA are subject to regulation, with competitive links exempt from regulation. Most ISPs purchase national transit from third party suppliers.

39. The Commission's competition reviews have concluded that competition for UCLL (unbundled copper local loop) Backhaul has increased steadily since 2008, and recent developments are likely to increase competition further. The Commission is currently conducting a review of the regulated UCLL and UBA (unbundled bitstream access) Backhaul services and will continue to monitor developments in this area. In addition we understand that MED has started a stream of work that will include a review of broader national transit issues.

40. Competition is likely to increase further because, as demand for high speed broadband increases, the incentives to invest in infrastructure to provide national transit should also increase. This is borne out by recent market developments including:

    - FX Networks (FX) intends to build out to and interconnect at:
        - UCLL exchanges – FX currently interconnects at 21 exchanges and intends to build out to more; and
        - most of the UFB POIs
    - it was recently reported that China Telecom, together with Datalight and Maori interests, has invested in a cable from Auckland to Whangarei,[21] and that further such investments are possible.[22]

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[20] The contention ratio is the number of users sharing the same data capacity. The lower the contention ratio the higher the quality of service. A 10:1 contention ratio means that up to 10 broadband customers are sharing the same bandwidth at any one time.

[21] http://www.nbr.co.nz/article/snubbed-government-iwi-secure-china-telecom-funding-auckland-whangarei-cable-ck-85258

41. Given the current state of competition in the national transit market, it is unlikely that competition issues associated with national transit will adversely impact consumers' uptake of high speed broadband services.

International transit

42. International transit refers to data transmission from New Zealand's international switch to other countries, and data transmission within those countries.

43. Almost all of New Zealand's international connectivity is provided by the Southern Cross Cable.[23] Alternative international cables have been proposed, with current attention focused primarily on Pacific Fibre and the joint venture between Axin and Huawei Marine.

44. The Southern Cross Cable forms a 'figure of eight' with southern and northern loops linking New Zealand and Australia to Fiji, Hawaii and the United States. Southern Cross is owned by Telecom (50%), SingTel (40%), and Verizon (10%). Southern Cross says that its prices in New Zealand are benchmarked against the prices it offers in Australia.

45. The structure of the New Zealand wholesale market for international data capacity is shown in the simplified diagram below (a comprehensive map of New Zealand international connectivity is provided in Attachment 2: Map of New Zealand international transit arrangements).

46. While there is a single international cable, there are a number of wholesalers providing wholesale data transmission services to retail service providers. At the right edge of the diagram in Figure 5 below is Southern Cross, which operates the Southern Cross international cable. The wholesalers sell wholesale services (denoted in Mbps) to ISPs. The ISPs use those wholesale services as inputs into their retail broadband services.

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22 http://computerworld.co.nz/news.nsf/news/national-backhaul-may-be-next-for-chinese-investors

23 There is a second Trans-Tasman cable which has very limited capacity and is operated by Telecom. It is, therefore, generally discounted from analyses of New Zealand's international connectivity market.

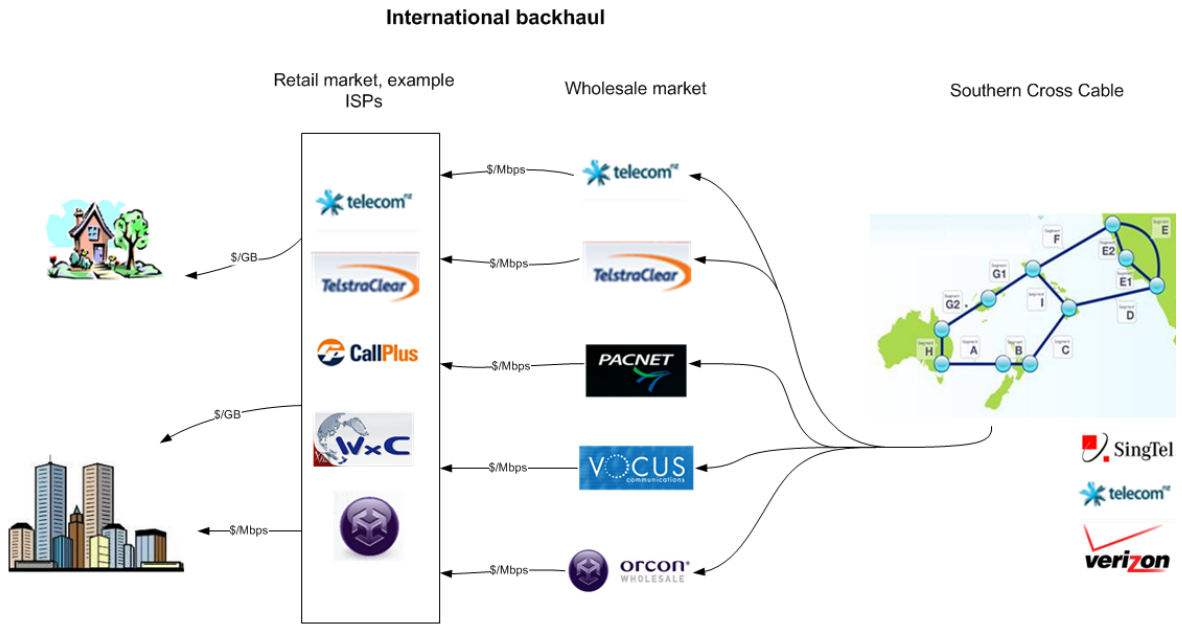

Figure 5: International connectivity markets[24]

47. In the last couple of years there has been evidence of significantly greater competition in the wholesale market including:

- significant falls in prices paid by retail service providers (see Figure 6 below)
- new entry in the wholesale market
- the ability of retail service providers to switch between wholesale providers
- evidence of some flow-on effects to down-stream markets, such as reduced retail prices and higher data caps.

48. As the wholesale market has become more competitive, the price of international transit has fallen significantly. For example the graph below shows the relative changes in the price of international transit per Mbps/month observed by two ISPs between 2006 and 2011:

[24] Orcon Wholesale operates in the wholesale market through Odyssey Networks. It was stated in the October 2011 edition of *Spectrum* that Odyssey sub-leases cable capacity to provide international transit services. Orcon is owned by Kordia.

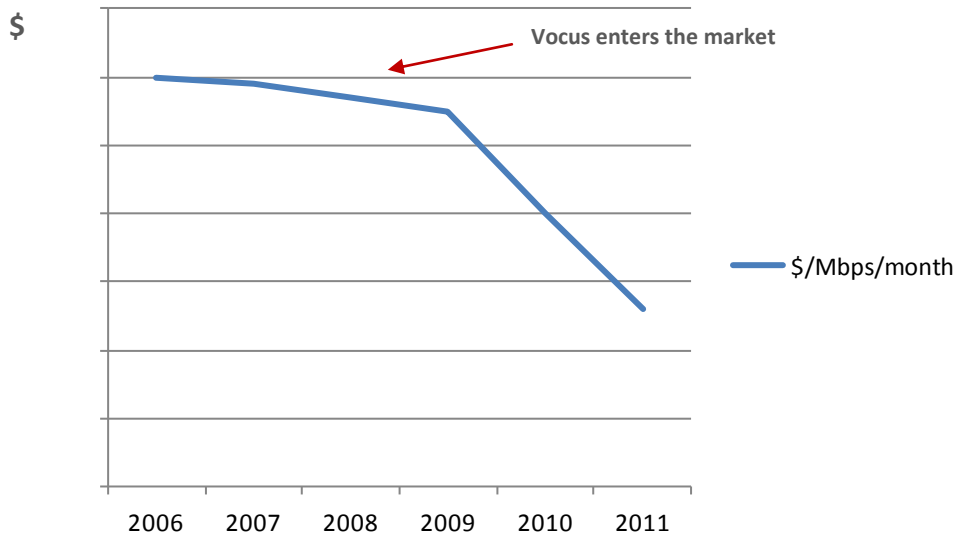

Figure 6: Effective price ($) of international transit purchased at the date indicated[25,26]

49. Pacific Fibre, in its submission to the draft report, commented that, according to a report produced by Australian firm Market Clarity, New Zealanders paid 5.8 times more per GB in 2011 than Australians. The submission argued that this disparity is due, at least in part, to the lack of competition in the international bandwidth market in New Zealand.[27]

50. The cost of international connectivity has fallen dramatically over the last few years. Falls over the last few months have been attributed to the potential entry of two further international capacity providers, Pacific Fibre and a joint venture between Axin and Huawei Marine. However, the actual entry of either of these new providers is uncertain. It was recently reported that Pacific Fibre is experiencing difficulties in finding financial backers for the proposed trans-Pacific communications cable.[28] If more competition in the international capacity market does not eventuate, further cost reductions may be unlikely.

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25 Because ISPs have purchased capacity at earlier dates, the effective price they pay will be higher than the market price.

26 The dollar amounts on this graph have been removed because they were sourced from commercially sensitive information provided to the Commission.

27 http://www.comcom.govt.nz/assets/Telecommunications/Studies/UFB-Demand-Side/Submissions-on-draft-report/Pacific-Fibre-Submission-on-High-Speed-Broadband-Demand-Side-Study-Draft-Report-11-June-2012.pdf

28 http://www.stuff.co.nz/dominion-post/business/7093950/Pacific-Fibre-founders-chip-in

IP interconnection and peering

51. IP-based interconnection is normally implemented by a mixture of peering and transit. With peering, two ISPs agree to exchange traffic solely among their respective customers, sometimes without payment; with transit, one ISP agrees to carry the traffic of a customer (possibly also an ISP) to third parties, generally for a fee. These freely negotiated arrangements result in a richly interconnected Internet, and do not (in most cases) depend on any regulatory obligations.[29]

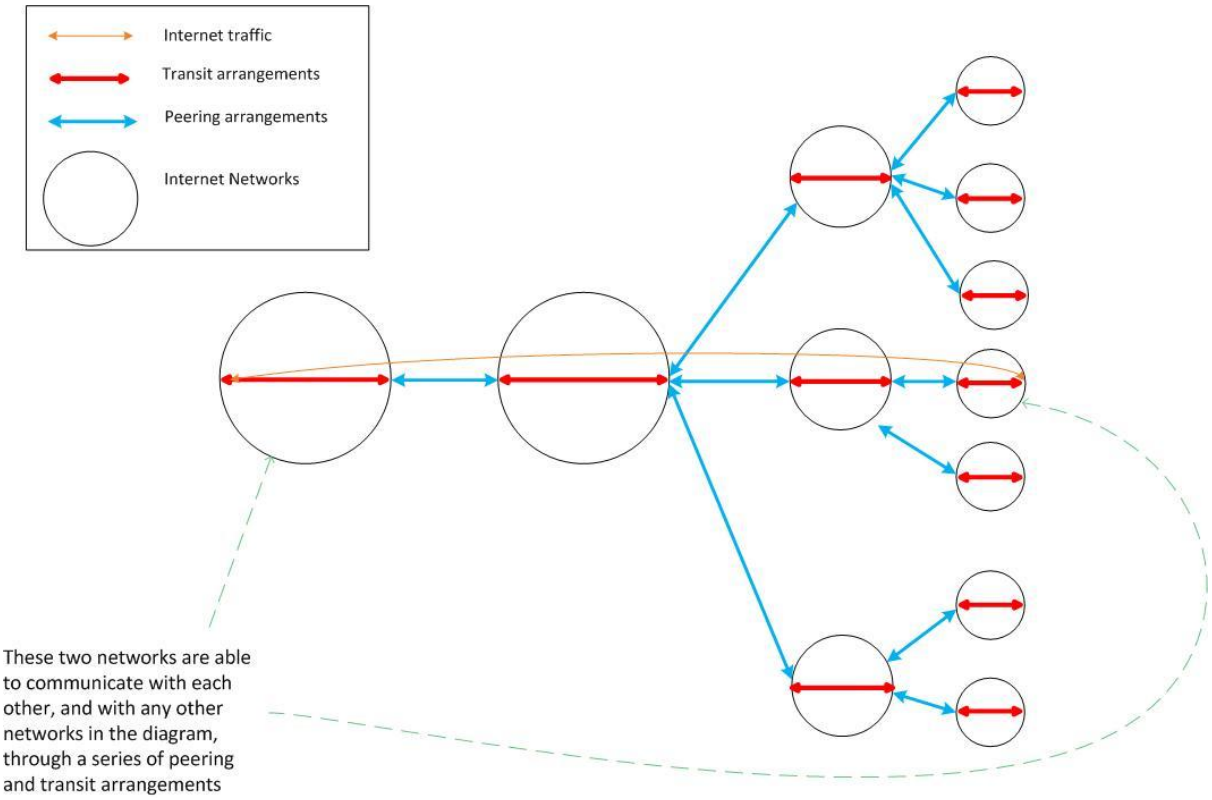

Figure 7: Explanation of peering and transit arrangements

52. We discussed IP interconnection in our Issues Paper 1.[30] As the number of IP services increases, it is likely that IP interconnection will be negotiated commercially, and is unlikely that issues related to IP interconnection will impede the uptake of high speed broadband services.

