
NEW ZEALAND INSTITUTE FOR THE STUDY
OF COMPETITION AND REGULATION INC.

# The State of e-New Zealand:
## 12 Months On

By Bronwyn Howell and Lisa Marriott
November 2001

***http://www.iscr.org.nz/research/***

New Zealand Institute for the Study of Competition and Regulation Inc.
PO Box 600
Wellington, New Zealand

Phone 64 4 463 5563
Fax 64 4 463 5566
Email bronwyn.howell@vuw.ac.nz

***Acknowledgements:*** *This paper updates* ***The State of e-New Zealand****, produced for the New Zealand Ministry of Economic Development's E-Commerce Strategy in November 2000. The authors acknowledge the helpful comments provided by Lewis Evan, and the editorial assistance of Melinda Malloch.*

## Contents

## List of Figures

## List of Tables

## Executive Summary

In *The State of e-New Zealand: 12 Months On*, we revisit the measures of New Zealand's preparedness to utilise and capitalise upon the economic and social benefits promised by the uses of electronic infrastructures addressed in our November 2000 paper *The State of e-New Zealand*.

We acknowledge the considerable difficulties in measuring and assessing the complete range of benefits arising from the use of these technologies, given that the ultimate effects of their use are hard to separate out from other factors. Hence, we once again test our hypothesis: that if New Zealand is performing at the international forefront of infrastructure indicators, then there is every reason to believe that, in the absence of any evidence to the contrary, it is performing well also in those areas where no measurable or reliable indicators of performance are available.

Once more, we find support for our hypothesis. New Zealand remained at the forefront of practically all publicly-available electronic infrastructure indicators throughout 2000 and into 2001. In particular, the comparative advantage identified over Australia in the 2000 report is largely maintained. Specifically:

- Strong growth in the use of mobile telephones continues, and outstrips that of Australia, driven in large part by the burgeoning use of prepaid mobile telephones in the domestic cellphone market;
- Continuation of an unmetered call charging policy, fundamental to the uptake of 'always-on' Internet access;
- Domestic telephone charges for the OECD basket of services for fixed line access lower than the OECD average;
- Extremely high levels of computer ownership by businesses (in excess of 90%)
- 7$^{th}$ place in the OECD in the number of Internet hosts per inhabitant maintained (Australia 9$^{th}$);
- 5$^{th}$ in the world in the percentage of the population accessing the Internet from any location (higher proportions access from locations other than home than in Australia, indicating that PC ownership is not necessarily a pre-requisite for Internet access);
- Internationally competitive Internet Service Provider (ISP) charges – between 38% and 75% lower than comparable charges in Australia;
- 5$^{th}$ in the OECD in the number of secure servers per inhabitant (down one place since 2000, but only just overtaken by Canada);
- More websites and domain names registered per inhabitant than Australia, as well as a faster growth rate in this statistic, indicating a widening of the gap;

- Domain name registration fees amongst the lowest in the OECD, and 20% lower than those of Australia;
- Lower levels of high speed Internet access (cable and DSL) than most OECD countries. However this may be due to a combination of lower volume average information transfers, and a combination of low ISP prices, unmetered telephone charges, 'all you can eat' dial-up Internet access pricing versus per megabyte pricing for DSL, and the types of applications for which information is used biasing against uptake of these services;
- High levels of uptake of other information-transferring technologies such as satellite TV and game consoles;
- Continued leadership over Australia in the use of electronic banking technologies: New Zealanders undertake twice as many EFTPOS transactions a year as their trans-Tasman counterparts, who use ATMs, and hence cash, more. This indicates greater sophistication and comfort by New Zealanders in the substitution of information for cash;
- Continuing evidence that Internet uptake, and use of email in particular, is higher and occurring earlier in areas where the costs of communication (both for business and personal purposes) are higher – the South Island, and Otago, Canterbury, Nelson/Marlborough and Southland in particular.

The extension of our analysis to include measures of human capital and infrastructure investment, not hitherto considered, enriches our understanding of New Zealand's position. Growth in uptake of physical infrastructures appears to be also paralleled by growth in investment in human capital relative to the utilisation of these physical infrastructures. The correlated movement of these figures further emphasises the potential New Zealand has to reap benefits from the application of electronic technologies.

Together, this range of statistics contributes to a consistent story. High connectivity to infrastructures is carried through to high levels of uptake of applications utilising these infrastructures. Commensurate growth in investment in human, information and communications technologies parallels growth in both connectivity to and use of infrastructures, indicating the platform from which economic and social benefits can be yielded is strong.

Thus, we contend, there is growing evidence that New Zealand has maintained, at least up until the date of the statistics presenter here, its position at the international forefront of development and use of applications built upon the infrastructure platform, and consequently at the forefront of those nations standing to gain benefits from the use of infrastructures and technologies to generate economic and social benefits. However, our warnings of 12 months ago remain: continued world leadership is dependent upon the continuation of a relevant and conducive policy environment that is flexible enough to embrace the demands of changing technologies

and uses of information. New Zealand's current world-leading position has been achieved over the past decade despite the disadvantages of small scale, geographic isolation and low population density, and has been nurtured by such a policy environment. Such flexibility is vital to ensuring that New Zealand can continue to build upon this world-leading position. Any changes to the policy environment that has been fundamental to nurturing this position must be carefully analysed for their effect upon this world leadership.

## Introduction

Twelve months ago, on November 1 2000, Lewis Evans and Bronwyn Howell[1] of ISCR presented a paper on *The State of e-New Zealand*[2] to the Ministry of Economic Development's e-Commerce Summit at the Aotea Centre in Auckland. Using a variety of publicly-available data, we tested the hypothesis that, unless there were any indicators to the contrary, New Zealand's level of uptake of telecommunications and communications infrastructures could be taken as an indicator of the level of uptake of electronic commerce applications, and by extension, an indicator of the extent of the benefits accruing from such use. Indeed, the statistics collected for that analysis showed that not only did New Zealand have a high level of uptake by international standards of the telecommunications infrastructures that underpin successful electronic commerce, but also that there was a consistent picture across all but one of these indicators that New Zealand was performing significantly better than its most relevant benchmark economy – Australia. Furthermore, plausible explanations could be found for the one aberrant indicator – secure servers – in the pattern of New Zealand's international trade.

It is timely that we now revisit this analysis, to determine if New Zealand has been able to maintain and capitalise upon the advantages promised by the analysis of twelve months ago[3]. The purpose of this paper is to examine progress in the measures used for the first paper, and to add further statistics that have become available in the interim, in order to reassess the country's progress, both absolute and comparative, since the first paper was written. In particular, building upon the framework developed for the *Scoping Report: e-Commerce Performance Measurement for New Zealand*[4], prepared in August for the Ministry of Economic Development, we examine in more detail the elements of connectivity to and uptake of the underpinning computer and telecommunications infrastructures, as core measures of both accessibility and utilisation of the fundamental components underpinning electronic commerce – the creation, transmission, storage, utilisation and communication of information.

The results, we find, continue to reinforce New Zealand's world leadership. Not only is New Zealand still amongst the world leaders in all Internet-related indicators (Internet Hosts, Secure

---

[1] The paper on which this presentation was based was co-authored by Lewis Evans and Bronwyn Howell with David Boles de Boer. David Boles de Boer did not participate in the presentation to the e-Commerce Summit.

[2] Boles de Boer, David; Lewis Evans and Bronwyn Howell. 2000. *The State of e-New Zealand.* Wellington: ISCR http://www.iscr.org.nz/research/

[3] The 2000 report (p 5) stated "The current state of E-New Zealand serves as a yardstick against which future performance and policy outcomes can be measured and evaluated".

[4] Howell, Bronwyn. 2001. *Scoping Report: e-Commerce Performance Measurement for New Zealand.* Wellington: ISCR. http://www.iscr.org.nz/research/

Servers, Domain Name Registrations etc.), it continues to lead Australia in most indicators. In particular, this study reveals some significant pricing and productivity advantages for New Zealand in the core telecommunications and Internet Service Provider (ISP) products that form the backbone of information exchange in a 'wired' and 'wireless' economy. These further reinforce the timing and uptake advantages New Zealand was discovered to enjoy over Australia in the 2000 analysis.

The picture continues to get clearer. New Zealand is well placed to participate in and benefit from the international electronic economy. There is significant evidence of demand-driven uptake of specific technologies on the basis of business need. Most businesses are using email routinely, and over 60% have a website. While there is yet little firm data on actual usage of applications such as supply chain management and B2B exchanges, the level of comfort apparent in the use of electronic technologies for communicating fundamental business information at a level of sophistication compatible with the use and value of that information is reassuring, as it is perhaps a better indicator of business usage and relevance than dollars of sales exchanged (Howell (2001)).

New Zealand is performing at the international forefront of infrastructure indicators, then there every reason to believe that, in the absence of any evidence to the contrary, it is performing equally well in those areas where no measurable or reliable indicators of performance are available. Our analyses confirm the assessment of 12 months ago: that New Zealand continued to progress throughout 2000 in its preparedness and uptake of new infrastructures and technologies. New Zealand continues to be a world leader in Internet participation, and uptake of electronic banking continues to be strong. In particular, the advantage held over Australia in both of these areas appears to have been maintained New Zealand has already accrued benefits from this connectivity, capability and uptake, and while it is difficult to unequivocally or empirically assess the impact these have had on economic and social performance indicators, world leadership in the use of infrastructures and applications implies world leading accrual of the economic and social benefits that these infrastructures and applications offer.

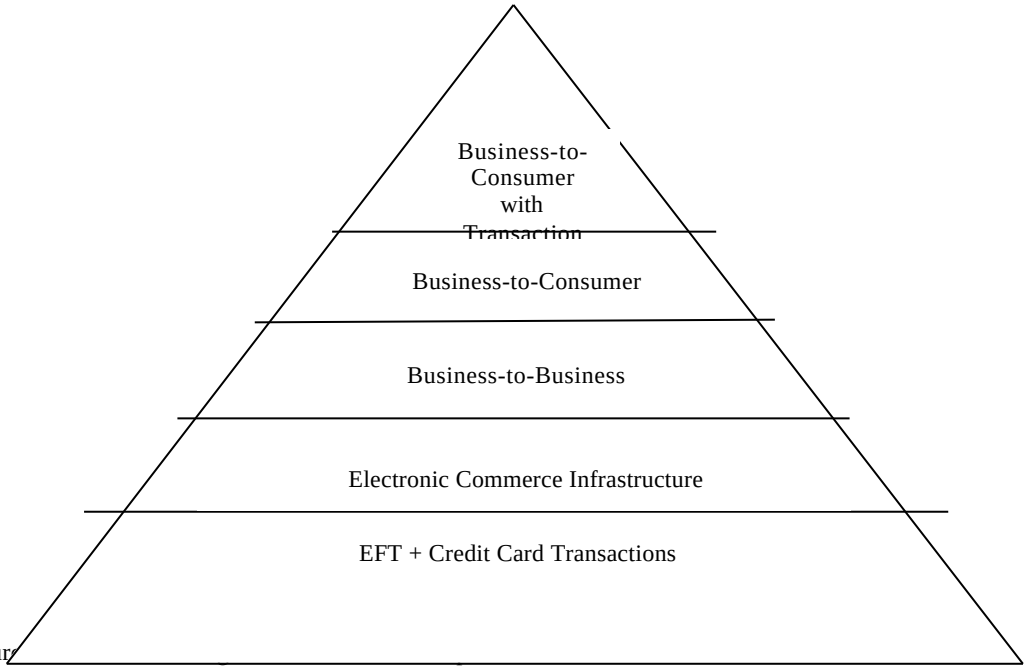
## Methodology

In *The State of e-New Zealand*, we took as our basis for analysis the OECD definition of electronic commerce:

> *"Electronic commerce refers generally to all forms of transactions relating to commercial activities*[5]*, including both organisations and individuals, that are based upon the processing and transmission of digitised data, including text, sound and visual images."*[6]

This definition presumes that the electronic infrastructures underpinning electronic transactions are fundamental components of the ability of any economy to participate in electronic exchange, as illustrated in Figure 1.

**Figure 1. Typology of Electronic Commerce Definitions.**




Sour

In the *Scoping Report: E-Commerce Performance Measures for New Zealand*, we argued that the fundamental component of electronic commerce is not the technologies that underpin the exchange processes, but the actual information that these technologies facilitate the creation, storage, transmission and utilisation of. Technologies such as telephony networks and the Internet are like the pipes that carry gas or the wires that convey electricity: they are conduits that enable the exchange of information. However, the commodity that is utilised in the actual

[5] Which must involve consumers *and* producers.
[6] OECD *Measuring Electronic Commerce* p 6.

creation of value is the commodity that these conduits convey – information. Hence, while electronic commerce infrastructure utilisation gives a measure of ***Connectivity***, that is, the capacity to exchange information electronically, and to indicate who is connected with whom and therefore who is capable of exchanging, it does not provide information of what information is being exchanged, nor the purpose of its exchange. Neither do these figures indicate the ability of the entities at either end of the 'pipe' to effectively or efficiently utilise the information they transmit or receive.

We proposed that a series of other measures are required to provide a more comprehensive assessment of electronic commerce performance measurement. These included ***Capability*** measures, assessing the ability of information generators and to both create and utilise information, as well as the technologies that transmit, store and process it; ***Uptake*** measures, assessing the utilisation of processes and applications that use electronic forms of information as an input or create, process and transmit it; and ***Performance*** measures, that provide an assessment of the economic and social impacts of the utilisation of electronically created, stored, processed, and transmitted information.

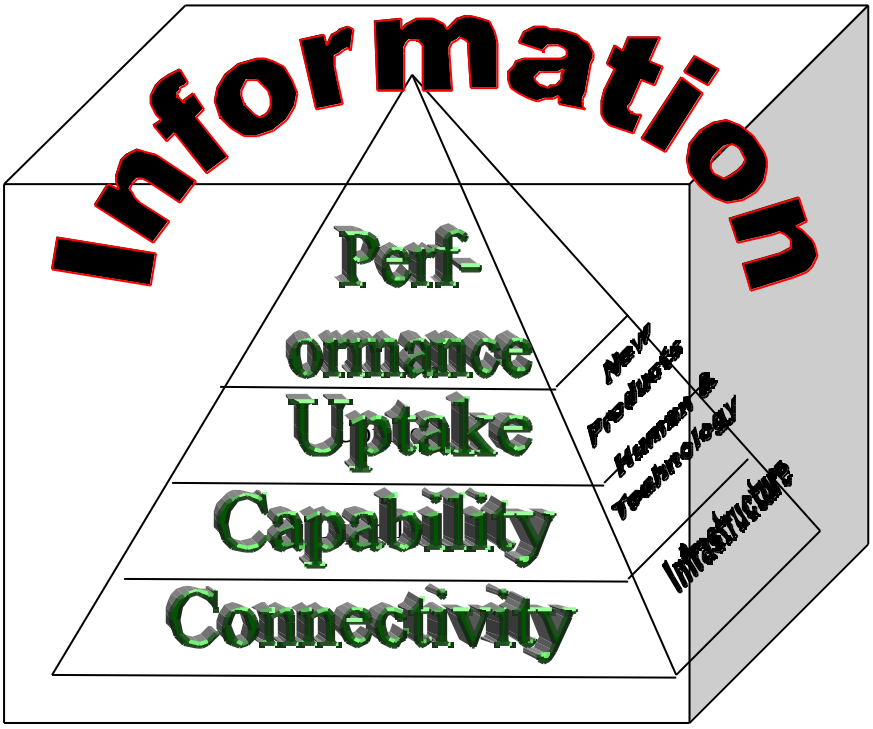
While we included elements of all of these measures in *The State of e-New Zealand*, in this updated version we classify the measures into this framework. Thus, we revise Figure 1 to a multi-dimensional framework recognising the role of information in this analysis as in Figure 2.