53. Peering enables Internet networks to communicate with each other (see Figure 7 above).

[29] http://ec.europa.eu/information_society/policy/ecomm/doc/library/ext_studies/future_ip_intercon/ip_intercon_study_final.pdf

[30] See Attachment 3 for the discussion. Issues Paper 1 is at http://www.comcom.govt.nz/assets/Telecommunications/Studies/UFB-Demand-Side/High-speed-broadband-technical-issues-paper-19-December-2011.pdf

54. It has been reported that some networks are taking local traffic off-shore (usually to the West Coast USA) to peer, because this is preferable to peering on-shore; however facts to back up these reports have been elusive.

55. A possible explanation had been advanced, suggesting that some .nz websites are hosted in the USA for economic reasons, and that there is actually no local traffic to peer with, as the traffic is coming from the US.

56. The Commission has not been able to get sufficient information to determine if this is an issue. We understand that MED has started a stream of work that will include a review of peering issues.

Network Neutrality

57. Net neutrality is the principle that ISPs will handle all network traffic in a non-discriminatory manner.

58. The proponents of net neutrality consider that:

- allowing ISPs and network operators to discriminate against competing or unaffiliated content and services damages competition in downstream content and applications markets
- failure to mandate net neutrality would mean the Internet would cease to be free and open, which would stifle innovation and prevent the emergence of new highly valued content.

59. Opponents of net neutrality consider that reducing the ability of ISPs to manage their networks would be inefficient and undermine their ability to offset the high investment costs of upgrading and expanding their networks.

60. Most commentators accept differentiation is required for network management. The key concern is that ISPs may block or discriminate against certain users or applications in order to give an advantage to their own services and making commercial arrangements with content providers to give preferential access to content in 'walled gardens'.

61. Stakeholders interviewed by the Commission generally considered that network neutrality was not a significant issue in New Zealand. No major concerns were raised in the submissions to the draft report. Internet New Zealand noted the need to define what network neutrality means in the New Zealand context, and intends to commence a work stream to look at net neutrality in New Zealand.

62. The Commission is of the view that network neutrality should not be an issue if ISPs are transparent about the limitations or restrictions placed on their broadband

services. The ISP marketplace is sufficiently competitive, that consumers are able to switch relatively easily between providers if restrictions are an issue.

63. The zero-rating of certain traffic by some ISPs, while other traffic counts towards the data consumed is regarded by some as a breach of net neutrality principles. Prof Dwayne Winseck[31] commented at the Conference that the practice of zero-rating traffic could 'have the effect of undercutting competition and diversity in the internet access and media content markets and could skew the broadband Internet away from the open, user-centric model to the provider-controlled, pay-per model'. [32]

64. Some New Zealand ISPs offer zero rated (or unmetered) content. For example, the Orcon O Zone offers unlimited access to a number of sites, including i-SKY, trademe and NZ Herald. [33] TelstraClear offers unmetered sites,[34] including trademe, tv3, channel 4, ziln tv. Snap[35] offers both unmetered sites as well as 'all you can eat' bundles.

65. The Commission is of the opinion that the practice of zero rating of certain content, for example locally cached content, is beneficial for end users. The Commission expects that competitive pressures in the market will lead to an increase in data caps and in the amount of content that is cached locally; consequently the practice and importance of zero rating traffic is likely to be reduced.

Data caps

66. Historically the high costs of international connectivity have resulted in low fixed line data caps. Recently data transmission costs have been steadily falling, while data caps, and unmetered content have been increasing.[36]

Do data caps discourage usage?

67. Some of the stakeholders interviewed by the Commission considered that data caps discourage consumers from downloading content for the fear of exceeding data caps.

68. In the Content and applications section of this report, we comment that the key driver of UFB services is content and in particular video content, such as HD movies. Such content requires large blocks of data to be downloaded and, in New Zealand, may lead consumers to hit data caps (and either have dial-up speeds for the remaining billing

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31 http://youtu.be/Y7aB_OiWh6w

32 The paper written by Prof Dwayne Winseck is at http://t.co/49LisJ1d

33 http://www.orcon.net.nz/home/page/o_zone

34 http://www.unmetered.co.nz/

35 http://www.snap.net.nz/home/package/broadband

36 A more comprehensive discussion on data caps was included in Issues Paper 1 (http://www.comcom.govt.nz/assets/Telecommunications/Studies/UFB-Demand-Side/High-speed-broadband-technical-issues-paper-19-December-2011.pdf)

period, or being forced to pay extra for GB downloaded), especially if the broadband speed is faster.

69. New Zealanders' low data usage was discussed at the Conference. It was pointed out that media and Internet use in New Zealand is 'strikingly low by global standards'[37] and that New Zealand is 'far behind the US and Western Europe'.[38]

70. This low usage might be related to the size of the data caps, the lack of access to content by New Zealanders (see Content and applications section below), or both.

71. A number of speakers mentioned British actor Stephen Fry's tweets on his experience with data caps in New Zealand, which were made during the first day of the conference:

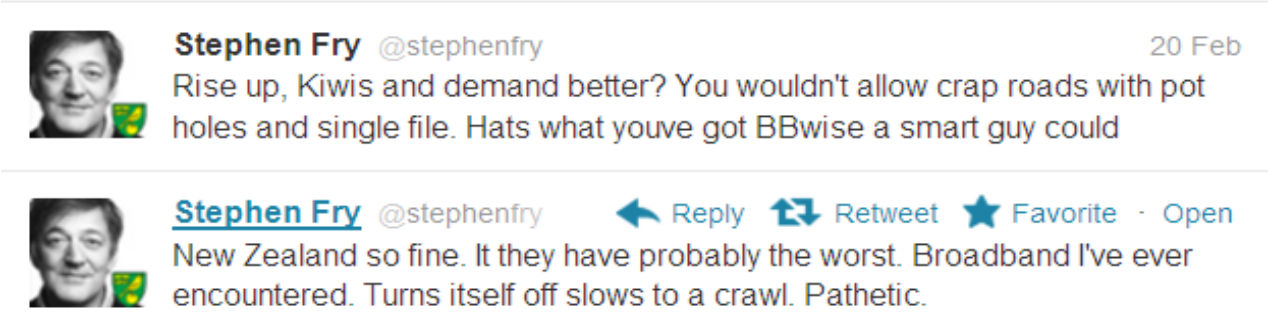

Figure 8: Stephen Fry's tweets

72. Stephen Fry later realised that he had reached his host's data cap and therefore had been reduced to dial-up speed.

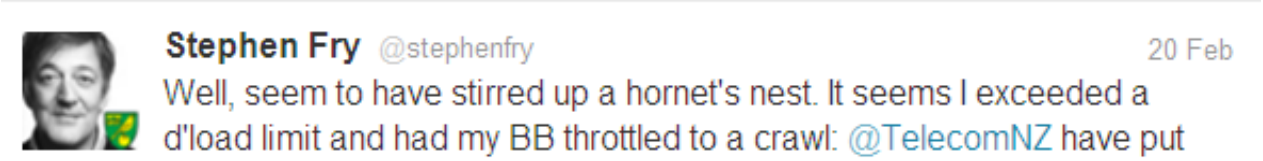

Figure 9: Stephen Fry's tweets (part 2)

73. The Commission expects that the practice of penalising consumers for exceeding their data caps, for example by slowing down their connection to dial-up speed, will be reduced, as consumers will be able to access additional data at reasonable prices. The Commission expects that competitive pressures will result in further data caps increases, and symmetrical speeds becoming the norm.

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37 Dwayne Winseck session.
38 Robert Pepper session.

Future data requirements

74. According to the Cisco forecasts presented at the Conference (see Figure 10 below), in five years time the average New Zealand internet user is forecasted to generate 13.7 gigabytes of Internet traffic per month (a six-fold increase from 1 GB per month in 2010). Cisco assumes that the average traffic per user in New Zealand will continue to be lower than elsewhere.

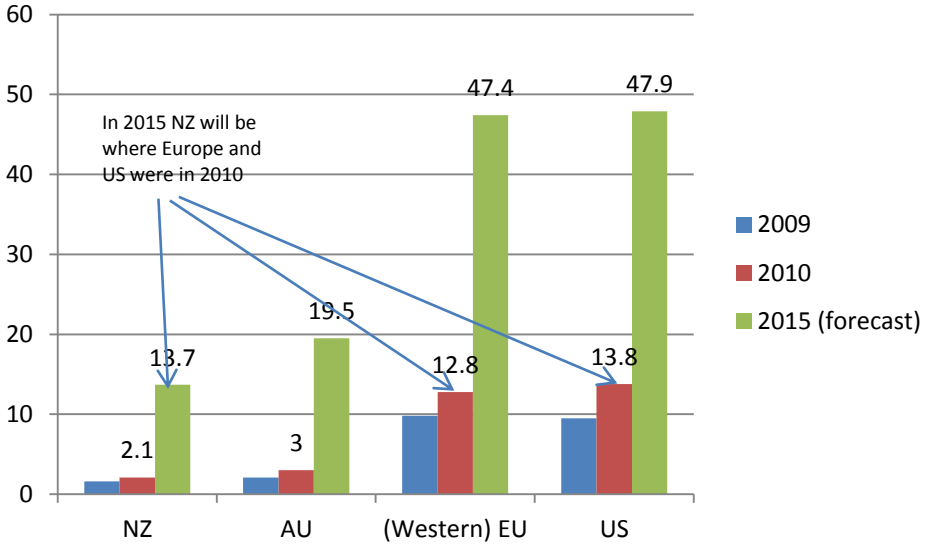

Figure 10: Average traffic per user actual and forecast (Source: Cisco)

75. Similarly, the same Cisco presentation predicted that the average New Zealand household will generate 33GB of traffic per month in 2015, an eight-fold increase from 2010 (see Figure 11 below).