We use this framework to classify and analyse measures in this update. To facilitate this analysis, we include indicators of telecommunications connectivity not analysed in our previous report. This will assist in future analyses to measure the extent to which new methods of information connectivity are being substituted for old, and thereby provide additional information relevant to the sources of changes revealed in uptake and performance measures[7].

Moreover, as we also recommended in the Scoping Report, and following the precedent established in *The State of e-New Zealand*, we interpret the measures in the context of the New Zealand economy.

[7] A full justification for the use of this classification system is provided in the *Scoping Report*.

**Figure 2. Electronic Commerce Performance Measurement Framework**




Our original hypothesis still remains that, unless any evidence can be found to the contrary, world leadership by New Zealand in infrastructure measures indicates a world-leading position also in preparedness and potential to access the benefits offered by new methods of trading in an information-based economy. As in the 2000 analysis, we test this hypothesis against uptake of specific applications that utilise information in the creation of new value, such as electronic banking, email, websites and specific applications (e.g. supply chain management). We also endeavour to test whether this infrastructure leadership is also reflected in measures of social and economic performance. However, as indicated in the *Scoping Report* and Howell (2001a), the methodological foundations for linking existing social and economic performance measures such as national measures of productivity may be inadequate due to their inability to capture the economic consequences of the use of intangible and as yet unmeasured effects, of information.

This '12 Months On' report therefore comprises a section analysing each of the four dimensions of electronic commerce performance measurement. The first section analyses Connectivity measures, including telephony, Internet and broadcasting statistics. The Capability section touches on elements of human and business preparedness. The third section on Uptake analyses data on the use of specific technologies, focusing primarily upon electronic banking, email and website uptake, while the fourth section on Performance takes a brief look at firm, industry and national productivity performance in the New Zealand context. We conclude

with a final section summarising the extent to which we have determined these figures either support or refute our hypothesis that New Zealand's leadership in Connectivity and Uptake statistics implies leadership in ability to capitalise upon the benefits promised by electronic commerce.

# 1. Connectivity

"Connectivity provides linkages between individuals and firms. These linkages are achieved via a number of media, . extending from purely human . to purely electronic"[8]. While the *Scoping Report* acknowledges the importance of non-electronic methods of information communication and exchange in understanding the mechanisms via which information is transformed into value, the existence of electronic mechanisms of connectivity has enabled the development of new methods of capturing and measuring the extent to which individuals and firms share information.

Although connectivity measures do not enable any estimate of the value of the information transferred to be assessed, if it is assumed that the network properties of information result in an increase in potential value in a proportion greater than the increase in the number of individuals and firms connected, then statistics that indicate an increasing number of people are connected via new electronic technologies imply increased potential to exchange information, and therefore increased total value[9].

*The State of e-New Zealand* examined the following key indicators of performance on the Internet:

- Internet hosts per 1000 inhabitants;
- domain name registrations; and
- secure web servers per 1 million inhabitants.

. The study also examined the role played by pricing policies (in particular unmetered telephone line access) and pricing levels (amongst the lowest in the world for some classes of Internet access) in encouraging high levels of both access (connectivity) and uptake. In this update, we widen the base of connectivity indicators to include the use of computers, telecommunications and other broadcasting networks (e.g. television), as these provide channels of information connectivity that can be used in both the transfer of information and ultimately value creation or consumption of value created by others.

This study shows that New Zealand has maintained its world-leading position in all of these indicators. Further, we reveal that New Zealand continues to enjoy telephony and ISP charges that are lower than its trans-Tasman neighbour Australia in both real and Purchasing Power

[8] *Scoping Report* p 68.

Parity terms over most types of service, which bodes well for the future of telephone-based Internet access and e-commerce utilisation. We also include data and analysis of telecommunications uptake and utilisation, indicating the quantities of information exchanged via electronic means (telephone, television and Internet lines), and providing a basis for future analysis of substitution between different forms of electronic information communication.

## *1.1 Computers*

New Zealand continues to demonstrate a strong uptake of computers for both personal and business use.

### *1.1.1 Personal Use of Computers in the Home*

AC Nielsen figures (Table 1.1.1 – June 2001) show New Zealand is 7th in the world, with 58% of households having at least one Personal Computer (PC) (an increase from 42.8% in March 2000 (MED Statistics[10]). Australia is 2nd, with 65%. New Zealand is ranked 8th in the world for households with more than one PC (22%), with Australia one of four nations leading the world at 26% in this statistic.

### *1.1.2 Business Use of Computers*

Over 92% of New Zealand businesses employing more than 10 people were using computers as at March 2001 (University of Waikato Management School), compared with 95% of similar Australian businesses (NOIE Current State of Play June 2001). This figure compares with the BRC/MED September 2000 figure of 93% of all New Zealand businesses using computers, and 92% of firms with 5 or fewer employees using computers.

The variation in actual percentages revealed in these statistics is almost certainly due to sampling variations inherent in the sample-based methodologies of these reports. The key characteristic revealed by all of these surveys is that very few New Zealand businesses do not use computers in their daily operation. It is also noted that for very small businesses, while the business may not own or lease a computer, by selective outsourcing of functions the firm can utilise specialist computer functions for tasks that benefit from computerisation (e.g. accounts

---

[9] It is noted, however, in the Scoping Report that when new technologies substitute for old, there may also be loss of some network effects if the functionality of the new technology does not replicate the exchange of all information conveyed via the old technology.

[10] Ministry of Economic Development. 2001. *Statistics on Information Technology in New Zealand 2001*.

management), even though the production process does not justify the firm owning a computer (see the Florist case in the *Scoping Report* (p 109)). Hence, it is unlikely that we can realistically expect 100% of businesses to invest directly in computer technologies, especially in the small business category (fewer than 5 employees). Nonetheless, this does not prevent these businesses from benefiting from the application of computers and associated software, or from creating information-based products.

**Table 1.1.1 Households with at least one PC at Home***

***Among households with fixed line telephone(s)***

| | Number of Households with at least one PC | % of Households with Multiple PCs | % of Households with one PC |
|---|---|---|---|
| Germany | 17,078,000 | 24 | 48 |
| UK | 10,542,000 | 26 | 46 |
| South Korea | 8,782,000 | 11 | 68 |
| Italy | 8,080,000 | 14 | 41 |
| France | 7,496,000 | 15 | 34 |
| Netherlands | 4,177,000 | 25 | 62 |
| Australia | 4,481,000 | 26 | 65 |
| Brazil | 4,334,000 | 12 | 27 |
| Spain | 3,805,000 | 12 | 34 |
| Taiwan | 3,762,000 | 26 | 59 |
| Sweden | 2,601,000 | 23 | 65 |
| Argentina | 2,086,000 | 8 | 35 |
| Belgium/Luxembourg | 1,941,000 | 19 | 47 |
| Mexico | 1,886,000 | 12 | 24 |
| India | 1,612,000 | 5 | 12 |
| Switzerland | 1,605,000 | 20 | 56 |
| Austria | 1,509,000 | 21 | 52 |
| Denmark | 1,501,000 | 26 | 62 |
| Hong Kong | 1,218,000 | 22 | 59 |
| Norway | 1,055,000 | 23 | 60 |
| Israel | 920,000 | 13 | 57 |
| Finland | 896,000 | 20 | 51 |
| South Africa | 783,000 | 15 | 25 |
| New Zealand | 681,000 | 22 | 58 |
| Singapore | 596,000 | 22 | 64 |
| Ireland | 446,000 | 16 | 45 |

Source: Nielsen//NetRatings Global Internet Trends, Q2 2001

## *1.2 Telecommunications*

While computers provide a fundamental tool for the creation, storage and processing of electronic (digital) information, telecommunications networks provide the key electronic means of transmitting that information between users and/or computers. Telecommunications networks (either cable-based or wireless) are key elements of that connectivity. Hence, access to, and utilisation of, telecommunications networks is a principal determinant of connectivity in an electronic commerce environment.

International figures (sourced from the biennial publication *OECD Communications Outlook 2001*, unless stated otherwise) show New Zealand to be extremely well-placed in relation to the rest of the world to capitalise on electronic connectivity. In particular, given the disadvantages of low population density and physical distance from the rest of the world, New Zealand's telecommunications infrastructure and environment appear to be comparable with, or even outperforming similar environments such as Sweden in some instances.

### *1.2.1 Access*

New Zealand ranks slightly lower than the OECD average for telecommunication channels (that is any telecommunications channel, either fixed or mobile, including prepaid) per 100 inhabitants (81, OECD average 84.1), including both standard and mobile connections. This compares to Australia with 100.2, the US with 101.4, Ireland with 89.1 and Canada with 88.1 (Table 1.2.1). The Nordic countries have the highest number of access channels (Norway 132, Sweden 131.3, Finland 120.2) while Mexico (19.1) and Poland (34.8) have the least.

The comparison with Australia reflects both a lower number of standard access lines and fewer mobile connections. While Australia maintained a cumulative average growth rate in the number of standard access lines of 3.3% over the entire 1990s, New Zealand's growth rate started the 1990s at a similar level, but tailed off to 0.4% over the period 1995-99 (Table 1.2.2). This appears to be due to two factors: New Zealand had completely digitised its standard network by 1997 (Table 1.2.4) so it was more likely to have had a stable number of standard lines, while Australia did not achieve this target until 1999; and New Zealand has had a slower initial uptake of mobile telephony, with 32.9 subscribers per 100 inhabitants in 1999 (OECD average 32.4) as opposed to Australia's 39.5 (Table 1.2.3). However, New Zealand's cumulative average growth rate for mobile subscribers in the period 1997-1999 (58.7%) has outstripped Australia's (23.3%), indicating that the gap in access paths will soon close.

The OECD attributes the high New Zealand growth in mobile telephony to the growth of prepaid subscribers (52% of Telecom's mobile subscribers use prepaid, whereas none of Telstra's customers used this method in 1999 – OECD Table 4.17). Telecom New Zealand's proportion of prepaid mobile telephony is significantly above the OECD average of 43%, placing Telecom at a similar proportion to the UK's Vodafone, Orange and BT (58%, 57% and 50% respectively) and Sweden's Netcom (55%). The UK's growth rate in mobile connections (67.4%) parallels New Zealand's. It is also noted that the average mobile call time is significantly longer for countries where post-paid mobile services are predominant. While average minutes of use per user in the OECD are 137 (NZ 134), countries where postpaid predominates have much higher average minutes of use (Telstra (Australia) 182, Telus (Canada) 218, whole of US (5% prepaid) 200) ("average MOUs[11] in countries with faster growth in prepaid cards have been falling" OECD p 74). Cumulative average growth rates in the number of mobile connections is similarly much higher in countries where prepaid mobile telephony is extensive (UK 67.4%, Netherlands 99.6%) whereas it is slower in countries with minimal use of prepaid (e.g. US 24.4%, Japan 21.4%, Canada 27%). In New Zealand, this growth will have been significant among domestic consumers, where prepaid is popular. The extent of growth among business users, for whom post-paid is the more usual payment method, has been less.

While the high rate of growth in standard lines in Australia is attributed to the growth in second lines for Internet access (OECD p70), anecdotal evidence in New Zealand suggests that there may be some substitution of prepaid mobile telephones for second lines, as no rental charge is incurred if the prepaid mobile is retained for voice telephony, and incoming callers pay the call charge, thereby reducing the cost to the Internet user and call recipient (*The State of e-New Zealand*). Further, the OECD notes the link between the falling number of ISDN channels in New Zealand between March 2000 and June 2000, and a corresponding increase in use of DSL[12]

[11] Minutes of Use.

[12] "In New Zealand between March 2000 and June 2000, the number of ISDN channels decreased for the first time, coinciding with an increasing range of broadband offerings such as DSL". (OECD p 72).

**Table 1.2.1 Telecommunications Channels per 100 Inhabitants**

| | 1990 | 1995 | 1996 | 1997 | 1998 | 1999 | Telecommunication access paths (fixed and wireless) per 100 inhabitants[1] 1999 |
|---|---|---|---|---|---|---|---|
| Australia | 45.6 | 52.3 | 53.0 | 54.3 | 56.1 | 60.7 | 100.3 |
| Austria | 41.8 | 46.6 | 48.4 | 49.2 | 49.5 | 47.7 | 99.8 |
| Belgium | 39.3 | 46.1 | 47.3 | 48.8 | 49.6 | 50.2 | 51.3 |
| Canada | 58.2 | 59.0 | 60.8 | 62.2 | 63.8 | 65.5 | 68.1 |
| Czech Republic | 15.7 | 23.2 | 27.3 | 31.9 | 36.7 | 37.5 | 56.4 |
| Denmark | 56.6 | 61.1 | 61.8 | 63.2 | 65.1 | 68.4 | 117.8 |
| Finland | 50.5 | 55.5 | 57.1 | 59.9 | 55.1 | 56.1 | 120.3 |
| France | 49.6 | 56.1 | 56.9 | 57.5 | 57.5 | 57.8 | 92.7 |
| Germany | 50.6 | 51.4 | 54.0 | 55.1 | 56.7 | 58.8 | 87.4 |
| Greece | 38.1 | 49.4 | 50.9 | 51.7 | 52.7 | 53.5 | 91.4 |
| Hungary | 9.6 | 21.1 | 26.1 | 31.5 | 34.2 | 41.4 | 57.8 |
| Iceland | 51.4 | 62.6 | 65.3 | 69.7 | 65.3 | 65.0 | 130.3 |
| Ireland | 26.1 | 36.5 | 38.3 | 41.0 | 44.1 | 46.4 | 89.1 |
| Italy | 39.4 | 43.0 | 44.4 | 45.1 | 45.6 | 46.4 | 99.1 |
| Japan | 44.2 | 49.6 | 51.1 | 51.7 | 52.8 | 54.6 | 99.5 |
| Korea | 35.7 | 42.0 | 43.8 | 45.4 | 44.9 | 46.6 | 96.8 |
| Luxembourg | 47.8 | 58.7 | 62.1 | 65.4 | 68.7 | 71.9 | 120.1 |
| Mexico | 8.4 | 9.9 | 9.6 | 9.9 | 10.4 | 11.2 | 19.1 |
| Netherlands | 46.4 | 52.5 | 54.3 | 55.8 | 59.5 | 60.6 | 103.7 |
| New Zealand | 43.8 | 47.9 | 46.8 | 47.5 | 47.8 | 48.0 | 81.8 |
| Norway | 50.3 | 56.0 | 56.2 | 55.1 | 56.2 | 70.5 | 132.8 |
| Poland | 8.6 | 14.8 | 16.9 | 19.4 | 21.8 | 24.7 | 34.8 |
| Portugal | 24.1 | 36.7 | 38.5 | 40.2 | 41.3 | 42.5 | 89.1 |
| Spain | 32.4 | 38.6 | 39.8 | 41.5 | 42.6 | 45.0 | 82.8 |
| Sweden | 68.3 | 66.7 | 69.4 | 70.1 | 71.8 | 73.6 | 131.2 |
| Switzerland | 58.7 | 62.6 | 64.6 | 66.1 | 68.7 | 71.6 | 112.8 |
| Turkey | 12.3 | 21.4 | 22.8 | 24.7 | 26.2 | 27.4 | 39.3 |
| United Kingdom | 44.1 | 50.4 | 52.4 | 53.3 | 55.1 | 56.5 | 96.8 |
| United States | 54.6 | 60.2 | 62.4 | 64.9 | 66.8 | 69.6 | 101.4 |
| OECD | 39.8 | 45.7 | 47.5 | 49.4 | 50.1 | 52.8 | 84.1 |