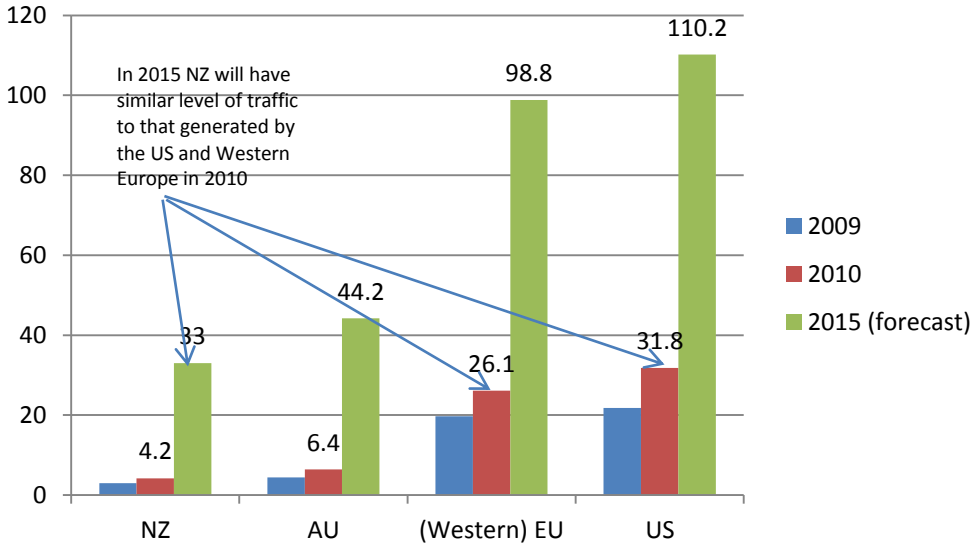

Figure 11: Average traffic per household actual and forecast (Source: Cisco)

Latest developments

76. As mentioned in the video content section later in this report, Quickflix has recently launched its Over the Top (OTT) service in New Zealand. Customers buying the streaming services might incur additional charges for internet usage as, unless the content is zero-rated by the internet service providers, the internet traffic will count towards subscribers' data caps. Some of these customers may hit or exceed their data caps, with the consequences explained in paragraph 68.

77. Two retails service providers, Orcon and Slinsgshot, have announced that Quickflix content will be zero rated for their subscribers, enabling these subscribers to watch on an 'all you can eat' basis.

78. Telecom, Snap and Orcon have recently announced data cap increases, with Telecom doubling broadband data for all customers on the Total Home packages; [39] Snap increasing the data allowances on its plans; [40] and Orcon offering 60GB, 200GB and 1000GB plans.[41]

79. The data caps offered by ISPs have increased significantly since the Commission started this study. For example Telecom has doubled the data caps on most of the packages offered (at the same cost) in September 2011 and then doubled them again in April 2012; a broadband package that had a 10GB data allowance in September 2010 saw its data allowance increased to 20GB in September 2011 and, as of April 2012, has a 40GB data allowance.

80. If these trends continue, data caps should not inhibit the take-up of high speed broadband services. However, if these trends do not continue, or do not occur at a sufficient pace, data caps may impact uptake of high speed broadband services, since the higher speed of these services might lead to consumers reaching their data caps sooner.[42]

81. The Commission currently monitors data caps, and will continue to monitor developments in this area. The Commission is currently reviewing its monitoring strategy and will take into account all the submissions received when redesigning its future monitoring programme.

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[39] http://www.telecom-media.co.nz/releases_detail.asp?id=3793&page=index

[40] http://www.snap.net.nz/support/news/12/en/so-we-heard-you-like-data.html

[41] http://www.orcon.net.nz/about/article/orcon_boosts_genius_plans

[42] As with higher speeds users are likely to download greater a quantity of data over the same period of time.

Mobile networks

Mobile data traffic forecast to grow substantially

82. Several presenters at the Conference commented on the importance of mobility in the mix of high speed broadband services. Cisco[43] noted that last year, mobile data traffic in New Zealand more than doubled. Most of this traffic was not transported over high speed networks; however, Cisco's projected rapid growth of mobile data over the next five years suggests that demand for high speed mobile broadband may increase markedly.

83. Cisco forecasts that global mobile data traffic will increase 18 times from 2011 to 2016. Cisco placed the New Zealand growth at 12 times.

84. The mobile data traffic growth is being driven by new applications and hardware, such as smartphones and tablets, machine to machine requirements, such as security surveillance, and greater use of laptops to access the internet. Figure 12 below (taken from the Cisco presentation at the Conference) also shows that, while laptops dominate today, smartphones will lead the mobile data traffic growth by 2016.

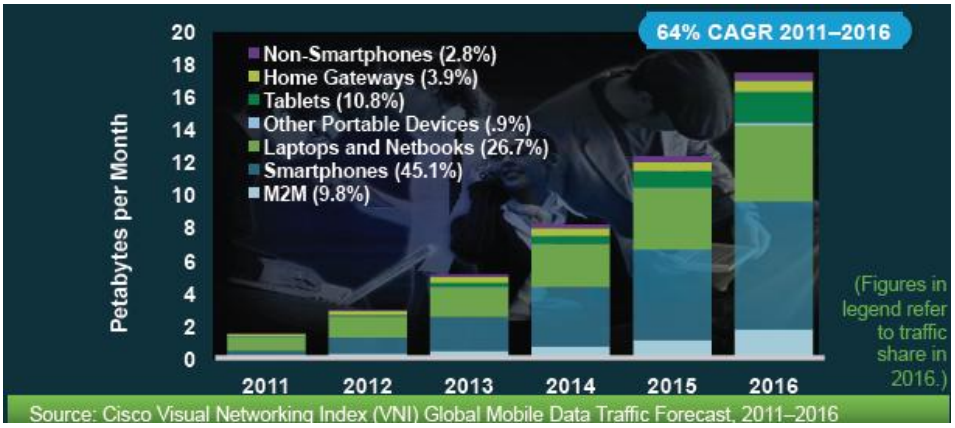

Figure 12: New Zealand mobile data traffic growth/devices (Source: Cisco)

The importance of mobility in the mix of high speed broadband services

85. The Cisco presentation also noted the emergence of mobile data as a major form of internet traffic. Gerd Leonhard,[44] media and communications futurist, also painted a future that included mobility as a key theme.

86. There are two broad forms of mobile network technology:

- Cellular networks. These networks deliver cellular radio coverage over licensed spectrum to customers in a broad range of environments:

[43] http://youtu.be/MT-vJUgSsAI
[44] http://youtu.be/T_GiPFFFEog

  - macro and micro environments – ranging from rural areas to indoor locations
  - a range of user speeds – from stationary to fast moving, eg, in a car

- Wifi hotspots. Wifi access points connect to a fixed, local access network. These access points tend to use unlicensed spectrum; interference is potentially an issue, particularly in public environments. Wifi data speeds are significantly faster than 3G cellular speeds. Wifi is typically deployed in localised hotspots (eg, airports, coffee shops, CBDs, sport stadiums, houses) because access points have limited range.

87. Advanced mobile networks have data speeds consistent with the Commission's definition of high speed broadband.

88. The latest Wifi standard, 802.11n, has a maximum data rate of more than 100 Mbps over a single channel. The next standard, 802.11ac, is scheduled for release in 2013 although some equipment may be available this year. This standard could have a data speed of 500 Mbps on a single link and maximum speeds that are possibly over 1 Gbps.

89. The latest macro cellular standard, LTE-Advanced, is scheduled to be released this year. LTE-Advanced has a theoretical peak speed of 1000/500 Mbps.

90. Spectrum for LTE technology in New Zealand will be available to be auctioned once it is cleared by the switch-over to digital television, scheduled for November 2013.

91. The Cisco presentation included discussion about mobile data 'offloading'. The term offloading refers to the 'smart' transfer of a user's session between types of broadband network. For example, a user might initially be transferring data from their mobile device using the macro cellular network. Upon entering a Wifi hotspot, the session is transferred to the Wifi access point and the fixed network. The benefits of offloading include the ability for the user to use the least cost form of mobile connectivity at any point in time and the availability of higher bandwidth. The complementary nature of offloading means that growth in both fixed and mobile broadband traffic will be related.

92. This offloading activity potentially enables mobile users to access high speed broadband today, even if the cellular technology their devices use is lower speed.

93. As we discuss later on in this report, cloud computing applications will be a major source of demand for fast mobile broadband. The rapid emergence of high-powered, mobile devices including laptops, smartphones and tablets, means that activities that once could only be done on the desktop can now be done anywhere. Cloud computing

and high speed broadband networks enable this location flexibility; 'placeshifting' is a mobility concept.

94. Many in the IT industry consider that these mobile devices represent the next era in personal computing. The chart below shows the growth in various mobile devices compared to desktop computers (note that the Y-axis scale is logarithmic).

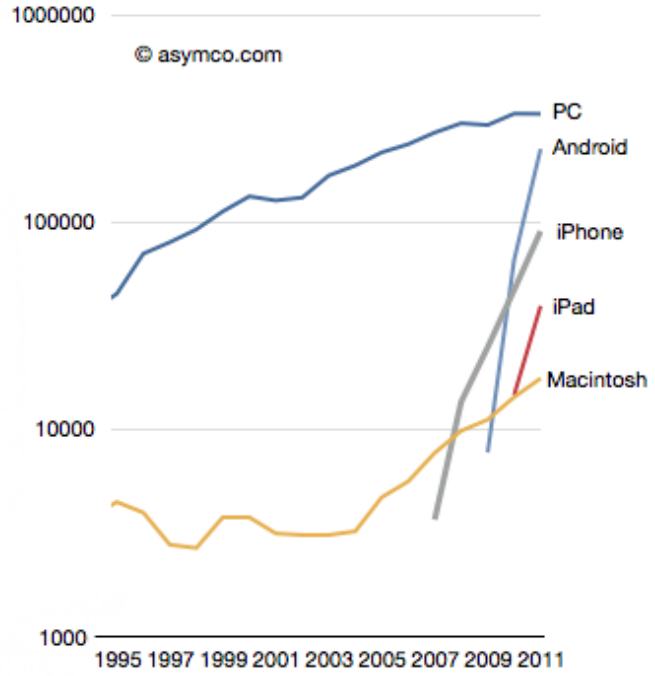

Figure 13: Units of devices shipped annually, (Source: Forbes, Jan 2012)[45]

95. The demand for greater mobile bandwidth is likely to increase as the computing power of these devices increases. For instance, applications and content optimised for the new iPad and its Retina display will be substantially larger than comparable content for the iPad2, eg, the iMovie application has increased from 70 to 404 MB.

Mobile data caps

96. The reasons for cellular data caps tend to be different to the reasons for fixed data caps.

97. The key differences between mobile and fixed broadband networks are that capacity is more constrained on mobile networks and the marginal cost of network infrastructure is higher. This means that the need for data caps to manage capacity limits is more significant for mobile broadband than fixed broadband.

98. Cellular technology is likely to be able to deliver high speed broadband in the future, at which point mobile data caps may become an issue for the take-up of mobile high speed broadband. Mobile data caps, both in New Zealand and internationally, are

[45] www.forbes.com/sites/timworstall/2012/01/19/the-end-of-the-pc-era/

much smaller than fixed broadband data caps. For example, Telecom offers 0.75, 2 and 4 GB monthly consumer mobile broadband data packages.

99. Mobile data caps are becoming more prevalent throughout the world as mobile voice revenues decline and mobile data traffic increases substantially.

100. Not all this mobile data traffic will count towards a user's cellular data cap, since mobile traffic may be offloaded from the cellular network to a Wifi network, when the latter option is available.

101. The picture below,[46] describes how US consumers use mobile devices over various types of environment (for example 70% of tablet owners and 68% of smartphone owners said they use their devices while watching television, compared to only 35% of eReader owners). This picture illustrates the role that offloading is already playing in connecting consumers: in several of the situations described below, consumers are likely to be within the coverage of a Wifi access point and accessing the internet using a fixed broadband network rather than a cellular network.