1. Telecommunication access paths include the total of fixed access lines and cellular mobile subscribers.
Source: OECD

**Table 1.2.2 Standard Telecommunications Access Lines in the OECD**

| | 1985 (000) | 1990 (000) | 1995 (000) | 1996 (000) | 1997 (000) | 1998 (000) | 1999 (000) | CAGR (1990-99) | CAGR (1995-99) |
|---|---|---|---|---|---|---|---|---|---|
| Australia | 6 501 | 7 787 | 9 170 | 9 350 | 9 579 | 9 865 | 10 456 | 3.3 | 3.3 |
| Austria | 2 729 | 3 223 | 3 748 | 3 776 | 3 726 | 3 670 | 3 202 | -0.1 | -3.9 |
| Belgium | 3 681 | 3 943 | 4 604 | 4 668 | 4 694 | 4 589 | 4 372 | 1.0 | -1.9 |
| Canada | 11 514 | 16 256 | 17 567 | 18 051 | 18 209 | 18 537 | 18 957 | 2.4 | 1.9 |
| Czech Republic | 1 330 | 1 624 | 3 368 | 3 647 | 3 975 | 3 732 | 3 795 | 9.9 | 12.2 |
| Denmark | 2 540 | 2 911 | 3 180 | 3 228 | 3 104 | 3 066 | 2 934 | 0.1 | -2.0 |
| Finland | 2 180 | 2 670 | 2 640 | 2 641 | 2 601 | 2 526 | 2 385 | -1.3 | -4.0 |
| France | 25 031 | 28 085 | 32 600 | 31 600 | 31 572 | 31 216 | 30 601 | 1.0 | -1.6 |
| Germany | 26 580 | 32 000 | 30 200 | 30 000 | 37 800 | 38 400 | 34 500 | 0.8 | -3.1 |
| Greece | 3 117 | 3 940 | 5 192 | 5 324 | 5 421 | 5 485 | 5 437 | 3.6 | 1.3 |
| Hungary | 730 | 956 | 2 155 | 2 646 | 3 182 | 3 386 | 4 049 | 16.9 | 17.1 |
| Iceland | 103 | 121 | 149 | 153 | 152 | 151 | 146 | 1.4 | -0.1 |
| Ireland | 703 | 963 | 1 343 | 1 390 | 1 509 | 1 536 | 1 595 | 5.5 | 4.8 |
| Italy | 17 306 | 22 360 | 26 695 | 26 915 | 26 801 | 26 251 | 22 455 | 0.5 | -1.3 |
| Japan | 45 370 | 64 525 | 51 100 | 51 525 | 50 100 | 53 559 | 55 446 | 0.2 | -2.4 |
| Korea | 7 539 | 15 260 | 18 925 | 19 940 | 20 845 | 20 756 | 21 152 | 3.7 | 2.9 |
| Luxembourg | 154 | 184 | 225 | 248 | 255 | 219 | 189 | 0.3 | -4.7 |
| Mexico | 3 486 | 5 189 | 8 601 | 8 628 | 9 354 | 9 907 | 10 907 | 8.6 | 5.6 |
| Netherlands | 5 823 | 6 990 | 8 000 | 8 100 | 8 850 | 7 767 | 7 530 | 0.6 | -2.2 |
| New Zealand | 1 260 | 1 473 | 1 732 | 1 719 | 1 755 | 1 755 | 1 759 | 2.0 | 0.4 |
| Norway | 1 708 | 2 132 | 2 431 | 2 550 | 2 724 | 2 475 | 2 486 | 1.5 | 0.1 |
| Poland | 2 482 | 3 250 | 5 725 | 6 532 | 7 510 | 8 485 | 9 535 | 12.5 | 13.6 |
| Portugal | 1 400 | 2 379 | 3 556 | 3 724 | 3 819 | 3 805 | 3 753 | 5.2 | 1.1 |
| Spain | 9 340 | 12 600 | 16 006 | 16 413 | 16 884 | 16 286 | 16 779 | 3.2 | 2.7 |
| Sweden | 5 242 | 5 849 | 6 013 | 6 032 | 6 010 | 5 965 | 5 899 | 0.1 | -0.5 |
| Switzerland | 3 377 | 3 943 | 4 104 | 4 065 | 4 076 | 3 885 | 3 622 | -0.9 | -3.1 |
| Turkey | 2 248 | 6 860 | 13 216 | 14 298 | 15 744 | 16 960 | 18 060 | 11.3 | 8.1 |
| United Kingdom | 20 931 | 25 404 | 29 409 | 30 079 | 30 330 | 30 900 | 31 200 | 2.3 | 1.5 |
| United States | 110 154 | 150 114 | 148 410 | 159 169 | 162 956 | 169 252 | 174 712 | 2.8 | 4.2 |
| OECD | 321 316 | 408 134 | 475 668 | 488 658 | 500 010 | 505 290 | 508 600 | 2.5 | 1.7 |

Source: OECD

## Table 1.2.3 Cellular Penetration in the OECD

| | Subscribers per 100 inhabitants 1997 | Subscribers per 100 inhabitants 1998 | Subscribers per 100 inhabitants 1999 | CAGR 1997-99 (%) |
|---|---|---|---|---|
| Australia | 30.0 | 31.3 | 39.5 | 23.3 |
| Austria | 14.3 | 28.6 | 51.9 | 90.7 |
| Belgium | 9.6 | 17.2 | 31.1 | 80.6 |
| Canada | 14.1 | 17.7 | 22.7 | 27.0 |
| Czech Republic | 5.1 | 9.4 | 18.8 | 92.6 |
| Denmark | 27.5 | 35.4 | 49.4 | 34.0 |
| Finland | 45.6 | 57.2 | 65.0 | 19.5 |
| France | 9.8 | 19.1 | 34.9 | 88.4 |
| Germany | 9.8 | 17.9 | 28.8 | 69.5 |
| Greece | 8.8 | 19.6 | 38.1 | 111.1 |
| Hungary | 7.1 | 10.6 | 16.2 | 51.4 |
| Iceland | 24.0 | 38.7 | 62.2 | 61.0 |
| Ireland | 14.4 | 25.5 | 42.7 | 72.5 |
| Italy | 20.5 | 35.6 | 52.7 | 60.3 |
| Japan | 30.4 | 37.4 | 44.9 | 21.4 |
| Korea | 16.1 | 30.1 | 50.0 | 82.1 |
| Luxembourg | 16.1 | 22.0 | 48.2 | 72.9 |
| Mexico | 1.9 | 3.5 | 7.9 | 106.6 |
| Netherlands | 10.8 | 21.3 | 41.9 | 99.6 |
| New Zealand | 13.1 | 18.7 | 32.8 | 58.7 |
| Norway | 38.4 | 47.5 | 61.5 | 26.5 |
| Poland | 3.1 | 5.0 | 10.1 | 119.2 |
| Portugal | 15.4 | 30.8 | 46.8 | 74.4 |
| Spain | 10.9 | 17.9 | 37.8 | 86.1 |
| Sweden | 35.8 | 46.4 | 57.9 | 26.8 |
| Switzerland | 14.4 | 23.9 | 41.2 | 69.3 |
| Turkey | 2.6 | 5.4 | 11.8 | 114.9 |
| United Kingdom | 14.3 | 21.9 | 40.2 | 67.4 |
| United States | 20.4 | 25.6 | 31.5 | 24.4 |
| OECD | 15.6 | 22.3 | 32.4 | 44.2 |

Source: OECD

## Table 1.2.4 Digitalisation in the OECD Area

| | Fixed networks (% of digital access lines) | | | | | Mobile networks (% of subscribers to digital technology) | | |
|---|---|---|---|---|---|---|---|---|
| | 1993 | 1995 | 1997 | 1998 | 1999 | 1997 | 1998 | 1999 |
| Australia | 40 | 62 | 84 | 95 | 100 | 87 | 92 | 98 |
| Austria | 54 | 72 | 82 | 92 | 100 | 79 | 91 | 95 |
| Belgium | 54 | 66 | 83 | 83 | 91 | 96 | 100 | 100 |
| Canada | 85 | 94 | 99 | 100 | 100 | .. | .. | .. |
| Czech Republic | 10 | 17 | 55 | 64 | 74 | 88 | 93 | 98 |
| Denmark | 46 | 61 | 86 | 100 | 100 | 84 | 92 | .. |
| Finland | 62 | 90 | 100 | 100 | 100 | 78 | 88 | .. |
| France | 80 | 100 | 100 | 100 | 100 | 98 | 98 | 100 |
| Germany | 41 | 56 | 100 | 100 | 100 | 94 | 97 | .. |
| Greece | 22 | 37 | 47 | 75 | 91 | 100 | 100 | 100 |
| Hungary | 27 | 55 | 70 | 75 | 78 | 89 | 91 | .. |
| Iceland | 60 | 100 | 100 | 100 | 100 | 62 | 72 | 84 |
| Ireland | 71 | 79 | 92 | 100 | 100 | 85 | 91 | .. |
| Italy | 57 | 76 | 94 | 98 | 100 | 71 | 83 | 89 |
| Japan | 72 | 90 | 100 | 100 | 100 | 95 | 99 | .. |
| Korea | 59 | 65 | 67 | 68 | 72 | 77 | 96 | .. |
| Luxembourg | 82 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Mexico | 68 | 88 | 90 | 98 | 100 | .. | .. | .. |
| Netherlands | 93 | 100 | 100 | 100 | 100 | 85 | 97 | 100 |
| New Zealand | 95 | 97 | 100 | 100 | 100 | .. | 100 | 100 |
| Norway | 60 | 82 | 100 | 100 | 100 | 77 | 85 | 92 |
| Poland | 10 | 48 | 58 | 62 | 68 | .. | 93 | .. |
| Portugal | 59 | 70 | 88 | 98 | 100 | 99 | 100 | .. |
| Spain | 41 | 56 | 81 | 86 | 87 | 75 | 87 | .. |
| Sweden | 87 | 91 | 99 | 100 | 100 | 78 | 88 | .. |
| Switzerland | 48 | 66 | 99 | 99 | 99 | 85 | 94 | 98 |
| Turkey | 74 | 77 | 82 | 83 | 84 | 92 | 96 | .. |
| United Kingdom | 75 | 88 | 100 | 100 | 100 | 79 | 91 | .. |
| United States | 82 | 90 | 95 | 96 | 98 | 12 | 39 | 51 |
| OECD | 69 | 76 | 88 | 93 | 94 | 78 | 87 | 95 |

Source: OECD

### *1.2.2 Competitive Entry*

In recent months, much emphasis has been given to the competitive environment for telecommunications. In New Zealand, this is reflected in the Telecommunications Inquiry conducted in 2000. The international figures make for interesting comparison.

Despite not having an overt policy for local loop unbundling, New Zealand's local market share of competitive new entrants is the sixth highest in the OECD at 3.5% of access lines (Table 1.2.5), only very slightly behind Australia at 3.97%, the United States at 5.44% and Poland at 5.30%. While Canada leads the world in this statistic (29%), the only other country with a statistic in double figures is the United Kingdom (15.4%). It is noted that "local loop unbundling has raised a number of issues dealing with pricing, collocation and service supply agreements" and is also "likely to involve increasing calls for arbitration by regulators and is focusing attention on tariff rebalancing for subscriber lines" (OECD p 28). Given the small size of the New Zealand market in standard access lines (at 1,759,000, it is the third smallest in the OECD (Table 1.2.3), with only Iceland and Luxembourg having fewer), very low growth in this statistic (almost static in 1999) and the comparative strong growth of the very competitive mobile communications sector, it is possible that the regulatory overheads of local loop unbundling may exceed any potential benefits in a declining market.

**Table 1.2.5 Local Loop Share by Competitive New Entrants**

% of access lines

| | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | | | | | | | | | | | | | | 0.41 | 1.04 | 3.97 |
| Austria | | | | | | | | | | | | | | | 0.20 | 1.80 |
| Belgium | | | | | | | | | | | | | | | 0.00 | 0.00 |
| Canada | | | | | | | 0.00 | 5.00 | 7.00 | 14.00 | 18.00 | .. | .. | .. | .. | 29.00 |
| Czech Republic | | | | | | | | | | | | | | | 0.30 | 0.34 |
| Denmark | | | | | | | | | | | | | | 0.00 | 0.89 | 0.37 |
| Finland | | | | | | | | | | | 0.36 | 0.39 | 0.39 | 0.38 | 0.46 | 0.35 |
| France | | | | | | | | | | | | | | | 0.00 | 0.00 |
| Germany | | | | | | | | | | | | | | | 0.50 | 1.00 |
| Greece | | | | | | | | | | | | | | | 0.00 | 0.00 |
| Hungary | | | | | | | | | | | | | | | 0.00 | 0.00 |
| Iceland | | | | | | | | | | | | | | | 0.00 | 0.00 |
| Ireland | | | | | | | | | | | | | | | 0.00 | 2.40 |
| Italy | | | | | | | | | | | | | | | 0.00 | 0.00 |
| Japan | | | | | | | | | | | | | | | .. | .. |
| Korea | | | | | | | | | | | | | | | 0.00 | 0.30 |
| Luxembourg | | | | | | | | | | | | | | | 0.00 | 0.00 |
| Mexico | | | | | | | | | | | | | | | 0.00 | 0.45 |
| Netherlands | | | | | | | | | | | | | | | 0.10 | 0.10 |
| New Zealand | | | | | | | | | | | | | | 0.06 | 2.00 | 3.50 |
| Norway | | | | | | | | | | | | | | | 0.00 | 0.40 |
| Poland | | | | | | | | | | | | | | | 3.70 | 5.30 |
| Portugal | | | | | | | | | | | | | | | 0.00 | 0.00 |
| Spain | | | | | | | | | | | | | | | 0.50 | 1.70 |
| Sweden | | | | | | | | | | | | | | | 1.00 | 1.00 |
| Switzerland | | | | | | | | | | | | | | 0.0 | 2.00 | .. |
| Turkey | | | | | | | | | | | | | | | 0.00 | 0.00 |
| United Kingdom | | | | | | | | | | | | | | | 14.30 | 15.40 |
| United States | | | | | | | | | | | | | 0.60 | 1.06 | 3.05 | 5.44 |
| OECD | | | | | | | | | | | | | | | | |

Source: OECD.

New Zealand also fares well by international comparison in the long distance market share of new operators, with 25% of switched minutes carried by new entrants in 1998, compared to Australia at 15% (OECD Table 2.2 p 30). Mobile competition is also strong, with two operators splitting the market on a 67% to 33% ratio (OECD Table 2.5 p 33).

### *1.2.3 Prices*

Telecommunications pricing policies are acknowledged as one of the key factors enabling growth of electronic information exchange. In particular, unmetered charging of local telephone access has been a key determinant of the high levels of Internet access recorded in countries where these policies apply: namely the United States, Canada, New Zealand and Australia (*The State of e-New Zealand*). Unmetered charging has encouraged 'always on' use, and hence prompted high uptake of dial-up Internet access.

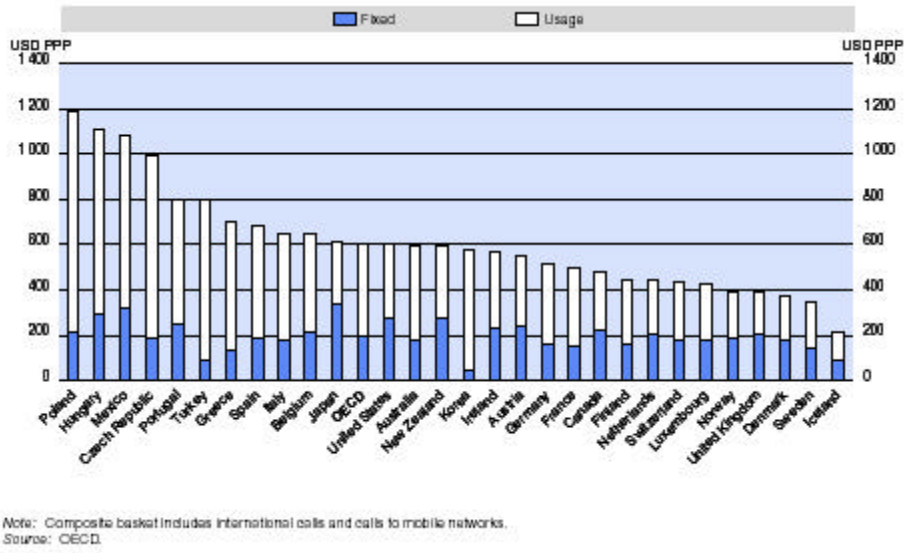
New Zealand domestic subscribers have benefited from unmetered pricing. However, business subscribers are liable for per minute charging which will have had some impact upon usage patterns of Internet-based business telephony.