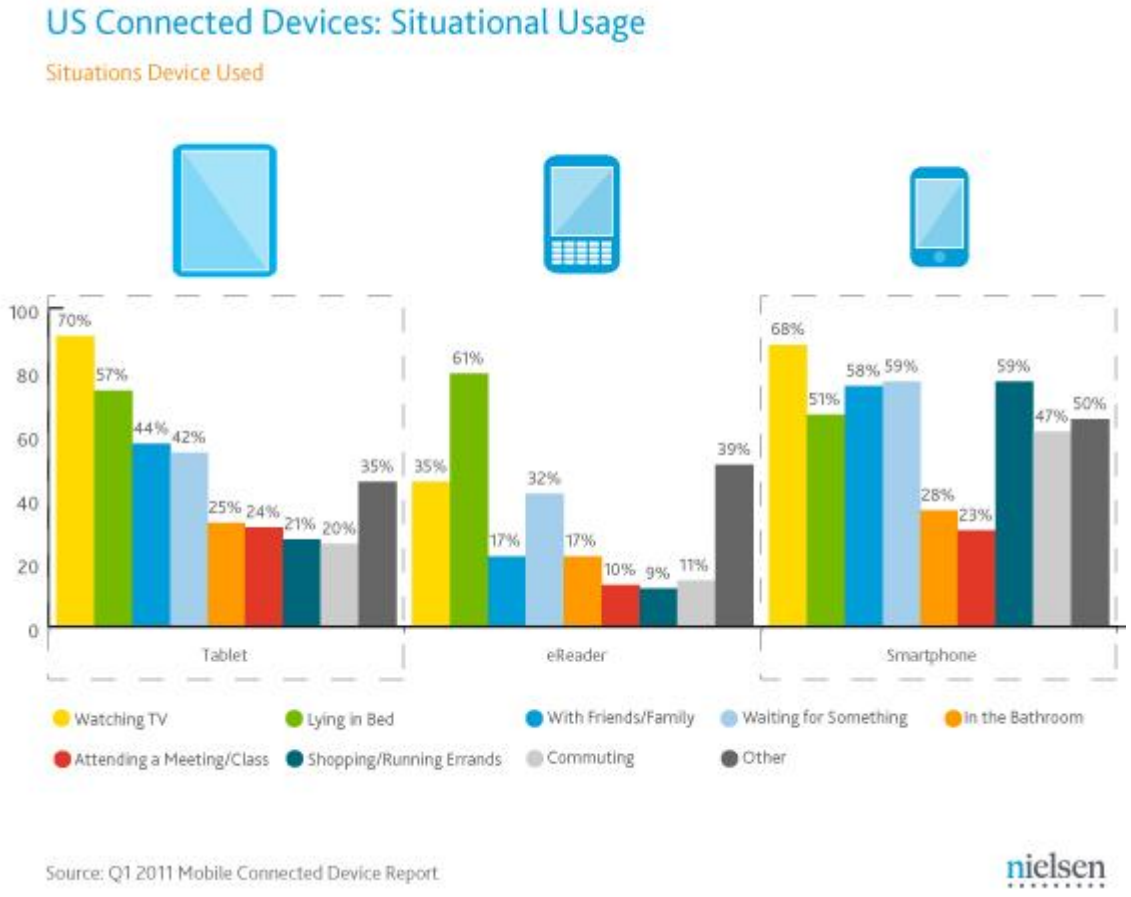

Figure 14: US connected devices: situational usage

[46] http://blog.nielsen.com/nielsenwire/online_mobile/in-the-u-s-tablets-are-tv-buddies-while-ereaders-make-great-bedfellows/. Nielsen surveyed nearly 12,000 connected device owners.

Mobile data caps in rural areas

102. Drivers of demand for high speed broadband services in rural areas were discussed at the conference.

103. Feedback received by the Commission, both at and post Conference, mentioned that mobile data caps are more of an issue for rural people dependent on mobile broadband. Their concerns relate to both the size of the data caps and the overage charges if additional usage is required.

104. Rural broadband issues are discussed further in the Rural broadband section of this report.

Content and applications

105. As we noted in Issues Paper 3,[47] content and applications requiring high speed broadband connectivity will be the major driver of consumers' uptake of high speed broadband. For instance, Allan Freeth, CEO TelstraClear, has recently said '… content is going to be the key for uptake on UFB'.[48]

Consumer interest in content and applications

106. Issues Paper 3 identified three broad categories of content that are likely to drive consumers' uptake of high speed broadband over the next several years:

- Consumer cloud computing applications and related content
- Video
- Gaming.

107. The presentations and discussions at the Conference confirmed the importance of these three forms of content.

108. Cisco[49] presented a forecast showing that video content[50] and applications could be 61% of global consumer internet traffic in 2015. This proportion is even higher if managed IP video and 'downloaded' (eg, peer to peer, P2P[51]) video is included. Cisco forecasts that in New Zealand, video will be 81% of all consumer internet traffic in 2015.

109. Another theme was the rapid growth of cloud computing and the requirement for high speed broadband to deliver this IT model. It was noted that much of the content consumed using cloud applications over the next few years will be video content.

110. Although video is likely to be the primary driver of IP traffic over the next few years, this does not necessarily mean that video will be the only major form of content leading to the uptake of high speed broadband. Figure 15 below shows the results

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47 http://www.comcom.govt.nz/assets/Telecommunications/Studies/UFB-Demand-Side/High-speed-broadband-issues-paper-3-Content-and-willingness-to-pay-9-February-2012.nrl.pdf

48 http://computerworld.co.nz/news.nsf/news/sky-tv-and-the-telcos-telstraclear-boss-tackles-content-issues

49 Robert Pepper, VP Global Technology Policy, Cisco. 'Consumer Demand Driving Ultra Broadband in a Zettabyte World'. http://futurebroadband.co.nz/sites/default/files/day1-pdfs/10.45%20-%20Pepper-NZ%20Broadband-02-2012%2016by9%20FOR%20DELIVERY.pdf

50 Video content includes video calling (eg, Skype and FaceTime), mobile video, short form video (Cisco defines short form video as video that is less than 7 minutes in length, eg, many You Tube videos) and long form video (greater than 7 minutes).

51 In a P2P network, the 'peers' are computers connected to each other via the Internet. Files can be shared directly between computers on the network without the need of a central server. In other words, each computer on a P2P network becomes a file server as well as a client. Bit Torrenting is an example of P2P networking.

from a 2011 Q3 Nielsen survey[52] on the amount of time US consumers spend on various forms of internet content and applications.

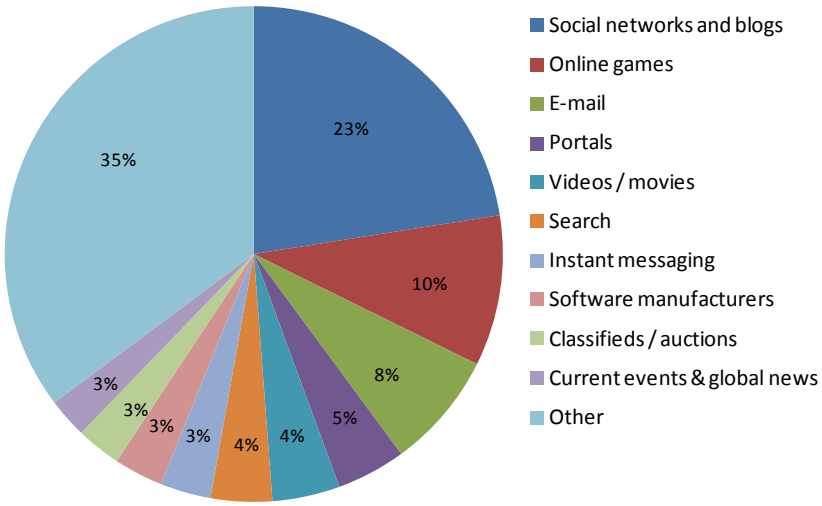

Figure 15: Percentage of on-line time that US consumers spend on various internet applications and content, 2011 Q3

111. These survey results show that consumers spend a relatively small amount of their on-line time watching video content; video/movies represents 4% of consumers' total on-line time. Although video content is a major driver of internet traffic because of its bandwidth-intensive nature, consumers spend most of their time engaged with other forms of on-line content.

112. Social networking stands out as the primary application used on the internet. US consumers spend 23% of their internet time on social networking and blog sites.[53] These are all cloud-based applications.

113. Consumers spend a further 10% on on-line games. While the bandwidth requirements associated with many games are relatively modest, gamers playing 'higher-end' games (eg, some massively multi-player online games, MMOG) have a requirement for low latency. As we discuss in the cloud section below, fibre networks have latency characteristics superior to current copper networks.

114. These three important application and content categories – cloud content, video and gaming – are discussed in the following sections.

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52 Nielsen (2011). State Of The Media: The Social Media Report. http://blog.nielsen.com/nielsenwire/online_mobile/social-media-report-spending-time-money-and-going-mobile/

53 The most popular sites are Facebook (140m unique visitors), Blogger (50m), Twitter (24m), Wordpress (22m), MySpace (19m), LinkedIn (18m).

Cloud computing

115. As we discussed earlier, a major theme at the Conference was the rapid growth of cloud computing.

116. Cloud-based applications and content reside in a 'cloud' environment (they are 'in the cloud') rather than on a users' computing device. Physically, they are hosted in server farms, which users access via the internet.

117. Strictly speaking, cloud computing is neither an application nor content. It is a form of IT architecture. Examples of other IT architectures include LANs (local area networks) and WANs (wide area networks). The cloud computing architecture is a distributed, internet-based architecture with centralised servers that provide a scalable platform providing 'on-demand' computing resources.

118. Consumers access cloud-based resources on demand and may be billed on the amount of resource they consume at any time. For example, Facebook is a cloud-based application, which is accessed using an internet browser. The application sits on Facebook's servers, along with all the information, photos etc that the user has uploaded. The resource scales with the amount of information the user uploads. For other cloud applications, where users pay for the service, the amount that a user pays typically scales with the amount of resource being used.

119. Many industry commentators consider the emergence of cloud computing to be one of the biggest trends currently occurring in the IT sector. For instance, Gartner[54] expects that the personal cloud will replace the PC as the digital hub by as soon as 2014. It notes that this trend will result in broad range of consumer devices including laptops, smartphones and tablets. The cloud could be considered the 'glue' that connects a user's range of devices together.

120. An important benefit of cloud computing for consumers is the ability to 'placeshift' content. Placeshifting is defined as consumers accessing digital media anywhere, anytime, and on any device, both fixed and mobile. Digital media is stored in the cloud and accessed using a variety of devices. For instance, this premise of any how and anywhere access is the key attribute of Apple's iCloud, with content accessible from any Apple device (including the iPod, iPhone, iPad and Apple TV).

121. Cloud applications will be a major driver of IP traffic. Cisco estimates that 66% of mobile data traffic in 2016 will be driven from cloud based applications, up from 40% in 2011. Global cloud traffic is estimated to increase 12 fold between 2010 and 2015. Cisco expects the demand for cloud services to grow faster than other forms of consumption across the internet.

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[54] Gartner (2012). 'The New PC Era: The Personal Cloud'.

122. Much of this cloud traffic is driven by video applications including YouTube, Skype and FaceTime and an increasingly range of over the top (OTT) video applications. Games are another form of content that may reside in the cloud. For example, Sony's PlayStation network and OnLive are examples of cloud based gaming environments. These two forms of content and applications are discussed in sections that follow.

123. Robert Pepper, Cisco, made the point that advanced cloud services require networks with latency below 50 ms. Cloud traffic is more symmetric than many other forms of traffic, with cloud users engaged in both uploading and downloading data. Pepper noted that low latency cannot be achieved over copper-based networks. He referred to an FCC review in the US which found that fibre networks have a latency that is around 50% lower than copper networks. A conclusion from the Cisco presentation is that high speed broadband connectivity may be required for consumers to use advanced cloud based applications.