Connection charges have decreased in markets where alternative network infrastructure is mature (e.g. wireless), indicating that the effects of universal service provisions have had minimal in these markets.

"Most operators of fixed networks have sought to raise fixed monthly charges as their margins have been reduced in segments with greater amounts of competition. This is evident in a trend towards higher monthly line rentals. Discount schemes that entail users paying a fixed fee in return for lower call chares or a bundle of minutes also have the impact of raising fixed charges" (OECD p 172).

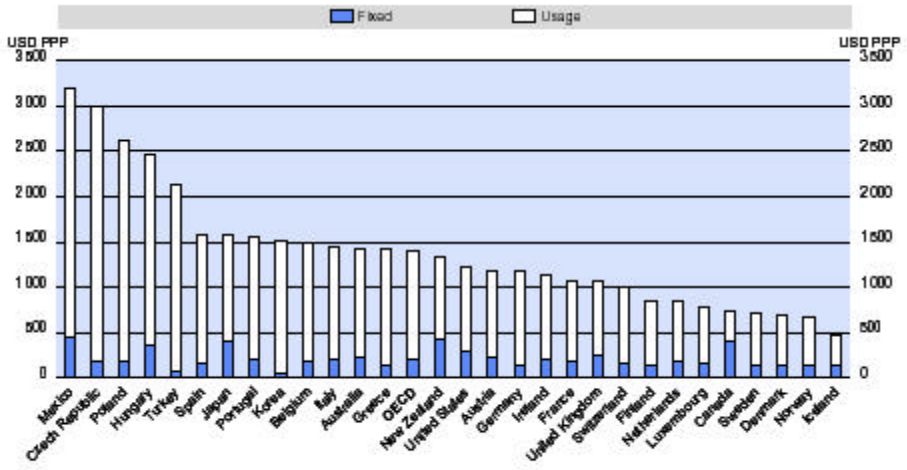
Using the OECD's composite basket of calls (including international calls and calls to mobile networks), at August 2000, New Zealand residential prices including value-added tax were below the OECD average and, significantly, were less than those of both Australia and the United States (Figure 1.2.1). The comparable business basket, excluding value-added tax, was also below the OECD average, and again less than that of Australia, but higher than that of the United States (Figure 1.2.2). While New Zealand had some of the highest fixed charges in both categories, it is significant to note that the basket of charges in both cases was lower than the OECD average. This finding is especially significant, as the OECD basket measures the comparative welfare produced by the telecommunications services of the member countries.

**Figure 1.2.1 OECD Composite Basket of Residential Telephone Charges, VAT included (Aug 2000)**




Note: Composite basket includes international calls and calls to mobile networks.
Source: OECD.

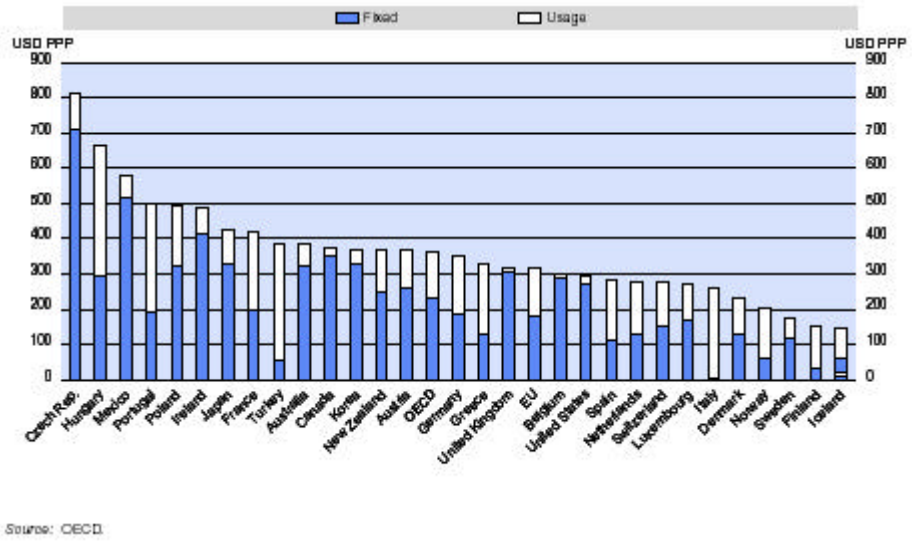
**Figure 1.2.2 OECD Composite Basket of Business Telephone Charges, VAT excluded (Aug 2000)**




Note: Composite basket includes international calls and calls to mobile networks.
Source: OECD.

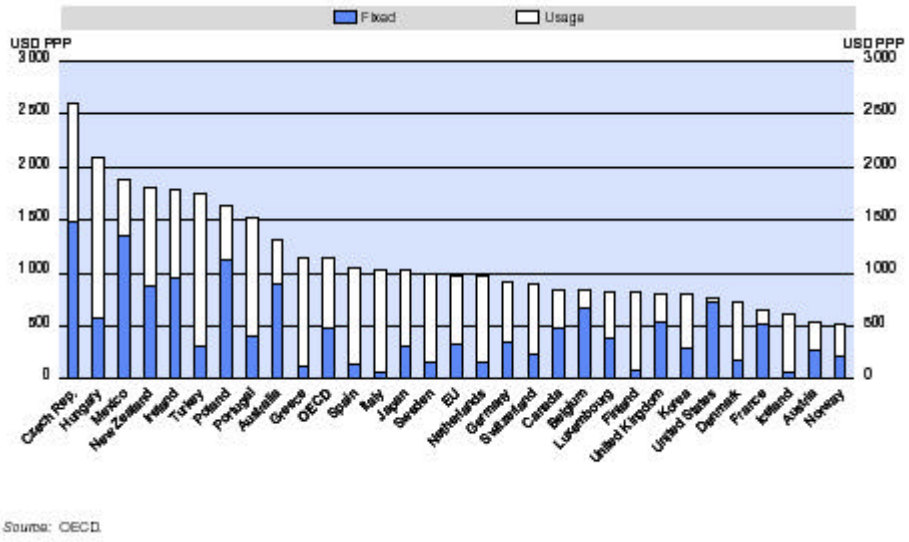
While New Zealand residential and business charges are determined by the dominant lines provider Telecom New Zealand, and are lower than the OECD average, the baskets of prices for both consumer and business mobile charges, a market presumed to be competitive due to the presence of multiple providers, are higher than the OECD average, as shown in figures 1.2.3 and 1.2.4. While consumer prices are less than those of Australia, the business basket is the fourth most expensive in the OECD, and higher than that of Australia.

**Figure 1.2.3 OECD Basket of Consumer Mobile Telephone Charges (August 2000)**




Source: OECD.

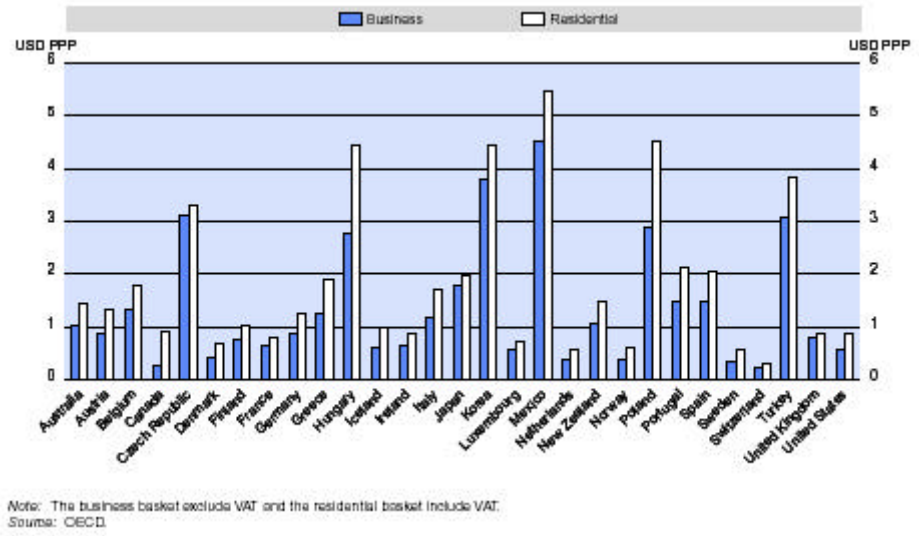
**Figure 1.2.4 OECD Basket of Business Mobile Telephone Charges (August 2000)**




Source: OECD.

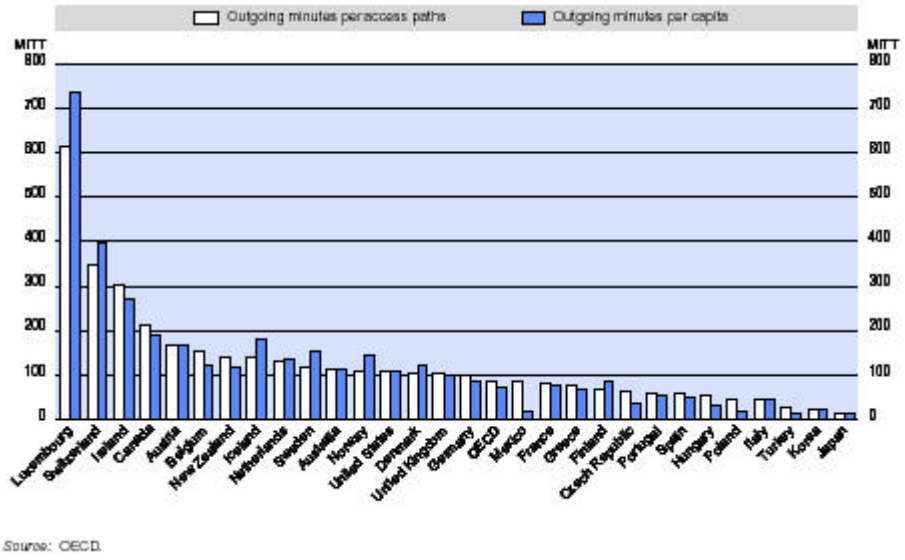
New Zealand prices for international calls in the OECD basket (average call charge for one single call, weighted by traffic) are also above average, and slightly higher than those of Australia (Figure 1.2.5). This is despite significant falls in price throughout 1999 ("Telecom New Zealand's international outgoing minutes increased by 24.9% in 1999, although overall revenue for outgoing calls decreased" OECD p 53), and the 7th highest minutes of outgoing international calls both per access path and per capita Figure 1.2.6). It is possible, however, that the OECD basket does not adequately reflect the flat rate international tariff that New Zealand was the first in the world to introduce ("New Zealand has led the world in the reduction of sensitivity of tariffs to time for long distance telephony" (OECD p 171)), as a standard basket does not capture well the effects of one-off 'specials' and the changes these cause in both usage patterns and total price paid.

**Figure 1.2.5 OECD Basket of International Telephone Charges (August 2000)**




Note: The business basket exclude VAT and the residential basket include VAT.
Source: OECD.

**Figure 1.2.6 OECD Minutes of Outgoing International Telecommunication Traffic (MITT) 1999**

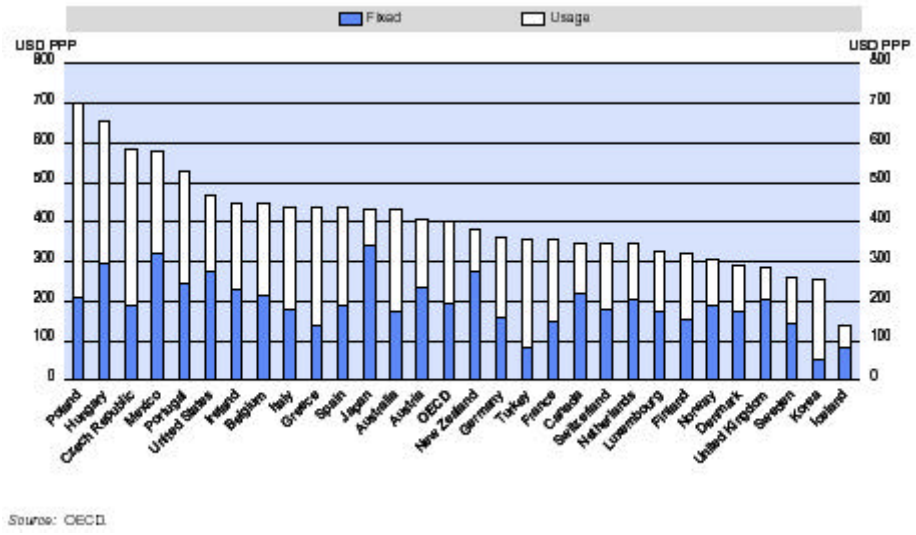



Source: OECD.

Significantly, when the higher cost of mobile and international telephony is removed from the OECD basket, New Zealand has markedly lower prices than both Australia and in particular, the United States (Figure 1.2.7). This graph essentially compares fixed line access services across the OECD – the market where it has been deemed that the incumbent operator has a near monopoly, and where price designation and local loop unbundling have been proposed as a means of reducing basic prices. It is a significant finding that New Zealand has achieved a level of pricing on these services which is lower than the OECD average, and lower than countries against which its light-handed regulatory policy of commercial agreement backed up by Commerce Act provisions has been consistently compared and deemed 'inadequate' (i.e. those

such as Australia and the US, where price designation occurs). This finding is even more astonishing when allowance is made for the fact that New Zealand prices for fixed access line services can be expected to be significantly higher than those of countries with higher population density (Alger and Leung (1999))[13].

**Figure 1.2.7 OECD Residential Tariff Basket, including VAT (August 2000)**




Source: OECD

### *1.2.4 Leased Data Lines*

New Zealand does not perform well in comparisons of the basket of charges for leased lines (Table 1.2.7). The charges for higher capacity (64 kbit/s and 1.5/22 Mbit/s) lines are particularly important for dedicated data transfer functions. Lower capacity leased lines are important for the transmission of low volumes data (for example, the patterns of short bursts of low volume traffic such as generated by EFTPOS and ATM transactions) and local data transmission, while the larger capacity lines are important for the transmission of high volumes of data over long distances. High capacity leased lines are especially important for the Internet Service Providers (ISPs), and companies that require data to be transferred between large, disparate locations.

Charges for all capacities reported are higher than the OECD average, with the charges for 64k lines in particular some 66% higher than the OECD average, and twice that of Australia. However, larger capacity 1.5/2 M lines, although still above the OECD average, are slightly less than those of Australia. These comparatively high prices are presumed to be a factor in the low levels of uptake of DSL services (section 1.3.7). It is noted, however, that the OECD figures capture only traditional telecommunications company provision of these lines. In New Zealand,

[13] The OECD baskets do not adjust for this factor.

other utility providers (e.g. gas and electricity utilities) are already entering the market for leased line provision, and this may be expected to place competitive pressure on the prices charged by telecommunications companies for these services.

**Table 1.2.6 OECD Basket of National Leased Line Charges (August 2000)**

| | Excluding tax | | | | | | |
|---|---|---|---|---|---|---|---|
| | USD M1020 | USD PPP M1020 | USD 64 k | USD PPP 64 k | USD 1.5/2 M | USD PPP 1.5/2 M | Index 2 Mbit/s |
| Australia | 287 606 | 368 726 | 334 118 | 428 356 | 3 346 856 | 4 290 841 | 132 |
| Austria | 429 843 | 467 220 | 447 993 | 486 949 | 1 965 581 | 2 136 501 | 66 |
| Belgium | 562 682 | 646 761 | 388 132 | 446 129 | 2 422 023 | 2 783 935 | 86 |
| Canada | .. | .. | 366 902 | 452 965 | 3 237 256 | 3 996 613 | 123 |
| Czech Republic | 320 997 | 844 730 | .. | .. | 3 015 207 | 7934 754 | 244 |
| Denmark | 117 773 | 103 310 | 187 171 | 164 185 | 777 967 | 682 427 | 21 |
| Finland | .. | .. | .. | .. | 638 389 | 613 836 | 19 |
| France | 477 838 | 519 389 | 402 318 | 437 302 | 1 954 095 | 2 124 016 | 65 |
| Germany | 404 182 | 439 329 | 353 410 | 384 141 | 1 966 920 | 2 137 956 | 66 |
| Greece | 252 165 | 355 162 | 415 288 | 584 913 | 2 520 782 | 3 550 397 | 109 |
| Hungary | 160 413 | 401 033 | 560 571 | 1 401 428 | 3 080 236 | 7 700 589 | 237 |
| Iceland | 148 749 | 118 999 | 154 892 | 123 914 | 728 391 | 582 713 | 18 |
| Ireland | 236 558 | 278 303 | 264 800 | 311 530 | 1 590 558 | 1 871 245 | 57 |
| Italy | 373 948 | 473 353 | 466 538 | 590 555 | 3 060 511 | 3 874 065 | 119 |
| Japan | .. | .. | 1 265 787 | 776 556 | 7 853 933 | 4 818 364 | 148 |
| Korea | 331 315 | 534 380 | 677 555 | 1 092 830 | 4 517 032 | 7 285 536 | 224 |
| Luxembourg | 160 163 | 179 959 | 240 380 | 270 089 | 2 365 572 | 2 657 946 | 82 |
| Mexico | .. | .. | 362 598 | 503 609 | 3 854 641 | 5 353 668 | 164 |
| Netherlands | 188 909 | 217 137 | 418 593 | 481 142 | 2 456 371 | 2 823 415 | 87 |
| New Zealand | 300 837 | 423 714 | 617 239 | 869 351 | 3 027 381 | 4 263 916 | 131 |
| Norway | 270 448 | 233 145 | 347 621 | 299 673 | 1 482 892 | 1 278 355 | 39 |
| Poland | 214 842 | 413 158 | 325 767 | 626 475 | 2 363 864 | 4 545 893 | 140 |
| Portugal | 396 527 | 610 042 | 313 990 | 483 061 | 2 329 747 | 3 584 227 | 110 |
| Spain | 867 291 | 1 188 070 | 475 499 | 651 369 | 3 661 083 | 5 015 182 | 154 |
| Sweden | 74 670 | 67 882 | 264 982 | 240 893 | 928 994 | 844 540 | 26 |
| Switzerland | 417 498 | 350 839 | 308 797 | 259 493 | 1 612 880 | 1 355 361 | 42 |
| Turkey | 70 189 | 129 979 | 150 337 | 278 401 | 1 240 950 | 2 298 055 | 71 |
| United Kingdom | 326 301 | 299 359 | 481 995 | 442 198 | 2 236 164 | 2 051 527 | 63 |
| United States | .. | .. | 994 235 | 994 235 | 2 065 200 | 2 065 200 | 63 |
| OECD | 307 989 | 402 666 | 429 167 | 521 546 | 2 493 154 | 3 259 347 | 100 |

*Source*: OECD, Teligen.

### *1.2.5 Investment*

At face value, New Zealand's investment in telecommunications does not appear to have kept pace with either the OECD averages or that of Australia in any of the 1999 statistics:

- public investment as a percentage of revenue (OECD Table 4.12 p 92 - NZ 16.2, Australia 24.4, OECD 26.6);
- public investment as a percentage of gross fixed capital formation (OECD Table 4.13 p 93 - NZ 3.30, Australia 4.29, OECD 3.38);
- public investment per access channel in US million dollars (OECD Table 4.14 p 94 - NZ 192.55, Australia 360.32, OECD 350.90);
- public investment per access path in US million dollars (OECD Table 4.15 p 95 - NZ 114.25, Australia 218.11, OECD 215.71); and
- public investment per capita in US million dollars (OECD Table 4.16 p 99 - NZ 92.51, Australia 218.54, OECD 181.47);

However, these figures are an understatement of the true investment picture of telecommunications in New Zealand, as they represent only public investment by the incumbent operator Telecom New Zealand ("the figures may understate overall investment because data were only available for the incumbent telecommunications carriers. This was the case for Austria, Hungary, Ireland, New Zealand and, to a lesser extent, Finland." OECD p 76). Further, the ability to accurately represent national investment is compromised by the growth of regional investment, which cannot be easily separated into national components.

Most countries exhibited significant investment growth in 1999 (OECD p 79). This is particularly evident in the United States, driven, in the OECD's analysis, by increasing investment in Internet backbones, digitalisation, wireless investment and expansion resulting from the 1996 telecommunications reform. While it is acknowledged that New Zealand's actual and relative position on the OECD scale is affected by the understatement of investment, it is interesting to note that the investment percentages identified above are very similar to countries that, like New Zealand, entered the late 1990s with completely digitised networks (e.g. Sweden and Finland). For example, Sweden and Finland exhibited:

- public investment as a percentage of revenue of 12.3 and 14.2 respectively (OECD Table 4.12 p 92 - NZ 16.2,);
- public investment as a percentage of gross fixed capital formation of 2.59 and 2.98 respectively (OECD Table 4.13 p 93 - NZ 3.30);
- public investment per access channel in US million dollars of 137.67 and 201.03 respectively (OECD Table 4.14 p 94 - NZ 192.55);
- public investment per access path in US million dollars of 78.44 and 92.21 respectively (OECD Table 4.15 p 95 - NZ 114.25); and
- public investment per capita in US million dollars of 103.03 and 110.08 respectively (OECD Table 4.16 p 99 - NZ 92.51).

These similarly low levels of investment (by OECD standards) do not appear to have been at the expense of Internet development, as Sweden, Finland and New Zealand all rank in the top seven countries for the number of Internet hosts per 1000 residents (see section 1.3).

Thus, it is hard to draw any firm conclusions on connectivity outcomes from investment figures across the OECD, and even harder to draw any relationships between electronic commerce and telecommunication investment outcomes at this stage.

#### *1.2.6 Summary*

Given the importance placed upon telecommunications infrastructure in the potential for nations to participate in electronic commerce, New Zealand appears to be comparatively well-placed

among the OECD countries. In particular, domestic telephone prices appear to be internationally competitive, especially for fixed line access. There is evidence that uptake of alternative technologies (e.g. wireless) is strong, and this is reinforced by anecdotal indications that cost-based substitution of prepaid mobile telephony for fixed line services is an explanatory factor in both the number of fixed access lines per person, and the bias in reported investment figures. While there is some evidence that leased data line charges may be higher than average, this does not appear to have translated into higher ISP charges (see section 1.3.8).

## *1.3 Internet Indicators*

### *1.3.1 Internet Subscribers*

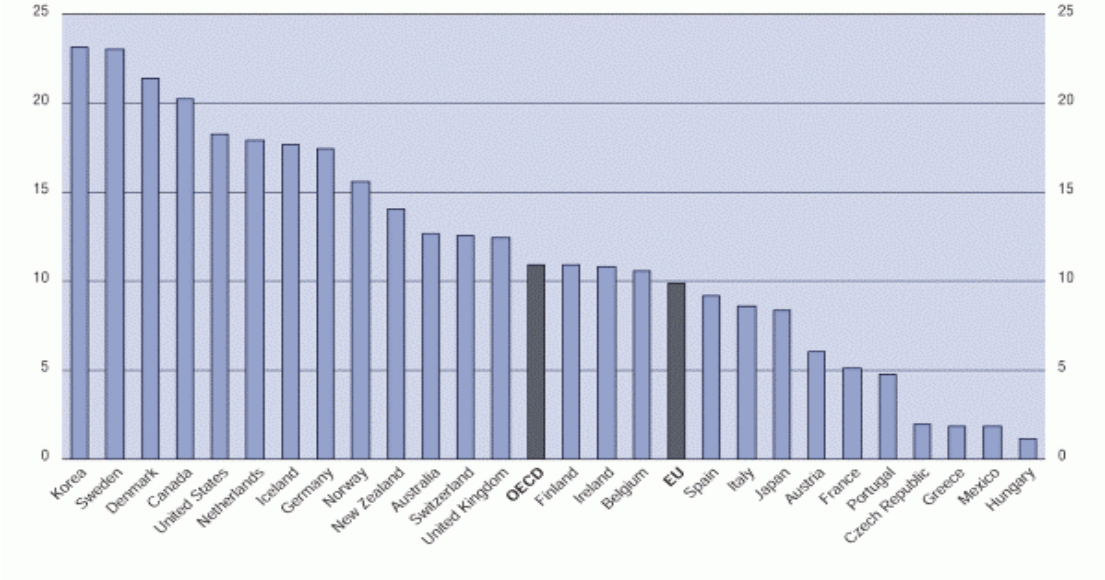
As the Internet maintains its rapid growth, it continues to play a critical role in many areas of economic development. New Zealand continues to display strong growth in this area, as can be seen in figure 1.3.1 where New Zealand is among the top ten OECD countries for Internet subscription rates per 100 inhabitants. In January 2000, New Zealand had 14 subscribers per 100 inhabitants, which compared to that of Australia at 12.7 subscribers.

### *1.3.2 Internet Usage*

New Zealanders continue to participate in a higher number of Internet sessions per month than Australia – 14, as compared to 12 (September 2001 figures from NielsenNet). During this time on line, they visit more unique sites (18, as opposed to 16), however they spend less time at each site (20 minutes compared with 27 for Australia). Further, New Zealanders spend less time per month (6 hours 4 minutes) on the Internet than Australia (7 hours 3 minutes), and less time per session (26 minutes for New Zealand, 34 for Australia)[14]. US figures show an average of 10 sessions per month per user, visiting 40 unique sites for an average total time of 10 hours, and duration per page of 54 minutes.

[14] Nielsen NetRatings http://www.nielson-netratings.com/

**Figure 1.3.1 Internet subscribers per 100 inhabitants, January 2000**




**Source: OECD, Telecommunications database, June 2001.**

It is noted, however, that these figures are determined from a survey, and reflect domestic usage patterns of 'surfing' by individuals, rather than targeted, specific usage of the Internet for business-related purposes.

While superficially it may appear that the average time spent 'surfing' by Australians is an indicator of greater use of the Internet for recreational purposes, the higher number of sites visited and less average time per site spent by New Zealanders may be an indication that New Zealand users are more 'efficient' in their use of the web. They may visit more sites for less time as they are (on average) more familiar with the sites they visit, revisit them repeatedly for extraction of specific information, thereby necessitating a shorter visit on each occasion. Indeed, this was the explanation given by Mark Henning, director of sales and marketing for ACNeilsen e-Ratings.com, Australia, when the number of sessions per surfer dropped in Australia from 17 to 15 per month in August 2000[15]:

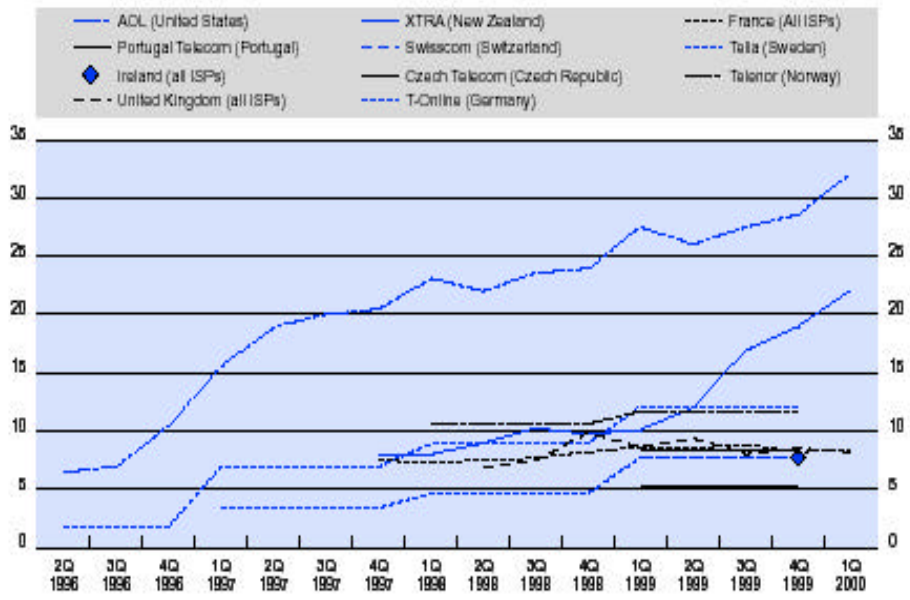
> *"These figures seem to indicate users … fine-tune their surfing behaviour by visiting less sites more often, rather than just using the web to explore. Our experience in overseas markets, particularly the United States, shows us that users tend to surf a smaller repertoire of sites as they become more familiar with the Net and start to bookmark a list of favourite sites. The total time spent online also tends to drop as people become more adept at navigating the web and locating the information they want."*

[15] Quoted in NielsenNetratings Press Release 3 August 2000
http://63.140.238.20/press_releases/pr_000803_au.htm

The NielsenNet ratings' focus on domestic usage does not accurately reflect Internet usage by combined domestic and business customers. OECD figures, by comparison, show the average number of hours spent online by subscriber, irrespective of business or residential classification. By these figures, subscribers to New Zealand's Xtra, which has 46% market share (OECD Table 5.1 p 111), spent an average of more than 22 hours per month online in the first quarter of 2000 – second only in the OECD's figures to customers of the United States' AOL with 32 hours per month (Figure 1.3.2).

The OECD notes that "in both cases, usage began to increase after changes in ISP charges which enabled unmetered Internet access. Prior to these changes, average users of AOL and Telecom New Zealand did not exceed average use in countries with metered charges." (OECD, p98). However, the advantage New Zealand holds over the rest of the world in this statistic may not persist, as "initial indications from countries where unmetered access was introduced in 2000, such as the United Kingdom, showed that online usage patterns were beginning to follow those of New Zealand and the United States". (OECD, ibid).

**Figure 1.3.2 Hours spent on line (average per month per subscriber)**




Source: OECD

### *1.3.3 Internet Hosts per 1000 Inhabitants*

Internet hosts per 1000 inhabitants reflect the number of hosts (computers) connected to the Internet by counting domain names that have an associated IP address. This captures any

computer system connected to the Internet (via full or part-time, direct or dial-up connections)[16] such as www.iscr.org.nz. (*The State of e-New Zealand* p 11).

The number of Internet hosts is one of the most commonly used indicators of growth of the Internet. Figure 1.3.3 and Table 1.3.1 show the number of hosts by country and the number of users within each country. When looked at as a proportion of hosts to users, it can be seen that Australia is 17% and New Zealand is 24%. That is, New Zealand has more computers connected to the Internet per user than Australia. This is consistent with the higher number of Internet subscribers in section 1.3.1 above.

Figure 1.3.3 shows, as at October 2000, New Zealand was 7th (92.6 hosts per 1000) amongst the OECD countries for Internet hosts per 1,000 inhabitants, a rank unchanged from the January 2000 figure quoted in *The State of e-New Zealand*. Australia remained 9th (75.0 hosts per 1000). However, Table 1.3.2 shows that while there was a significant growth of hosts in New Zealand in the period July 1999 to July 2000, which was not reflected in Australia, growth in the Australian figure in the period July 2000 to October 2000 outstripped New Zealand's (10.6% as opposed to 7.1%). Anecdotal evidence suggests that the introduction of GST in Australia may have resulted in an increase in the number of businesses taking up Internet connectivity, (e.g. in order to be able to lodge returns electronically), thereby inflating the growth figure for that period.

**Figure 1.3.3 Internet Hosts per 1000 Inhabitants gTLD adjusted, July 1997-October 2000**

[16] OECD *Internet Infrastructure Indicators* p 8.


Global top level domains (gTLDs) are distributed to country of location

*Source* OECD *Communications Outlook 2001;* OECD calculations based on Netsizer (*www.netsizer.com)*, May 2001.