Video content

124. A common theme of the Conference and submissions was the importance of video as a key application that will drive the uptake of high speed broadband. Video content was 37% of all consumer internet traffic in New Zealand in 2010. As mentioned earlier, Cisco expects this percentage to more than double by 2015.

125. According to IHS Screen Digest,[55] legal online movie viewing in the US will exceed DVD and Blu-ray use for the first time this year. In 2011, Amazon and Netflix accounted for 94% of all paid movie consumption online in the US. This trend highlights consumer increasing preference toward 'à la carte' video consumption, away from the traditional passive, linear model.

126. Cisco expects that the continuing trend in overall video over IP growth will be led by long form video. This long form video growth will be caused by:

- An increasing array of devices, including internet-capable TVs, media players, laptops, tablets and smartphones
- A growing number and variety of video on demand services including OTT and IPTV services.

[55] http://www.screendigest.com/reports/2012222a/2012_03_online_movies_the_future_today/view.html

OTT

127. OTT is defined as video delivered by content providers over third party broadband networks to a range of end-user devices.[56] These devices include any consumer electronic device able to connect to an IP network and display video content.

128. OTT services potentially alter the established video content industry value chain. New players can enter existing parts of the chain, unencumbered by the need to have transmission capabilities. Consumers' access to OTT services is independent of a dedicated facility or network.

129. The OTT model offers the ability for customers to view content on an 'à la carte' basis. With OTT, content can be delivered to consumers based on their individual requirements: any content, anytime, anywhere on any device (eg, from a 'traditional' TV to a smartphone or tablet).

130. Issues Paper 3 noted that, to date, New Zealand has had a limited number of OTT services. Existing New Zealand content providers and potential new domestic entrants are interested in developing OTT propositions for delivering subscription video on demand (SVOD) services. The introduction and shape of these new services will be driven by companies' access to video content rights. These rights have been held by a small number of market participants.

131. There was considerable discussion at the Conference on the issue of content rights. The CEO of SKY said that SKY does not own subscription SVOD rights. He went further, stating that pay-per-view (PPV), VOD and SVOD rights '…for the most part, are generally non-exclusive'. The Managing Director of Mediaworks had a very different perspective. She said content rights exclusivity was a major issue that would limit the emergence of video over IP services.

132. Content rights were also a major topic in submissions that the Commission received on the draft report. As with Conference participants, the views of submitters on this issue differed widely. For instance, SKY's submission noted that there will be 'plenty of opportunity' for new online video companies to capture market segments and acquire content rights. It argued that 'New Zealand consumers are already able to access a wide range of OTT content, such as YouTube, or content through social media such as Facebook or Google+'. In contrast, Quickflix noted that the concentration of current content rights has hampered its business development in New Zealand (see below). MediaWorks and TelstraClear had similar perspectives; they commented that the

[56] Examples of OTT services include Netflix, BBC iPlayer, Quickflix, FetchTV, Hulu, Amazon TV, Google TV, Microsoft (X Box 360), Sony and YouTube.

entry of new online SVOD businesses is likely to be hampered by the limited availability of content necessary to create quality, differentiated video services.

133. Quickflix, an Australian based OTT service provider, has recently launched its OTT service in New Zealand. Quickflix has two service offerings:

- A subscription service that allows customers to watch 'unlimited movies and television' for $16.99/month. 'New release' movies are not included in this package.[57]
- A pay-per-view service, where customers (current subscribers and non-subscribers) can view a 'new release' movie over a 48 hour time window for $6.99.

134. Quickflix has advised the Commission that it has approached a number of ISPs to negotiate zero rated, uncapped broadband traffic deals. Currently, it has arrangements with Orcon and Slingshot. Quickflix's submission to the Commission[58] noted there are 'significant contractual issues' that limit major ISPs' ability to un-meter (or zero-rate) the broadband traffic of OTT providers.

135. Quickflix's submission noted that existing content right arrangements in New Zealand limit Quickflix's offering in New Zealand compared to its Australian service. For example, SKY has content rights for HBO programming, which means that Quickflix is unable to offer this premium content in New Zealand despite the fact that HBO is a major shareholder in the company. Quickflix offers HBO content in Australia.

136. SKY commented on this point regarding HBO content in its submission. It noted that HBO's preference is to do linear programming deals first, which SKY was able to offer in New Zealand. SKY commented that at the time of the HBO deal, there were no SVOD providers (including Quickflix) in New Zealand. SKY submitted that if Quickflix had been in the market it may have been able to obtain SVOD rights from HBO.

Direct to fans

137. A business model that is not affected by companies' ability to access content rights is the 'direct to fans' model. Under this approach, content providers deliver their content directly to fans, bypassing a number of intermediary parties that exist in the traditional video content value chain.

138. In the US, Major League Baseball (MLB), the National Basketball Association (NBA) and the National Hockey League (NHL) offer OTT services that enable customers to watch

[57] http://www.quickflix.co.nz/?joinnow=true&gclid=CM7g_8vc268CFQcipAodZXcVAg

[58] http://www.comcom.govt.nz/assets/Telecommunications/Studies/UFB-Demand-Side/Feedback-and-additional-info/Feedback-on-Issues-paper-3-Quickflix-NZ-Ltd-8-May-2012.pdf

non-local games over broadband networks. Various subscription tiers are offered with different content packages.

139. An example of the 'direct to fans' model in New Zealand is Metservice's metservice tv.[59] This is a week day and severe weather bulletin. The bulletin includes week day forecasts for the whole country and the three main centres.

140. In conclusion, video content is likely to be the primary driver behind consumers' uptake of high speed broadband over the next several years. The rate of this uptake may be affected by the diversity of video on demand services that are available and the quality of content that they offer. The entry of Quickflix is an early indication that a greater range of video services may be emerging in New Zealand. Parties will be watching closely the evolution of the video content sector over the next few months and its impact on consumers' uptake of high speed broadband.

Gaming

141. Gaming is another form of content that could drive the uptake of high speed broadband in the consumer market.

142. On-line gaming represents a small part of global IP traffic, currently around 0.4% of IP traffic. However, this small traffic volume does not represent the likely demand for high speed broadband from gamers.

143. Figure 15 above shows that internet users spend 10% of their time playing on-line games. This proportion is clearly much bigger than the gaming proportion of IP traffic. Much of current gaming traffic is likely to be low bandwidth. Some gaming traffic may be recorded as social media traffic.[60]

144. The bandwidth requirement for on-line gaming is likely to increase as the gaming ecosystem develops and high bandwidth networks are deployed more widely. Over time, the percentage of time spent on gaming may translate in to a much greater volume of IP traffic. For instance, the next versions of Sony's PlayStation and Microsoft's Xbox are likely to include greater cloud functionality.[61]

145. Apart from bandwidth, gamers playing 'high-end' on-line games require low latency connectivity. Fibre networks have much lower latency than copper-based networks.

146. Stephen Knightly,[62] director of inGame and chairperson of the NZGDA, delivered a presentation on gaming at the Conference. Stephen commented that entertainment is

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59 http://www.metservice.com/tv/index

60 A ComScore report notes that Facebook users spend 10% of their time on applications. http://www.insidefacebook.com/2011/07/26/most-facebook-browsing-on-news-feed/

61 The Playstation Network and Xbox Live on-line gaming environments are both cloud-based environments.

62 http://www.youtube.com/watch?v=W6BfwJlQdds&feature=colike

a valid economic driver and reason to have UFB. He said that games and social media are a gateway for many people to get onto the internet and become digital consumers. As these users become comfortable with being on-line they may naturally transition to using services such as e-health and e-education.

147. Stephen also spoke about the gaming industry and how it is already larger than the music and Hollywood blockbuster industries. Although very small, the New Zealand gaming industry grew 46% in 2011. The industry is generating high tech, above average salary, full time jobs and producing digital weightless exports from New Zealand.

148. Stephen commented that NZ consumers, and especially younger consumers, are passionate about gaming, and that this level of passion shows that gaming is likely to be a key driver of uptake of high speed broadband. For example the picture below shows that the 6,000 New Zealanders surveyed are as passionate about games as they are about rugby league.

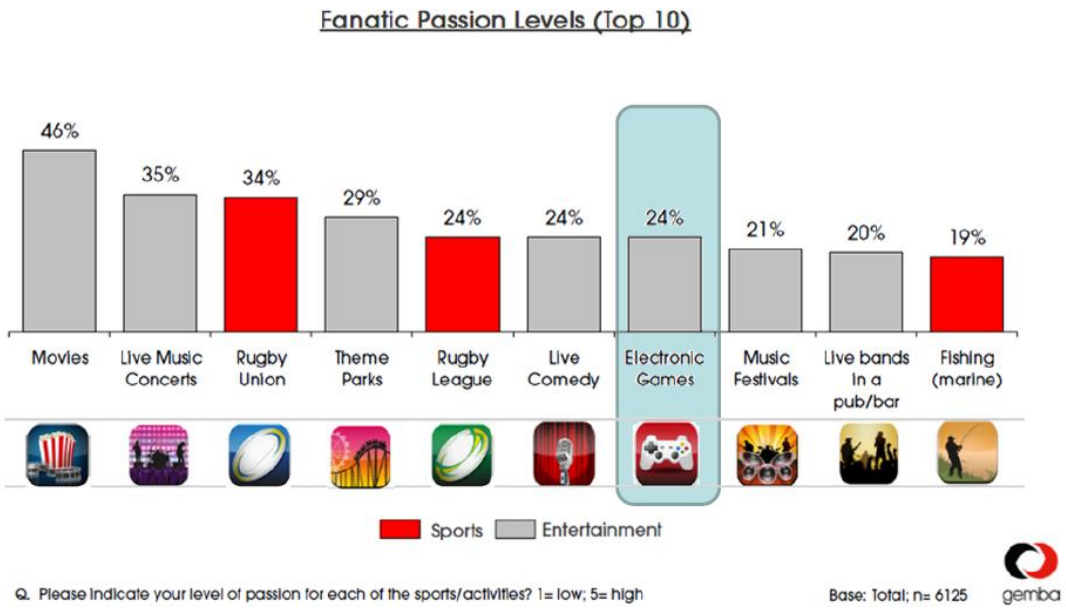

Figure 16: Stephen Knightly presentation, Fanatic Passion Levels

Consumer willingness to pay

149. The Commission engaged Roy Morgan[63] to survey consumers' interest in high speed broadband. The survey was discussed in Issues Paper 3. Amongst other things, the survey measured consumers' willingness to pay for a high speed broadband service. The survey found that while 4% of consumers said that they were willing to pay more than $20 extra per month, 37% said that they were willing to pay between $5 and $10 extra per month. A further 40% of consumers (640,000 households) said that they were willing to pay up to $5 extra per month. These results are summarised in Figure 17 below.