## Table 1.3.2 Internet Hosts per Country 1997-2000

| | Hosts July 1997 (000) | Hosts July 1998 (000) | Hosts July 1999 (000) | Hosts July 2000 (000) | Hosts Oct. 2000 (000) | OECD share % (Oct. 2000) | Increase July 1999 - July 2000 (%) | Hosts per 1 000 inhabitants (July 1997) | Hosts per 1 000 inhabitants (July 1998) | Hosts per 1 000 inhabitants (July 1999) | Hosts per 1 000 inhabitants (July 2000) | Hosts per 1 000 inhabitants (Oct. 2000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | 572.5 | 790.8 | 992.2 | 1 286.3 | 1 422.3 | 1.6 | 29.6 | 30.9 | 42.2 | 52.3 | 67.8 | 75.0 |
| Austria | 58.4 | 143.7 | 225.8 | 393.0 | 465.7 | 0.5 | 74.0 | 7.2 | 17.8 | 27.9 | 48.6 | 57.6 |
| Belgium | 80.7 | 166.4 | 267.1 | 369.4 | 406.0 | 0.4 | 38.3 | 7.9 | 16.3 | 26.1 | 36.1 | 39.7 |
| Canada | 911.8 | 1 548.9 | 2 254.2 | 3 434.8 | 3 879.2 | 4.3 | 52.4 | 30.4 | 51.2 | 73.9 | 112.6 | 127.2 |
| Czech Republic | 45.7 | 72.3 | 99.3 | 132.2 | 132.6 | 0.1 | 33.1 | 4.4 | 7.0 | 9.7 | 12.9 | 12.9 |
| Denmark | 137.5 | 196.7 | 314.7 | 362.0 | 385.5 | 0.4 | 15.0 | 26.0 | 37.1 | 59.2 | 68.1 | 72.5 |
| Finland | 349.9 | 511.1 | 623.1 | 762.1 | 822.5 | 0.9 | 22.3 | 68.1 | 99.2 | 120.5 | 147.4 | 159.1 |
| France | 308.4 | 451.4 | 711.6 | 1 070.7 | 1 134.2 | 1.3 | 50.5 | 5.3 | 7.7 | 12.0 | 18.1 | 19.2 |
| Germany | 842.8 | 1 212.5 | 1 646.1 | 2 297.5 | 2 600.1 | 2.9 | 39.6 | 10.3 | 14.8 | 20.1 | 28.0 | 31.7 |
| Greece | 29.1 | 37.7 | 71.5 | 114.1 | 137.0 | 0.2 | 59.6 | 2.8 | 3.6 | 6.8 | 10.8 | 13.0 |
| Hungary | 32.3 | 80.7 | 109.8 | 151.1 | 154.8 | 0.2 | 37.6 | 3.2 | 8.0 | 10.9 | 15.0 | 15.4 |
| Iceland | 10.9 | 19.6 | 26.8 | 32.1 | 36.3 | 0.0 | 19.8 | 40.2 | 71.6 | 96.5 | 115.6 | 130.8 |
| Ireland | 47.5 | 47.5 | 61.3 | 105.1 | 116.6 | 0.1 | 71.5 | 13.0 | 12.8 | 16.4 | 28.1 | 31.1 |
| Italy | 209.6 | 285.0 | 512.0 | 1 435.7 | 1 861.1 | 2.1 | 180.4 | 3.7 | 5.0 | 9.0 | 25.2 | 32.6 |
| Japan | 1 059.5 | 1 613.6 | 2 314.0 | 3 579.5 | 4 116.4 | 4.6 | 54.7 | 8.4 | 12.8 | 18.3 | 28.3 | 32.5 |
| Korea | 98.6 | 178.6 | 318.8 | 445.3 | 504.4 | 0.6 | 39.7 | 2.1 | 3.8 | 6.8 | 9.5 | 10.8 |
| Luxembourg | 1.3 | 6.2 | 8.4 | 14.4 | 13.2 | 0.0 | 71.4 | 3.1 | 14.5 | 19.4 | 33.3 | 30.5 |
| Mexico | 19.5 | 71.7 | 157.0 | 337.4 | 372.6 | 0.4 | 114.9 | 0.2 | 0.7 | 1.6 | 3.5 | 3.8 |
| Netherlands | 341.2 | 554.1 | 800.4 | 1 190.1 | 1 290.2 | 1.4 | 48.7 | 21.9 | 35.3 | 50.6 | 75.3 | 81.6 |
| New Zealand | 112.0 | 199.5 | 210.8 | 329.3 | 352.9 | 0.4 | 56.2 | 29.8 | 52.6 | 55.3 | 86.4 | 92.6 |
| Norway | 180.3 | 335.0 | 382.2 | 476.1 | 519.7 | 0.6 | 24.6 | 40.9 | 75.6 | 85.7 | 106.7 | 116.5 |
| Poland | 78.8 | 100.4 | 159.0 | 265.3 | 318.8 | 0.4 | 66.9 | 2.0 | 2.6 | 4.1 | 6.9 | 8.2 |
| Portugal | 31.0 | 50.5 | 63.0 | 105.0 | 133.4 | 0.1 | 66.7 | 3.1 | 5.1 | 6.3 | 10.5 | 13.4 |
| Spain | 157.5 | 246.9 | 368.5 | 583.4 | 620.4 | 0.7 | 58.3 | 4.0 | 6.3 | 9.3 | 14.8 | 15.7 |
| Sweden | 309.6 | 400.1 | 560.0 | 869.8 | 941.7 | 1.0 | 55.3 | 35.0 | 45.2 | 63.2 | 98.2 | 106.3 |
| Switzerland | 146.6 | 237.3 | 310.8 | 414.1 | 453.2 | 0.5 | 33.2 | 20.7 | 33.4 | 43.5 | 58.0 | 63.5 |
| Turkey | 16.4 | 35.0 | 71.4 | 196.5 | 216.2 | 0.2 | 175.2 | 0.3 | 0.5 | 1.1 | 3.0 | 3.3 |
| United Kingdom | 923.8 | 1 397.4 | 1 979.4 | 2 848.3 | 3 124.0 | 3.5 | 43.9 | 15.7 | 23.6 | 33.3 | 47.9 | 52.5 |
| United States | 15 131.0 | 23 638.0 | 38 744.0 | 58 672.0 | 63 907.0 | 70.7 | 51.4 | 56.5 | 87.5 | 142.0 | 215.0 | 234.2 |
| OECD | 22 244.2 | 34 628.6 | 54 363.2 | 82 272.6 | 90 438.0 | 100.0 | 51.3 | 20.3 | 31.4 | 49.0 | 74.2 | 81.5 |
| World | 23 035.8 | 36 262.2 | 56 901.4 | 86 050.5 | 94 588.2 | | 51.2 | 4.0 | 6.1 | 9.5 | 14.4 | 15.8 |
| OECD share of world (%) | 96.6 | 95.5 | 95.5 | 95.6 | 95.6 | | | | | | | |
| EU | 3 828.3 | 5 707.2 | 8 212.9 | 12 520.6 | 14 051.6 | | 52.5 | 10.2 | 15.2 | 21.9 | 33.4 | 37.4 |

*Note:* gTLDs are distributed to country of location.
*Source:* Netsizer (http://www.netsizer.com).

**Table 1.3.1 No of Internet Hosts and Internet Users by Country**

*Source www.netsizer.com*

| COUNTRY | NO. OF HOSTS | NO OF USERS | HOSTS AS A % OF USERS |
|---|---|---|---|
| USA | 77378.4 | 175619 | 44.06% |
| Japan | 6836.36 | 58101.3 | 11.77% |
| Germany | 4536.12 | 33814.8 | 13.41% |
| UK | 4441.14 | 29118.1 | 15.25% |
| Canada | 6100.14 | 26612.4 | 22.92% |
| Australia | 1783.97 | 10590.6 | 16.84% |
| Finland | 996.259 | 3043.96 | 32.73% |
| Netherlands | 2037.96 | 11016.7 | 18.50% |
| Sweden | 1692.34 | 7080.01 | 23.90% |
| France | 1745.24 | 18824.3 | 9.27% |
| Norway | 594.979 | 2814.03 | 21.14% |
| Italy | 2566.66 | 19090.9 | 13.44% |
| Taiwan | 2032 | 11266.3 | 18.04% |
| New Zealand | 419.1 | 1761.12 | 23.80% |
| Spain | 1180.28 | 8540.8 | 13.82% |
| Denmark | 569.68 | 4148.26 | 13.73% |
| South Africa | 280.24 | 2165.74 | 12.94% |
| South Korea | 529.179 | 19063.2 | 2.78% |
| Brazil | 942.56 | 18798.6 | 5.01% |
| Switzerland | 594.219 | 3432.43 | 17.31% |
| Austria | 692.739 | 4650.79 | 14.90% |
| Africa | 298.039 | 3932.54 | 7.58% |
| Asia | 11341.2 | 155424 | 7.30% |
| Europe | 24662.6 | 166061 | 14.85% |
| Oceania | 2215.5 | 15364.7 | 14.42% |
| Central America | 485.48 | 2458.62 | 19.75% |
| South America | 1540.78 | 19011.2 | 8.10% |
| North America | 83477.7 | 202231 | 41.28% |

### *1.3.4 Websites*

The number of websites recorded per country, corrected for gTLD and ccTLD[17] registrations, reveals some information about the amount of content produced in each country for distribution over the Internet. Table 1.3.3 shows the comparative number of websites per country, and per 1000 inhabitants.

New Zealand's relative leadership over Australia per head of population in content created is evident in Table 1.3.3. New Zealand records 11.4 sites per 1000 to Australia's 7.5 per 1000 in 2000. New Zealand's growth rate in this statistic also outstrips Australia's (223% as opposed to 155.8%), indicating that this dominance will continue. However, both countries trail the OECD average for these figures, with the United States, Canada, Germany and the Nordic countries clear leaders.

**Table 1.3.3 Web Sites by Domain**

| | Country code | Web sites July 1998 | Web sites July 2000 | Sites per 1 000 inhabitants (1998) | Sites per 1 000 inhabitants (2000) | Growth % |
|---|---|---|---|---|---|---|
| Australia | au | 34 258 | 140 972 | 1.8 | 7.5 | 311.5 |
| Austria | at | 10 581 | 53 071 | 1.7 | 6.6 | 251.4 |
| Belgium | be | 6 902 | 47 705 | 0.7 | 4.7 | 354.8 |
| Canada | ca | 26 258 | 75 713 | 0.9 | 2.5 | 84.2 |
| Czech Republic | cz | 6 175 | 52 771 | 0.6 | 5.1 | 327.3 |
| Denmark | dk | 34 123 | 109 931 | 6.4 | 20.5 | 103.4 |
| Finland | fi | 7 158 | 20 966 | 1.4 | 4.1 | 97.5 |
| France | fr | 16 497 | 63 435 | 0.3 | 1.1 | 142.3 |
| Germany | de | 120 086 | 1 607 190 | 1.5 | 19.6 | 527.8 |
| Greece | gr | 2 089 | 15 726 | 0.2 | 1.5 | 324.7 |
| Hungary | hu | 5 016 | 23 491 | 0.5 | 2.3 | 331.4 |
| Iceland | is | 784 | 4 120 | 2.9 | 15.0 | 212.8 |
| Ireland | ie | 2 009 | 9 535 | 0.5 | 2.6 | 188.3 |
| Italy | it | 22 254 | 180 011 | 0.4 | 3.2 | 354.6 |
| Japan | jp | 34 746 | 69 515 | 0.3 | 0.5 | 48.6 |
| Korea | kr | 4 683 | 170 071 | 0.1 | 3.7 | 1 361.8 |
| Luxembourg | lu | 634 | 4 675 | 2.0 | 10.7 | 293.3 |
| Mexico | mx | 4 514 | 12 489 | 0.0 | 0.1 | 81.1 |
| Netherlands | nl | 30 187 | 253 331 | 1.9 | 16.1 | 289.6 |
| New Zealand | nz | 7 915 | 43 213 | 2.1 | 11.4 | 223.2 |
| Norway | no | 7 685 | 37 905 | 1.7 | 8.5 | 193.3 |
| Poland | pl | 6 955 | 69 358 | 0.2 | 1.8 | 448.6 |
| Portugal | pt | 4 911 | 13 178 | 0.5 | 1.3 | 84.2 |
| Spain | es | 7 522 | 25 012 | 0.2 | 0.6 | 110.3 |
| Sweden | se | 24 946 | 60 116 | 2.8 | 6.8 | 71.5 |
| Switzerland | ch | 24 577 | 102 797 | 3.5 | 15.4 | 171.7 |
| Turkey | tr | 3 749 | 10 955 | 0.1 | 0.2 | 101.9 |
| United Kingdom | uk | 131 724 | 607 445 | 2.2 | 10.8 | 201.8 |
| United States | | 94 610 | 94 760 | 0.2 | 0.2 | 22.3 |
| .gov | | 3 541 | 4 364 | | | 11.6 |
| .mil | | 1 095 | 947 | | | 21.9 |
| .us | | 16 189 | 34 265 | | | 35.0 |
| .edu | | 33 385 | 35 186 | | | 35.2 |
| Total gTLDs | | 1 846 736 | 11 905 800 | | | 273.3 |
| .com | | 1 680 172 | 5 482 505 | | | 25.8 |
| .net | | 133 261 | 1 899 971 | | | 68.0 |
| .org | | 152 265 | 552 241 | | | 15.8 |
| .int | | 54 | 87 | | | 21.0 |
| OECD ccTLD total | | 648 427 | 4 329 937 | 0.6 | 3.9 | 25.5 |
| EU ccTLD total | | 452 984 | 1 440 942 | 1.2 | 3.2 | 24.7 |
| World total | | 2 594 625 | 18 169 496 | 0.4 | 3.1 | 30.1 |

Source: Netcraft (http://www.netcraft.com).

[17] gTLD registrations record websites with generic Internet names (e.g. 'xx.com'); ccTLD registrations record country-based Internet names (e.g. 'xx.nz').

### *1.3.5 Domain Name Registrations*

The Domain Name System (DNS) servers map literal Internet addresses (such as www.iscr.org.nz) to the IP addresses of user computers, thereby ensuring correct routing of messages to and from participants in the World Wide Web[18]. When an organisation connects to the Internet, it typically registers a Domain Name (usually based upon its trading name). A count of New Zealand's registered Domain Names thus provides a measure of organisational penetration. Due to cross-border registrations and names registered but not active, this measure is not definitive, although it is indicative. (*The State of e-New Zealand* p 15). Domain names are classified as either country-based (ccTLDs such as .nz) or generic (gTLDs such as .com).

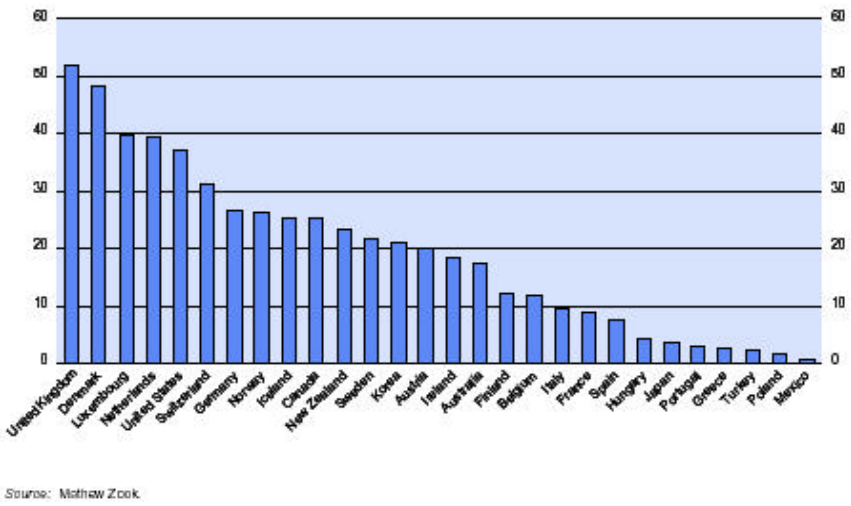
New Zealand continues to have a higher proportion of domain names per 1,000 inhabitants, with 23.4 compared with Australia's 17.6 (Figure 1.3.4). New Zealand entities continue to display the preference for use of ccTLDs identified in *The State of e-New Zealand* compared to Australian entities. New Zealand's 23.4 domain names per 1000 is comprised of 17.8 per 1000 ccTLD and 5.7 gTLDs, whereas for Australia has 9.8 per 1000 gTLDs and 7.8 per 1000 ccTLDs. This compares favourably to Australia with 1.8 in 1998 and 7.5 in 2000. The New Zealand rate of Domain name registrations is approximately half that of the world leader the United Kingdom, which is probably a reflection of the large number of multi-national companies operating in New Zealand, with websites registered in overseas domains.

The OECD notes the fierce competition among resellers of domain names, which has contributed to the very high number of registrations of the .uk ccTLD, and the associated anticipatory registration of names. Thus, registered domain names are not necessarily a good indication of active usage.

The pricing of domain name registration can influence the ability of an entity to exchange information over the Internet. Most domain name registries operate as monopolies, allocating names under licence from the International Corporation for the Assignment of Network Names (ICANN)[19]. The cost of registering a domain name in New Zealand is, at $41.61 US PPP substantially below the OECD average of $58.40 US PPP. Further, this is price is some 20% lower that the comparable price in Australia ($52.88 US PPP) – Table 1.3.4.

[18] OECD *Internet Infrastructure Indicators* p 11.
[19] Boles de Boer, Lewis Evans and Bronwyn Howell. 2000. *Governance of the Internet: emerging issues.*

**Figure 1.3.4 Domain Names in OECD per 1000 inhabitants, July 2000**




Source: Mathew Zook

### *1.3.6 Secure Web Servers per 100,000 Inhabitants*

Traditionally, it has been assumed that if there is strong commercial uptake of Internet usage, then the level of secure socket layer (SSL) server utilisation for encrypted transmission over TCI/IP networks will be higher than if the Internet is being used for recreational purposes. This assumption is based upon the premise that commercial transactions have a greater requirement to protect sensitive data from scrambling, loss and hacking than recreational transactions. The most common usage of secure servers is thus to provide a secure link for e-commerce transactions, with the majority of these transactions being encryption of credit cards for retail organisations and to restrict access to private information.

The number of secure servers recorded by the OECD is considered a reasonably robust measure of each country's secure-server count, as software registration data (from which this statistic is collated) contains the user's business address, and hence the physical location irrespective of the country of registration of the domain name[20] (*The State of e-New Zealand* p 15).

Australia and New Zealand are both above the OECD average of 8.6 secure servers per 100,000 inhabitants at July 2000, with New Zealand having 12.7 and Australia 14.9, although average annual growth in New Zealand is higher than Australia at 218% as compared to 17.4%. Table 1.3.5 shows the high uptake of both New Zealand and Australia of secure servers per 100,000 inhabitants. New Zealand has, however, been overtaken in its ranking of fourth in the world in this statistic by Canada (12.78) since the March 2000 figure reported in *The State of e-New*

[20] For example, the registration for www.amazon.com is Seattle, Washington, USA. This is also the site of registration for www.amazon.co.uk, because that is the physical location of that server.

*Zealand*. This is the only Internet-based statistic in which New Zealand ranks lower than Australia. It is noted, however, that the nature of trade patterns in New Zealand (single desk exporters, high level of imports, trading in a volatile fringe currency etc. may encourage New Zealand firms to conduct a higher proportion of their electronic commerce transactions on foreign-based servers (*The State of e-New Zealand* p 17-18).

**Table 1.3.4. Domain Name Registry Prices, July 2000**

| | Country code | Registry | Fee per year, based on three-years (USD PPPs) |
|---|---|---|---|
| Australia | au | Internet Names Australia | 62.86 |
| Austria | at | nic.at | 54.89 |
| Belgium | be | DNS BE | 70.00 |
| Canada | ca | WebNames | 46.73 |
| Czech Republic | cz | CZNIC | 81.57 |
| Denmark | dk | dk-Hostmaster | 10.89 |
| Finland | fi | FAC | 29.37 |
| France | fr | AFNIC (indirect through ISP) | 43.83 |
| Germany | de | DENIC | 82.28 |
| Greece | gr | GR Hostmaster | 0.00 |
| Hungary | hu | ISP (indirect through ISP) | 219.41 |
| Iceland | is | ISNIC/Siminn | 48.48 |
| Ireland | ie | IE Internet Domain Registry | 139.86 |
| Italy | it | NA Italcom | 146.66 |
| Japan | jp | JPNIC | 41.69 |
| Korea | kr | KRNIC | 26.67 |
| Luxembourg | lu | dns-lu Restena | 47.93 |
| Mexico | mx | NIC-Mexico | 50.00 |
| Netherlands | nl | SIDN (indirect through ISP) | 65.36 |
| New Zealand | nz | Domainz | 41.61 |
| Norway | no | NORID | 17.36 |
| Poland | pl | NASK | 32.62 |
| Portugal | pt | DNS.PT (FCCN) | 40.51 |
| Spain | es | ES-NIC | 71.07 |
| Sweden | se | ISP (indirect through ISP) | 32.48 |
| Switzerland | ch | Switch | 38.29 |
| Turkey | tr | METU | 40.67 |
| United Kingdom | uk | Nominet UK | 35.07 |
| United States | us | USC-ISI | 0.00 |
| gTLDs | com | Network Solutions | 35.00 |
| OECD | | | 68.40 |

Note: These data are the lowest registration price direct to the registry (unless otherwise stated) for initial registration and three years operation expressed in US$ purchasing power parities.
France: direct registration not allowed, above is cost for an ISP excluding FRF 1 400 per annum membership.
Sweden: direct registration not allowed, above is cost for an ISP excluding membership.
Netherlands: direct registration not allowed, above is cost for an ISP excluding membership.
Hungary: direct registration not allowed, and ISP membership and registration charges are confidential. The above is cost for registration through a representative ISP (Matarnic).
1. Network Solutions is one of a number of registries registering names under the .com domain.
Source: Registry Web sites.

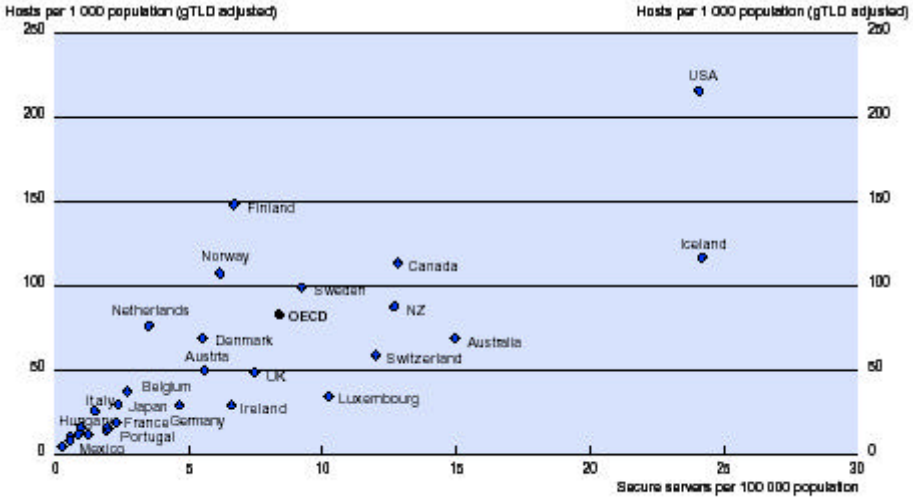
Countries, such as New Zealand and Australia, that rank high on both scales of hosts and secure servers are those that are assumed to be the most active in e-commerce as producers and in terms of high levels of connectivity. Figure 1.3.5 details this high proportion of both countries, as evidence of New Zealand's world leadership in potential to utilise e-commerce activities.

**Table 1.3.5 Secure Servers in OECD Countries**

| | Secure servers July 1998 | OECD share | Secure servers July 2000 | OECD share | Per 100 000 inhabitants (July 1998) | Per 100 000 inhabitants (July 2000) | Average annual growth % |
|---|---|---|---|---|---|---|---|
| Australia | 632 | 3.2 | 2 828 | 3.1 | 3.37 | 14.91 | 174 |
| Austria | 98 | 0.5 | 447 | 0.5 | 1.21 | 5.52 | 178 |
| Belgium | 52 | 0.3 | 268 | 0.3 | 0.51 | 2.62 | 208 |
| Canada | 929 | 4.7 | 3 896 | 4.2 | 3.07 | 12.78 | 160 |
| Czech Republic | 19 | 0.1 | 194 | 0.2 | 0.18 | 1.89 | 461 |
| Denmark | 44 | 0.2 | 289 | 0.3 | 0.83 | 5.43 | 278 |
| Finland | 68 | 0.3 | 343 | 0.4 | 1.32 | 6.63 | 202 |
| France | 222 | 1.1 | 1 297 | 1.4 | 0.38 | 2.19 | 242 |
| Germany | 492 | 2.5 | 3 761 | 4.1 | 0.60 | 4.58 | 332 |
| Greece | 8 | 0.04 | 87 | 0.1 | 0.08 | 0.83 | 494 |
| Hungary | 18 | 0.1 | 90 | 0.1 | 0.18 | 0.89 | 200 |
| Iceland | 13 | 0.1 | 67 | 0.1 | 4.75 | 24.14 | 208 |
| Ireland | 56 | 0.3 | 245 | 0.3 | 1.51 | 6.54 | 169 |
| Italy | 167 | 0.9 | 795 | 0.9 | 0.29 | 1.39 | 188 |
| Japan | 429 | 2.2 | 2 900 | 3.1 | 0.34 | 2.29 | 288 |
| Korea | 38 | 0.2 | 243 | 0.3 | 0.08 | 0.52 | 270 |
| Luxembourg | 11 | 0.1 | 44 | 0.05 | 2.58 | 10.17 | 150 |
| Mexico | 26 | 0.1 | 176 | 0.2 | 0.03 | 0.18 | 288 |
| Netherlands | 127 | 0.6 | 541 | 0.6 | 0.81 | 3.42 | 163 |
| New Zealand | 90 | 0.5 | 482 | 0.5 | 2.37 | 12.65 | 218 |
| Norway | 55 | 0.3 | 273 | 0.3 | 1.24 | 6.12 | 198 |
| Poland | 23 | 0.1 | 188 | 0.2 | 0.06 | 0.49 | 359 |
| Portugal | 27 | 0.1 | 116 | 0.1 | 0.27 | 1.16 | 165 |
| Spain | 239 | 1.2 | 759 | 0.8 | 0.61 | 1.93 | 109 |
| Sweden | 145 | 0.7 | 811 | 0.9 | 1.64 | 9.16 | 230 |
| Switzerland | 152 | 0.8 | 854 | 0.9 | 2.14 | 11.96 | 231 |
| Turkey | 7 | 0.04 | 116 | 0.1 | 0.01 | 0.18 | 779 |
| United Kingdom | 714 | 3.6 | 4 404 | 4.8 | 1.21 | 7.40 | 258 |
| United States | 14 674 | 75.0 | 65 565 | 71.2 | 5.43 | 24.03 | 173 |
| OECD total | 19 575 | 100.0 | 92 079 | 100.0 | 1.78 | 8.30 | 185 |
| EU total | 3 004 | | 16 588 | | 0.80 | 4.42 | 226 |
| World total | 20 455 | | 96 585 | | 0.35 | 1.61 | 186 |

*Source:* Netcraft (http://www.netcraft.com).

**Figure 1.3.5 Hosts and Secure Servers per Population July 2000**



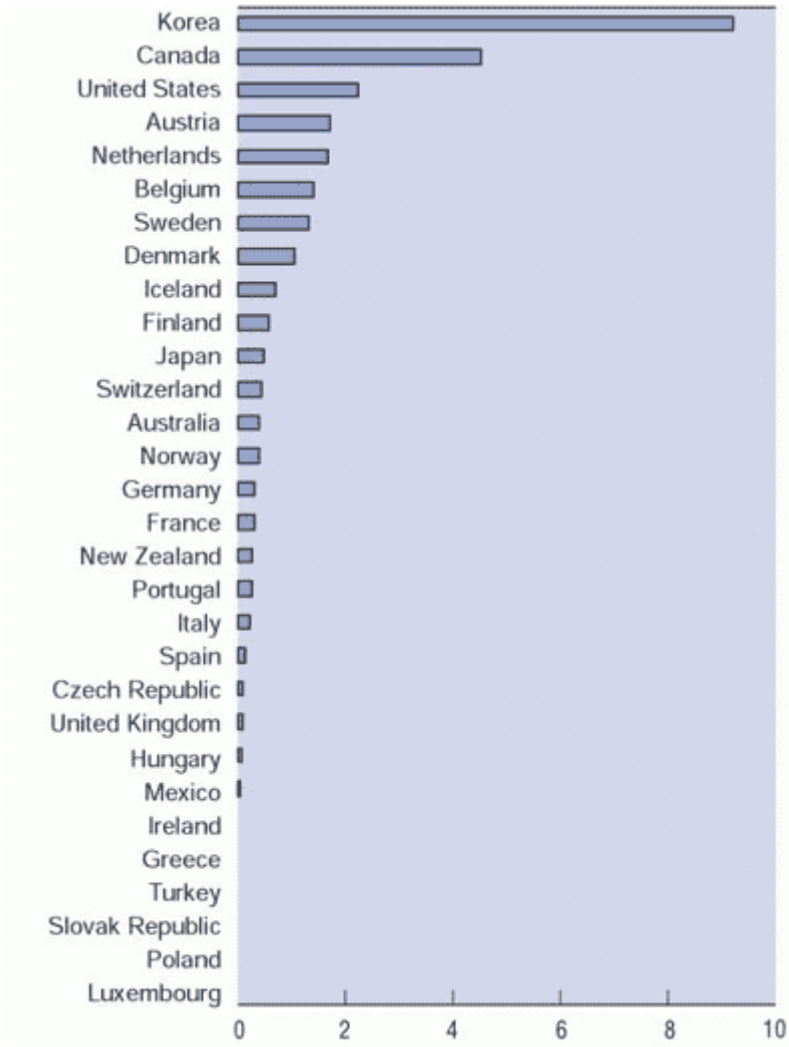

*Source:* Netcraft (www.netcraft.com) and Netsizer (www.netsizer.com). OECD Analysis.

### *1.3.7 High-Speed Internet Access Uptake*

Much emphasis has been given in recent months to the ability of users to access high-speed Internet connections (cable modem and broadband services such as Digital Subscriber Lines (DSL), of which Telecom's Asynchronous (ADSL) offering is an example). Worldwide, uptake of such services has been variable. Figure 1.3.6 shows that Korea leads the OECD with the number of connections per 100 inhabitants. New Zealand has slightly more than half the number of high speed connections of Australia.

While infrastructure investment has played a role in the very high rate of this connectivity in Korea, pricing also has a role to play (see section 1.3.8 below). Flat-rate pricing for dial-up modems has biased usage of these services by heavy users (Scoping Study p 81-83) to the extent the heaviest users use disproportionately more of the resource than the lighter users (Varayia and Varian (1999)). The propensity to charge for broadband services per Megabyte downloaded biases heavy users towards continued use of dial-up services, especially if the information they are downloading is neither time nor mission-critical (Lehr and McKnight (2000)). If, as hypothesised in the Scoping Report, many of these heavy users are recreational users (e.g. teenagers downloading MP3 music files and video clips), then the time-cost trade-off may not yet justify the substitution of dial-up by high-speed pay-per-use services for residential users. This leaves the demand for high-speed services predominantly in the business sector, where New Zealand has many small businesses for whom the volume of electronic data transferred may not yet have reached the level where the benefits of high-speed access outweigh the costs, given current applications and industry information intensity (*Rural-Urban Digital Divide*). If the optimal time to invest has not yet been reached for these businesses, investing too early in high-speed may in fact be less efficient for these businesses than remaining with dial-up connections. From the perspective of overall welfare, however, until high data volume applications for which large numbers of consumers are prepared to pay a premium for high speed access are developed, persistence with flat-rate pricing may dampen demand and investment in broadband services, delaying the societal benefits to be gained from development of the new products and services based upon high volume data transfers (Goolsbee (2001)). While the extent of this effect is uncertain, and to some extent controversial, we note it is one which warrants future investigation.