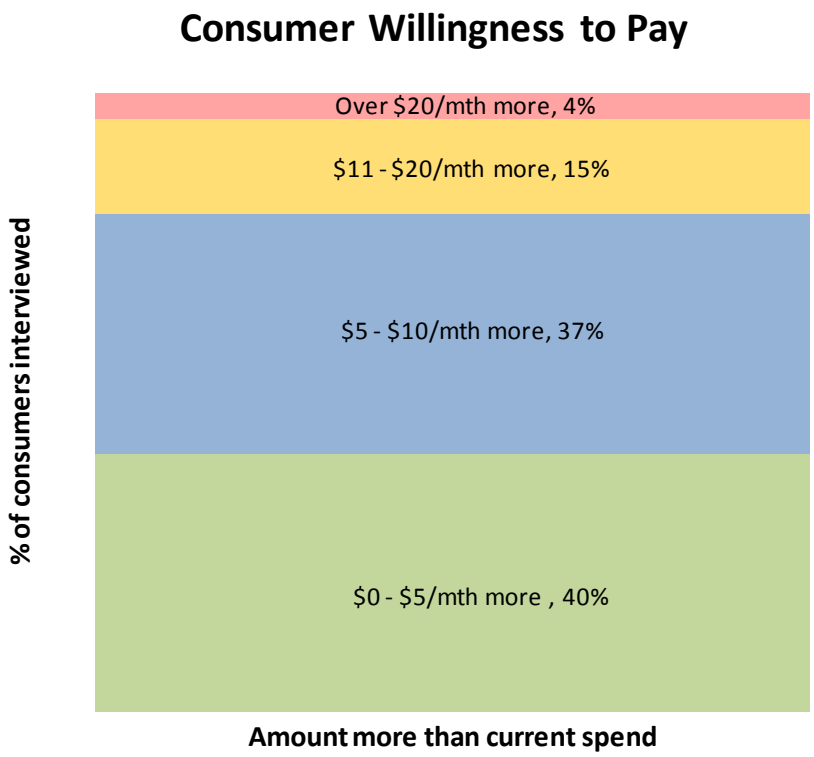

Figure 17: Additional amount consumers are willing to pay for high speed broadband, (Source: Roy Morgan consumer survey 2011)

150. The Issues Paper caveated these survey results, noting that the results from research like this may be somewhat limited when respondents are asked to evaluate a product that has not been introduced (that is, a concept or abstraction). Accordingly, the results from this survey are likely to be only indicative, at best. This point was made a number of times at the Conference.

63 http://www.comcom.govt.nz/assets/Telecommunications/Studies/UFB-Demand-Side/Roy-Morgan-Consumer-Behaviour-in-NZ-Telecommunications-Market-Presentation-High-Speed-Broadband-Conference-Feb-2012.ppt

Small and Medium Enterprises

151. Small and medium-sized enterprises (SMEs) are defined as organisations with fewer than 20 employees. The Ministry of Economic Development and Statistics New Zealand estimate that SMEs account for around 40% of New Zealand's total output and employ approximately 31% of the New Zealand workforce. There are 456,929 SMEs – 97% of businesses in New Zealand.

152. SMEs include a very diverse range of organisations, with different ICT needs. Accordingly, the demand for high speed broadband, including the content and services used on this infrastructure, will vary widely between SMEs. For instance, a small graphic design firm may be interested in purchasing high bandwidth connectivity. On the other hand, an owner-operated trade enterprise (eg, a plumber or electrician) is likely to have significantly lower demand.

153. Issues Paper 3 presented a summary of the results of the Commission's Nielsen survey[64] of SMEs' interest in high speed broadband. The survey found that the majority of SMEs were satisfied that current broadband services give them the ability to use the applications they want to use (76% very satisfied or satisfied) and with reliability (70%). Even so, around a quarter were dissatisfied with price, download/upload time and mobile broadband coverage.

154. SME discussions at the Conference were largely consistent with the survey findings. SME presenters commented that SMEs generally have limited human resources and no specialised IT resource. Their primary requirements for broadband are ease-of-use and reliability. For many SMEs, bandwidth is a lower priority. Stuart Birch,[65] from Education Personnel, a SME that uses video conferencing to deliver its service to international customers, commented that its requirements include a service that is easy-to-use, fast and reliable. Local fast broadband is an important component of the solution, but the SME's requirements also included reliable international transit and local country bandwidth.

SME willingness to pay

155. The Nielsen survey also measured SMEs' willingness to pay for high speed broadband. The survey tied the question on willingness to pay to concrete examples of the types of services that consumers could use high speed broadband for, such as high definition telepresence and high definition security.

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64 http://www.comcom.govt.nz/assets/Telecommunications/Studies/UFB-Demand-Side/Feedback-and-additional-info/Nielsen-SME-Survey-Results-Presentation-High-Speed-Broadband-Conference-February-2012.pdf

65 http://youtu.be/Ia98HcsPGbI

156. The survey found that 10% of SMEs said that they would be willing to pay greater than 20% more for high speed broadband. Overall, 26% of SMEs said they would be willing to pay more than an additional 10% of their current bill for faster connectivity. A further 34% of SMEs said they would pay up to 10% more, while 35% said that they would pay no more than their current charges. These results are summarised in Figure 18 below.

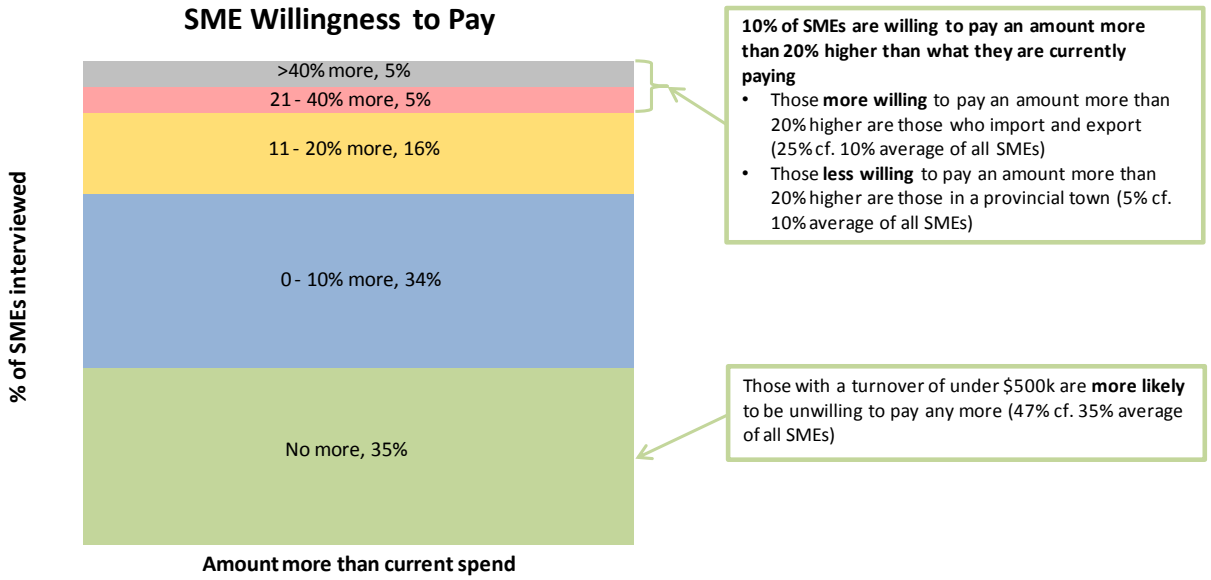

Figure 18: Additional percentage SMEs are willing to pay for high speed broadband, (Source: Nielsen SME survey 2011)

157. In conclusion, the cost of high speed broadband services is likely to be a significant issue for many SMEs. The market is likely to recognise this cost sensitivity in service offerings. We expect that competition between retail service providers should result in broadband packages that meet the needs of SMEs.

Rural broadband

158. The presentations[66] at the Conference on rural broadband issues stressed the role broadband can play in connecting both rural businesses and communities with the rest of New Zealand and the world. This is consistent with the government's objective for its Rural Broadband Initiative (RBI): '…to help rural communities, schools, and health services as well as rural businesses [through significantly better broadband services]'.

159. The government's RBI has two phases:

Phase One

- Provide community broadband coverage to 86% of rural homes and businesses. This coverage will be delivered using a combination of 'fixed' wireless, with a minimum peak bandwidth of 5Mbps, and fibre-to-the-node (FTTN), initially providing ADSL2+ speeds
- Build over 3,100 km of fibre to 744 rural schools, 1224 rural cabinets and 6 rural hospitals. This fibre can be accessed at points along its length, providing flexibility to extend the reach of fibre services in the future.

Phase Two

- Extend the reach of RBI to address priority users that were not covered by the original UFB and RBI initiatives. These users could not be identified until uncertainty over UFB boundaries (which were the subject of commercial negotiations) had been resolved. RBI Phase Two covers the more populous rural areas, such as larger rural towns. In Phase Two, fibre will be provided to 193 additional schools, 37 rural hospitals, 10 integrated family health centres and 183 rural libraries.

160. In addition to these two phases, the RBI also includes the Remote Schools Broadband Initiative (RSBI). Under this initiative, broadband services will be provided to New Zealand's 57 most remote schools.

161. Telecom (now Chorus, following the separation) and Vodafone (the Joint Venture Provider) were awarded the RBI contract in April 2011. Chorus is delivering the fibre part of the initiative. Vodafone is delivering the radio part of the initiative which connects communities using a fixed wireless solution.

162. Ngā Pū Waea (the National Māori Broadband Working Group) was established to provide advice to the Joint Venture Provider about Māori development opportunities associated with RBI. This advice includes issues around the coverage and connectivity to marae, wānanga, kura, kōhanga, rūnanga, and other Māori organisations.

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66 http://youtu.be/zcRAw3bS-6M

163. Although the data speeds that will available to rural consumers may be faster than current speeds in many rural areas, with the exception of the fibre-to-schools component, these speeds are lower than the Commission's definition of fast broadband.

164. The presentations at the Conference were not focussed on the speed of broadband, but rather the availability of **any form of on-line access**. For instance, Liz Evans,[67] the Rural Women New Zealand National President, noted that on-line availability and cost are major issues in rural communities. In some areas, there is still a reliance on satellite access to the internet, which is slow and expensive. A significant proportion of the Rural Women New Zealand membership is not on-line at all.

165. Potaua Biasiny-Tule,[68] Director of Digital Māori, expressed broadly similar issues for rural Māori communities. He commented that rural broadband for Māori was 'over-hyped, over-promised and under-delivered'. Despite the establishment of Ngā Pū Waea, he said that marae and papakāinga are not included adequately in current broadband initiatives.

166. Antony Royal,[69] Chair of Ngā Pū Waea, said that rural communities should focus on developing the opportunities that the RBI provides. He floated the idea that rural marae could be hubs for the rollout of broadband, analogous to the role schools are playing in the RBI.

167. Phil McKenzie,[70] from Landcorp, spoke about the opportunities that broadband provides for farms in New Zealand. He highlighted the potential to use broadband to assist in improving the efficiency of farm performance, particularly in relation to the management of livestock. He echoed the other rural speakers, noting that the key challenges for Landcorp regarding broadband are availability, speed and geographical coverage.

168. The overall message from the Conference is that many rural people and businesses consider that they are not well served by even the current generation of broadband. There is a risk that rural communities and businesses could be left behind, as New Zealand moves forward with high speed broadband services, this is of particular concern, given their significance to the economy. This issue has been recognised in the RBI and in the five point government action plan for faster broadband (see Figure 20).

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67 http://youtu.be/SCzyLJPwdM4
68 http://youtu.be/L5gNdmQwxdc
69 http://youtu.be/J0KQULwIejM
70 http://youtu.be/SOTdP8fkIP8

169. The Commission is also aware of an initiative by Vodafone NZ, the 'Community Cell Site Request Scheme'[71] aimed at improving mobile coverage in rural communities that are outside the scope of the RBI. Vodafone recently announced that two rural communities North and South Catlins in the South Island, and Waihau Bay in the East Cape will have cell sites built in 2012.

170. Internet New Zealand, in its submission to the draft report, commented that, by using the 50/50 Mbps high speed broadband definition the Commission has ignored any consideration related to rural broadband uptake. As commented above, rural users have the same appetite for fast broadband as urban users, but have a more fundamental need, which is to be connected to basic broadband. They are concerned that they could be left behind as New Zealand moves forward with high speed broadband services. This issue has been recognised in the RBI and in the five point government action plan for faster broadband.

[71] http://www.vodafone.co.nz/smart-network/community-cell-site/

e-health and e-education

171. e-health and e-education issues were discussed in Issues Paper 2,[72] written for the Commerce Commission by Ernie Newman.

172. The Commission has not received feedback on the e-health issues raised in the issues paper. We have received some feedback on the e-education issues.

173. The Conference had an e-health and e-education panel discussion. In addition Dr Kate Cornick,[73] from the Australian Institute for a Broadband-Enabled Society (IBES), spoke about how high speed broadband can provide e-health and e-education opportunities.

174. Some of the opportunities are related to e-learning, with classrooms not confined to the physical 'four walls' of a school room. For example, children have the opportunity to telecommute with other children around the world using video-conferencing and interacting using on-line tools. e-learning also enables children to share teaching resources or attend school from home when they are unable to physically attend classes.

175. Dr Cornick also discussed the following e-health examples:

- video consultations. The Australian Medicare benefits scheme has been extended to cover telehealth (the delivery of health-related services and information via telecommunications technologies). The scheme covers GP's teleconsultation[74] charges and financial support for the purchase of associated equipment and online training
- 3D telemedicine. [75]
- remote monitoring.

176. Dr Cornick spoke about broadband saving lives; for example 72% of hospitals in Australia are unable to treat acute strokes as well as metropolitan hospitals, by using teleconsultations with specialists teleconsulting into a regional hospital, eight lives were saved over the study period.

177. Aged care was mentioned as the most obvious place where technology can play an important role. IBES is focusing on the well being of elderly people, with trials enabling them to communicate and connect with other people, or to take up 'serious gaming'

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72 http://www.comcom.govt.nz/assets/Telecommunications/Studies/UFB-Demand-Side/Issues-paper-2-e-health-and-e-education-January-2012.pdf

73 http://youtu.be/MUlul2aeuQ4

74 Teleconsultation is a 'virtual' consultation between a medical professional and patient.

75 3D telemedicine is the use of three dimensional video- conferencing equipment (which enables simultaneous verbal and visual communication) with patients, clinicians, management and educators/supervisors located at some geographic distance from each other.

aimed at rehabilitation and exercise. Kate commented that games and apps need to be designed for the aged care sector, as uptake would be more forthcoming this way.

178. Other key points mentioned were:

- Literacy: if people don't know what broadband can do for them, how do you tell them so that they can innovate in their own areas of the economy?
- Cost: who pays for the broadband connection? For example if we expect university students to stream lessons online, they will see 10-20 hours of lessons online per week, and download a vast amount of data. The cost of this large amount of data could be considerable for students. This issue of affordability is also relevant to the health care sector, where the people who stand to benefit the most are often the people who don't have the opportunity because of financial or literacy constraints.

179. In the education part of the panel discussion Kate Shevland,[76] principal of Orewa College (a co-ed school with 2,000 pupils) commented on the college's experience in bringing devices in the classroom (see Figure 19 below). She noted that the problem of 'who pays' is a major concern for schools, in terms of both the cost and possible subsidy of devices and the cost of UFB services. She also commented that there is considerable administrative burden and costs associated with implementing e-learning programmes.

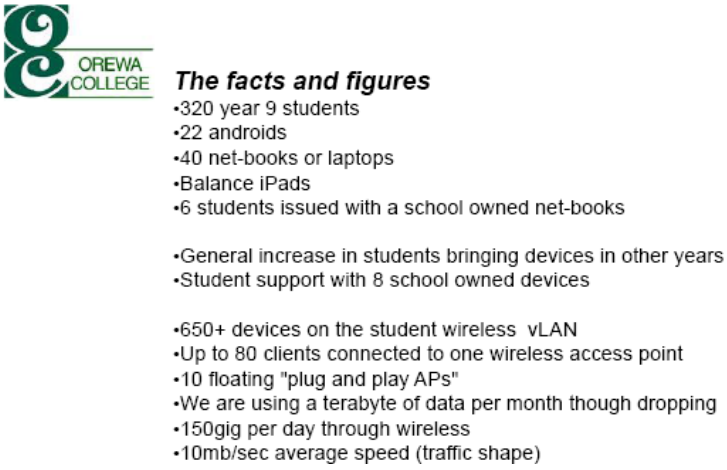


Figure 19: Orewa College e-learning programme

180. In the health panel discussion Richard Medlicott[77] commented that there are already initiatives on the West Coast where doctors and patients are having remote clinics, using expertise from specialists in Christchurch. Also hospitals use video conferencing facilities for multidisciplinary team meetings. Richard referred to video consultations being the 'killer patient app', in terms of freeing his patients' time as well as his own.

[76] http://youtu.be/f5IgEmvEH14
[77] http://youtu.be/J78r3dGM7jE

He noted that the costs of these initiatives need to be considered, both in terms of charging for video consultations and setting up the equipment.

181. MED will be looking at e-health and e-education issues as part of the five point government action plan for faster broadband.[78]

[78] http://www.med.govt.nz/sectors-industries/technology-communication/fast-broadband/pdf-and-documents-library/Five-point-Government-Action-Plan-Faster-Broadband.pdf

FIVE POINT GOVERNMENT ACTION PLAN for faster broadband

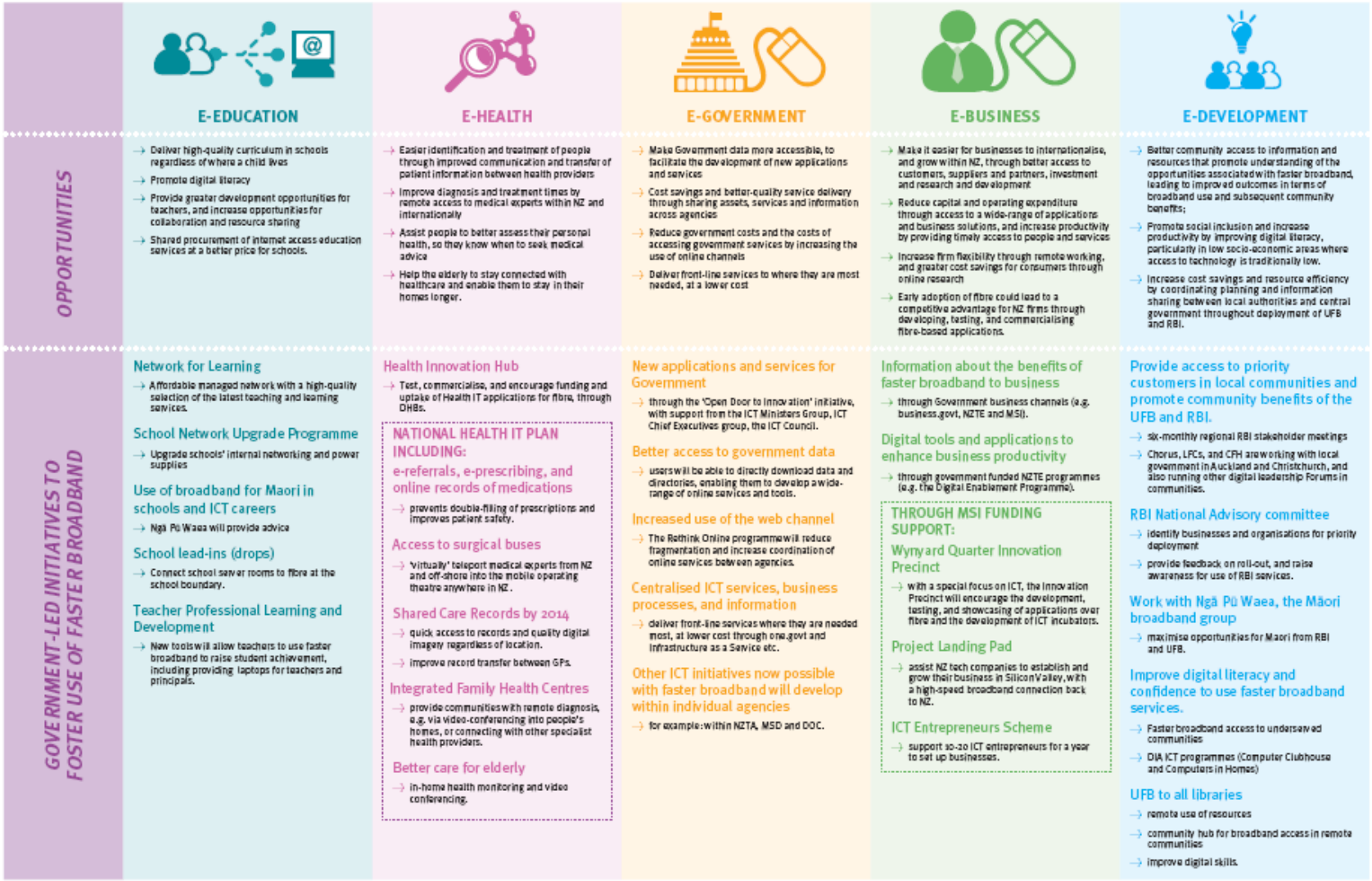
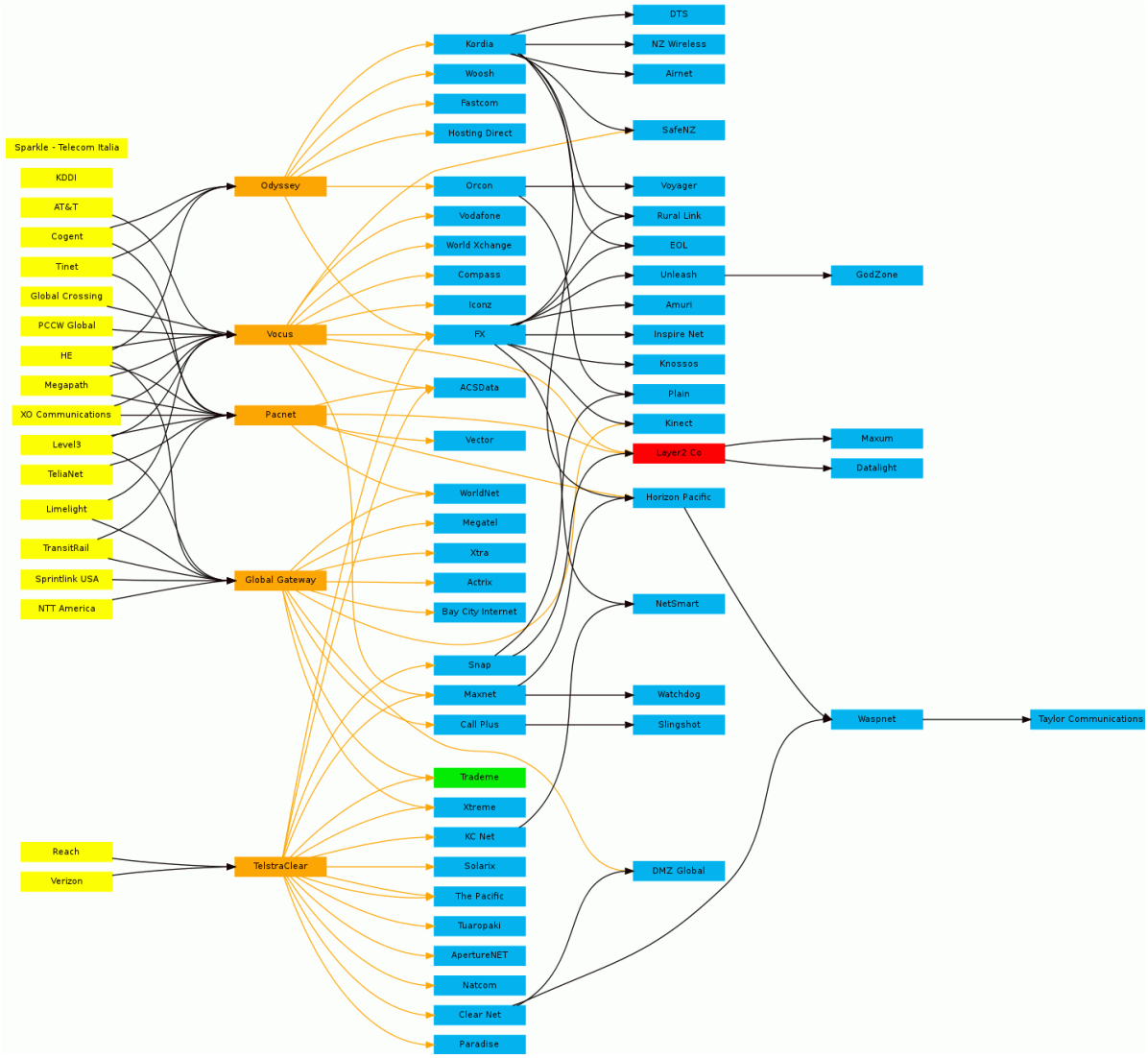


Figure 20: Five point government action plan for faster broadband (Source: MED)

Attachment 1: Standard residential connections details

Chorus	Ultrafast Fibre	Enable networks	Northpower Fibre
Fibre lead-in from the Fibre Access Point to an ETP at the clos est convenient point on the End User Premises, as agreed with End User, where the Fibre Lead-in utilises no more than:	Fibre lead-in from the Fibre Access Point to an ETP at the closest convenient point on the End User Premises, as agreed with End User, where the Fibre Lead -in utilises no more than:	Fibre lead-in from the Fibre Access Point to an ETP at the closest convenient point on the End User Premises, as agreed with End User, where the Fibre Lead -in utilises no more than:	Fibre lead-in from the Fibre Access Point to an ETP at the closest convenient point on the End User Premises, as agreed with End User, where the Fibre Lead -in utilises no more than:
100m of approved conduit or open trench (already in place at the time of installation) or	100m of approved conduit or open trench (already in place at the time of installation) or	100m of approved conduit or open trench (already in place at the time of installation) or	100m of approved conduit or open trench (already in place at the time of installation) or
a **single** span of aerial drop lead (available only in areas where there is overhead deployment) or	a **double** span of aerial drop lead on existing poles from the fibre access point (this will include road crossings) (available only in areas where there is overhead deployment) or	a **double** span of aerial drop lead on existing poles from the fibre access point (this will include road crossings) (available only in areas where there is overhead deployment) or	a **double** span of aerial drop lead on existing poles from the fibre access point (this will include road crossings) (available only in areas where there is overhead deployment) or
15m of buried lead-in (available only in areas where there is underground deployment); and	**30m** of buried lead-in (available only in areas where there is underground deployment); and	**30m** of buried lead-in (available only in areas where there is underground deployment); and	**30m** of buried lead-in (available only in areas where there is underground deployment); and
An extension of the Fibre Lead-in up to **5m** radius from the ETP to a suitable mounted SC/APC connector at a secure location inside the End User Premises; or if there is an OFDF beyond the ETP, a splice or LCA connector on the OFDF	An extension of the Fibre Lead -in up to **10m** radius from the ETP to a suitable mounted SC/APC connector at a secure location inside the End User Premises or if there is an OFDF beyond the ETP, a splice or LCA connector on the OFDF	An extension of the Fibre Lead -in up to **10m** radius from the ETP to a suitable mounted SC/APC connector at a secure location inside the End User Premises or if there is an OFDF beyond the ETP, a splice or LCA connector on the OFDF	An extension of the Fibre Lead -in up to **10m** radius from the ETP to a suitable mounted SC/APC connector at a secure location inside the End User Premises or if there is an OFDF beyond the ETP, a splice or LCA connector on the OFDF

Attachment 2: Map of New Zealand international transit arrangements[79]



[79] This map is reproduced from http://www.ispmap.co.nz/

Attachment 3: IP interconnection in New Zealand

182. In June 2008, the Telecommunication Carrier's Forum (TCF) established the IP Interconnection working party (IPIWP) to provide a forum for Telecom to consult with industry on IP interconnection issues (as part of its Operational Separation Undertakings), and to develop an industry code of practice for IP Interconnection

183. In 2010 the scope of the IPIWP was revised to cover three key areas of interconnection of VOIP only:

- commercial principles
- technical standards
- technical trial and/or pilot.

184. To date, the IPIWP has focused on a trial using 'Minimum Technical Standards' required to pass IP voice calls. The minimum standard specifies interconnection of voice converted to ITU-T G.711 standard for interconnection (PSTN standard), with all other options to be negotiated on a bi-lateral basis.

185. Due to a perceived lack of value in trialling, most existing VoIP providers have pulled out of the process, citing resource issues and a view that the trial results will be irrelevant by the time there is significant migration of PSTN customers to IP.[80]

Next steps for IP interconnection

186. In the longer term, it is likely that mainstream voice services will evolve and diverge from the PSTN service description. Changes may include:

- no requirement for conventional telephone numbers/dialling
- the integration of video, messaging and other information (such as location) into the call
- higher or lower quality/price options under user control.

IP service interconnection to support innovation and the evolution of future IP services is outside the scope of current commercial or standardised IP interconnection schemes.

[80] There is currently no forecast for this migration except for a general understanding that the PSTN platform is nearing the end of its viable lifetime, and that migration will ultimately be required.

Glossary

Term	Definition
3G	Third Generation. A term commonly used to describe the third generation of technology used in a specific application or industry. In cellular telecommunications, third generation systems use wideband digital radio technology as compared to second generation narrowband digital radio.
4G	Defined by the International Telecommunications Union (ITU) as mobile systems with new capabilities that go beyond those of IMT-2000 (3G). Also referred to as 'IMT-Advanced'. Such systems will provide access to a wide range of telecommunication services (including advanced mobile services), supported by mobile and fixed networks that are increasingly packet-based. The ITU has determined that 'LTE-Advanced' and 'WirelessMAN-Advanced' should be accorded the official designation of IMT-Advanced.
Byte/ bits relationship	1 byte (B) = 8 bits (b).
Bitstream	A stream of compressed data.
Caching	The storage of data closer to the end user, for use at a later time.
CPE	Customer Premises Equipment. CPE is all telecommunications terminal equipment located on the customer's premises, including telephones, private branch exchanges (PBXs) and data terminals.
Data cap	An Internet subscription data cap is a method employed by ISPs to limit the volume of data downloaded and/or uploaded by subscribers during a fixed period, normally a month. Once a fixed data cap has been reached, lower speed or extra access charges may apply. Also referred to as a data allowance.
Fixed wireless	Fixed wireless is the use of wireless technology to provide voice, data, or video service to fixed locations. Fixed wireless services include wireless local loop (WLL), point-to-point microwave, wireless broadband. Fixed wireless systems may replace or bypass wired telephone services, high-speed telephone communication links, and cable television systems.
FTTP	Fibre to the premise is a distribution system that uses fibre optic cable to connect telephone networks to nodes that are located within businesses and homes. FTTP is also known as fibre to the home (FTTH) and fibre to the building (FTTB).
GB	A gigabyte is one billion bytes of data. When a gigabyte is used to identify the amount of data storage space (such as computer memory or a hard disk), it commonly refers to 1,073,741,824 bytes (2^{30}) of information.

Term	Definition
GSM	Global system for mobile communication (GSM) is a wide area wireless communications system that uses digital radio transmission to provide voice, data, and multimedia communication services. A GSM system coordinates the communication between mobile telephones (mobile stations), base stations (cell sites), and switching systems.
HD	High definition. HD video is the resolution of enhanced analogue video and digital video. The resolutions of HD range from 480/60p-480 pixels (vertical) by 728 pixels (horizontal) with 60 progressive fields (60p) per second to 1080/60p-1080 pixels (vertical) by 1920 pixels (horizontal) with 60 progressive fields per second.
IEEE 802.11n	An IEEE 802.11 wireless network standard that increases transmission speeds to 300 Mbps and beyond. Because 802.11n works in both the 2.4 GHz and 5 GHz frequency bands, it is compatible with legacy 11a and 11b/g users.
IP	Internet protocol. IP is low-level network protocol that is used for the addressing and routing of packets through data networks. IP is the common language of the Internet. The Internet protocol only has routing information and no data confirmation rules. To ensure reliable data transfer using Internet protocols, higher level protocols such as TCP are used. IP is specified in RFC-791 (http://www.ietf.org/rfc/rfc0791.txt?number=791).
IPTV	Internet protocol television. IPTV is the process of delivering video and/or audio services over Internet protocol (IP) networks. These IP networks initiate, process, and receive voice or multimedia communications using Internet protocol. These IP systems may be public IP systems (e.g. the Internet), private data systems (e.g. LAN based), or a hybrid of public and private systems.
ISP	Internet service provider. An ISP is a company that receives and converts (formats) information to and from Internet connections to Internet end users. An ISP purchases a high-speed link to the Internet and divides up the data transmission to allow many more users to connect to the Internet.
Kbps	Kilobit per second. kbps is a measure of data transmission equal to one thousand bits per second.
Latency	Latency is the amount of time delay between the initiation of a service request for data transmission or when data is initially received for retransmission to the time when the data transmission service request is granted or when the retransmission of data begins.
Lead-in	The lead-in cable is the cable from the fibre jointing pit to the customer's premises.

Term	Definition
LFC	Local Fibre Company.
LTE	Long term evolution, a 4th generation mobile technology. Relative to 3rd generation wireless, the LTE specification enables 100 Mbps+ data transmission rates, increased system capacity and shorter transmission latency times.
Massively multiplayer online gaming	A massively multiplayer online game (MMO or MMOG) is a multiplayer video game which is capable of supporting hundreds or thousands of players simultaneously.
MB	Megabyte. A megabyte is one million bytes of data. When megabyte is used to identify the amount of data storage space (such as computer memory or a hard disk), a megabyte commonly refers to 1,048,576 bytes (2^{20}) of information.
Mbps	Megabit per second. A measurement of digital bandwidth where 1 Mbps =1 million bits per second (1,000,000 bits per second). The word 'mega' is sometimes used to describe the nearest integral power of 2, namely 1,048,567 (2^{20}).
OFDF	Optical fibre distribution frame. This is a passive device which terminates cables, allowing arbitrary interconnections to be made.
OTT	OTT is defined as video delivered by content providers over third party broadband networks to a range of end-user devices.
P2P	Peer to peer is the exchange of information between devices or systems that are capable of operating as both a server (provider) of information and a client (consumer) of information.
POTS	Plain old telephone service.
PSTN	Public Switched Telephone Network.
RBI	Rural broadband initiative.
SC/APC connector	An optical fibre plug.
SD	Standard definition. SD video is the resolution of traditional analogue video. Standard definition for PAL/SECAM is 576 lines with 50 interlaced fields (50i) per second.
SME	Small and medium business. A SME business is a business with 19 or fewer employees which also meet at least one of the following criteria: • annual expenses or sales subject to GST of more than $30,000 • 12-month rolling mean employee count of greater than three • part of a group of enterprises • registered for GST and involved in agriculture or forestry • over $40,000 of income recorded in the IR10 annual tax return

Term	Definition
	(this includes some units in residential property leasing and rental).
UBA	The regulated unbundled bitstream access service.
UCLL	The regulated unbundled copper local loop service.
UFB	Ultra-fast broadband.
VOIP	Voice Over Internet Protocol (VoIP) is a process of sending voice telephone signals over the Internet or other data network. If the telephone signal is in analogue form (voice or fax) the signal is first converted to a digital form. Packet routing information is then added to the digital signal so it can be routed through the Internet or data network.