**Figure 1.3.6 Number of DSL and cable modem lines per 100 inhabitants Jan 1 2001**




Source: OECD Telecommunications Database, June 2001.

### *1.3.8 Internet Access Prices*

In *The State of e-New Zealand*, we highlighted the role played by unmetered pricing and 'always-on' access to the Internet in the development of New Zealand's world-leading position in Internet connectivity. Further, that paper demonstrated how relative pricing advantages in Internet Service Provider (ISP) prices contributed significantly to the ranking advantage in numbers of Internet hosts, Internet users and hours of use of New Zealand over Australia. The differences in price were consistent with the much higher levels of Internet penetration evidenced in New Zealand. (*The State of e-New Zealand* p 27-31).

Twelve months on, that advantage continues to apply. Using the OECD basket of Internet access prices, although New Zealand exhibits higher Purchasing Power Parity (PPP) prices for the PSTN fixed line access than Australia, over all number of hours of access measured, Australian

prices are between 38% and 75% higher than New Zealand ISP prices (Tables 1.3.6). This compares to ISP prices in New Zealand between 26.5% and 41% cheaper than those in Australia in the earlier report. New Zealand also has a clear pricing advantage over Australia in total price (including both PSTN and ISP) for higher levels of use (40 hours). Total prices for higher usage also fall significantly below the OECD average, as well as total prices for lower hours of usage at peak times. New Zealand prices exceed the OECD average only for 20 hours peak time usage.

New Zealand's price advantage in ISP prices over the USA for low usage at peak times, identified in *The State of e-New Zealand* has since disappeared, due to very significant price-cutting of ISP charges in the USA since the last survey. Tables 1.3.7 show that while New Zealand prices for 20 hours and 40 hours usage fell 5% and 19% between 1999 and 2000, USA prices fell 39% and 36% respectively. It is significant to note that the New Zealand prices for 40 hours usage fell more sharply than those in Australia (13%). However, while 20 hour prices fell less in New Zealand in 1999-2000 (5% as opposed to 10%), New Zealand prices in this usage category fell by a total of 17% over the period 1998-2000 (Australia 4%) indicating that New Zealand prices have fallen consistently, while Australian prices actually rose over the period 1998-1999.

It is interesting to note that prices for dial-up access have risen significantly in Korea (24% off peak for 20 hours, 29% off-peak for 40 hours) in 1999-2000. Korea is the only country to record price increases for access for high volume dial-up usage in this period, which coincides with the surge in its use of broadband (Figure 1.3.6). This tends to confirm the relationship between dial-up pricing and broadband demand postulated in section 1.3.7 above.

**Table 1.3.6a OECD Internet Access Basket for 20 Hours Peak Times (incl VAT) Sept 2000**

| | PSTN fixed | | PSTN usage | | ISP | | Total | |
|---|---|---|---|---|---|---|---|---|
| | USD | USD PPP | USD | USD PPP | USD | USD PPP | USD | USD PPP |
| Australia | 8.76 | 10.95 | 1.52 | 2.29 | 17.38 | 21.73 | 28.86 | 35.07 |
| Austria | 18.48 | 19.08 | 26.65 | 25.72 | 0.00 | 0.00 | 45.14 | 44.79 |
| Belgium | 14.65 | 16.09 | 26.90 | 29.56 | 5.59 | 6.11 | 47.13 | 51.79 |
| Canada | 16.76 | 20.44 | 0.00 | 0.00 | 12.37 | 15.09 | 29.13 | 35.53 |
| Czech Republic | 4.71 | 11.77 | 26.72 | 66.80 | 15.89 | 39.72 | 47.32 | 107.29 |
| Denmark | 16.24 | 15.33 | 0.00 | 0.00 | 16.87 | 15.16 | 33.11 | 30.51 |
| Finland | 11.55 | 11.41 | 11.44 | 11.30 | 7.36 | 7.17 | 30.35 | 29.88 |
| France | 16.66 | 11.11 | 0.00 | 0.00 | 27.04 | 22.54 | 32.70 | 33.65 |
| Germany | 13.31 | 13.72 | 0.00 | 0.00 | 19.79 | 20.40 | 33.10 | 34.12 |
| Greece | 7.59 | 10.20 | 7.59 | 10.20 | 15.82 | 21.26 | 31.01 | 41.66 |
| Hungary | 7.66 | 16.76 | 25.16 | 55.06 | 9.55 | 22.74 | 42.61 | 101.45 |
| Iceland | 6.09 | 5.33 | 15.29 | 75.51 | 17.24 | 6.59 | 24.29 | 29.83 |
| Ireland | 15.17 | 17.05 | 16.04 | 31.36 | 13.89 | 16.61 | 45.07 | 64.02 |
| Italy | 16.46 | 12.63 | 16.25 | 19.58 | 0.00 | 0.00 | 26.73 | 32.21 |
| Japan | 16.17 | 9.86 | 24.02 | 14.65 | 18.02 | 10.09 | 58.20 | 35.49 |
| Korea | 2.47 | 3.98 | 10.87 | 17.21 | 3.85 | 6.21 | 16.99 | 27.40 |
| Luxembourg | 11.80 | 12.69 | 0.00 | 0.00 | 42.86 | 45.87 | 54.46 | 58.56 |
| Mexico | 17.20 | 24.57 | 0.00 | 0.00 | 8.98 | 12.83 | 26.18 | 37.40 |
| Netherlands | 16.68 | 18.53 | 15.26 | 31.56 | 0.00 | 0.00 | 31.94 | 50.08 |
| New Zealand | 16.46 | 20.77 | 0.00 | 0.00 | 11.13 | 15.08 | 27.36 | 35.85 |
| Norway | 28.47 | 16.91 | 21.61 | 19.52 | 10.94 | 9.04 | 61.02 | 45.47 |
| Poland | 7.00 | 13.22 | 32.15 | 60.65 | 0.00 | 0.00 | 39.16 | 73.86 |
| Portugal | 11.62 | 17.38 | 26.26 | 39.62 | 0.00 | 0.00 | 33.17 | 47.31 |
| Spain | 9.09 | 11.96 | 25.14 | 33.57 | 0.00 | 0.00 | 34.00 | 45.53 |
| Sweden | 11.32 | 10.02 | 26.02 | 23.03 | 2.59 | 2.29 | 39.93 | 35.33 |
| Switzerland | 15.93 | 10.77 | 30.64 | 20.34 | 0.00 | 0.00 | 46.69 | 31.10 |
| Turkey | 3.59 | 0.65 | 3.59 | 0.65 | 3.85 | 7.11 | 11.04 | 20.41 |
| United Kingdom | 14.87 | 13.64 | 23.25 | 27.11 | 6.90 | 8.00 | 44.62 | 48.75 |
| United States | 13.65 | 13.65 | 2.53 | 2.53 | 5.45 | 5.45 | 21.45 | 21.45 |
| OECD | 12.17 | 13.48 | 13.11 | 15.14 | 5.39 | 11.05 | 30.65 | 44.09 |
| EU | 13.27 | 14.21 | 16.43 | 17.62 | 9.34 | 9.68 | 39.71 | 41.99 |

Source: OECD.

**Table 1.3.6b OECD Internet Access Basket for 20 Hours Off Peak Times (incl VAT) Sept 2000**

| | PSTN fixed | | PSTN usage | | ISP | | Total | |
|---|---|---|---|---|---|---|---|---|
| | USD | USD PPP | USD | USD PPP | USD | USD PPP | USD | USD PPP |
| Australia | 8.76 | 10.95 | 1.52 | 2.29 | 17.38 | 21.73 | 28.86 | 35.07 |
| Austria | 18.48 | 19.08 | 12.94 | 13.34 | 0.00 | 0.00 | 31.42 | 32.48 |
| Belgium | 14.65 | 16.09 | 17.93 | 19.71 | 0.00 | 0.00 | 32.58 | 35.80 |
| Canada | 16.76 | 20.44 | 0.00 | 0.00 | 12.37 | 15.09 | 29.13 | 35.53 |
| Czech Republic | 4.71 | 11.77 | 12.33 | 30.82 | 8.44 | 21.10 | 21.48 | 53.68 |
| Denmark | 16.56 | 15.53 | 0.00 | 0.00 | 16.87 | 15.16 | 33.11 | 30.61 |
| Finland | 11.55 | 11.41 | 9.30 | 9.19 | 7.36 | 7.17 | 28.12 | 27.78 |
| France | 16.66 | 11.11 | 0.00 | 0.00 | 21.64 | 22.54 | 32.30 | 33.65 |
| Germany | 13.31 | 13.72 | 0.00 | 0.00 | 19.79 | 20.40 | 33.10 | 34.12 |
| Greece | 7.59 | 10.20 | 5.80 | 5.15 | 15.82 | 21.26 | 27.21 | 36.57 |
| Hungary | 7.66 | 16.76 | 10.42 | 24.81 | 9.55 | 22.74 | 27.85 | 66.58 |
| Iceland | 6.09 | 5.33 | 12.58 | 10.06 | 11.24 | 8.99 | 30.47 | 24.38 |
| Ireland | 15.17 | 17.05 | 12.46 | 13.09 | 0.00 | 0.00 | 27.62 | 31.01 |
| Italy | 16.46 | 12.63 | 11.42 | 13.76 | 0.00 | 0.00 | 27.90 | 26.38 |
| Japan | 16.17 | 9.86 | 24.02 | 14.65 | 18.02 | 10.09 | 58.20 | 35.49 |
| Korea | 2.47 | 3.98 | 10.87 | 17.21 | 3.85 | 6.21 | 16.99 | 27.48 |
| Luxembourg | 11.80 | 12.69 | 0.00 | 0.00 | 25.41 | 25.17 | 35.21 | 37.87 |
| Mexico | 17.20 | 24.57 | 0.00 | 0.00 | 8.98 | 12.83 | 26.18 | 37.48 |
| Netherlands | 16.68 | 18.53 | 15.26 | 16.96 | 0.00 | 0.00 | 31.94 | 35.49 |
| New Zealand | 16.16 | 22.77 | 0.00 | 0.00 | 11.13 | 15.68 | 27.30 | 38.45 |
| Norway | 28.47 | 16.91 | 15.43 | 12.74 | 10.94 | 9.04 | 46.83 | 38.78 |
| Poland | 7.00 | 13.22 | 16.08 | 30.33 | 0.00 | 0.00 | 23.08 | 43.55 |
| Portugal | 11.62 | 17.38 | 8.46 | 12.47 | 10.08 | 15.07 | 31.16 | 45.92 |
| Spain | 9.09 | 11.96 | 12.43 | 16.06 | 0.00 | 0.00 | 21.52 | 28.02 |
| Sweden | 11.32 | 10.02 | 13.36 | 11.64 | 2.59 | 2.29 | 27.26 | 24.14 |
| Switzerland | 15.93 | 10.77 | 20.99 | 14.20 | 0.00 | 0.00 | 36.92 | 25.18 |
| Turkey | 3.59 | 6.65 | 2.75 | 5.09 | 3.85 | 7.14 | 9.90 | 18.38 |
| United Kingdom | 14.87 | 13.64 | 14.33 | 12.97 | 0.00 | 0.00 | 29.20 | 26.61 |
| United States | 13.65 | 13.65 | 2.53 | 2.53 | 5.45 | 5.45 | 21.45 | 21.45 |
| OECD | 12.17 | 13.66 | 8.68 | 10.16 | 8.16 | 9.56 | 29.31 | 34.19 |
| EU | 13.27 | 14.21 | 8.72 | 9.67 | 7.48 | 8.29 | 29.47 | 32.69 |

Note: The off-peak time used for these calculations is 20:00 hours on a weekday. In Portugal, off-peak pricing does not commence until 22:00 hours; the tariffs used for this basket are those in effect at 21:00 hours.
Source: OECD.

**Table 1.3.6c OECD Internet Access Basket for 40 Hours Peak Times (incl VAT) Sept 2000**

| | PSTN Fixed | | PSTN Usage | | ISP | | Total | |
|---|---|---|---|---|---|---|---|---|
| | USD | USD PPP | USD | USD PPP | USD | USD PPP | USD | USD PPP |
| Australia | 8.76 | 10.05 | 3.83 | 4.79 | 21.77 | 27.21 | 34.35 | 42.04 |
| Austria | 18.48 | 19.06 | 48.91 | 51.85 | 0.00 | 0.00 | 60.39 | 70.51 |
| Belgium | 14.65 | 16.09 | 53.84 | 59.12 | 5.59 | 6.14 | 74.09 | 81.36 |
| Canada | 16.76 | 20.04 | 0.00 | 0.00 | 12.37 | 15.09 | 29.13 | 35.13 |
| Czech Republic | 4.71 | 11.77 | 63.32 | 158.43 | 11.49 | 28.72 | 69.57 | 173.92 |
| Denmark | 18.24 | 15.33 | 0.00 | 0.00 | 28.99 | 22.76 | 57.22 | 48.09 |
| Finland | 11.55 | 11.41 | 23.87 | 22.99 | 7.26 | 7.17 | 41.69 | 41.18 |
| France | 10.66 | 11.11 | 0.00 | 0.00 | 48.45 | 48.39 | 57.12 | 59.50 |
| Germany | 13.31 | 13.72 | 0.00 | 0.00 | 35.88 | 35.99 | 49.19 | 50.71 |
| Greece | 7.59 | 10.26 | 15.19 | 20.52 | 15.82 | 21.38 | 38.60 | 52.16 |
| Hungary | 7.88 | 18.75 | 32.48 | 78.74 | 21.71 | 51.68 | 62.07 | 150.13 |
| Iceland | 6.60 | 5.33 | 38.78 | 31.83 | 11.24 | 8.99 | 56.62 | 46.14 |
| Ireland | 15.17 | 17.05 | 38.00 | 42.73 | 13.89 | 15.61 | 67.06 | 75.38 |
| Italy | 10.48 | 12.63 | 27.48 | 33.08 | 0.00 | 0.00 | 37.94 | 45.71 |
| Japan | 16.17 | 9.06 | 46.18 | 26.17 | 15.62 | 10.09 | 80.30 | 46.01 |
| Korea | 2.47 | 3.08 | 21.34 | 34.43 | 3.85 | 6.21 | 27.66 | 44.62 |
| Luxembourg | 11.80 | 12.09 | 0.00 | 0.00 | 84.14 | 87.25 | 95.94 | 99.34 |
| Mexico | 17.20 | 24.57 | 0.00 | 0.00 | 8.98 | 12.83 | 26.18 | 37.40 |
| Netherlands | 16.68 | 18.53 | 56.79 | 63.10 | 0.00 | 0.00 | 73.47 | 81.63 |
| New Zealand | 16.16 | 22.77 | 0.00 | 0.00 | 11.13 | 15.68 | 27.30 | 38.45 |
| Norway | 20.47 | 16.91 | 45.58 | 37.84 | 10.94 | 9.04 | 77.31 | 63.80 |
| Poland | 7.00 | 13.22 | 64.38 | 131.33 | 0.00 | 0.00 | 71.31 | 134.56 |
| Portugal | 11.82 | 17.38 | 40.78 | 59.85 | 0.00 | 0.00 | 52.52 | 77.24 |
| Spain | 9.09 | 11.96 | 49.45 | 65.86 | 0.00 | 0.00 | 58.54 | 77.02 |
| Sweden | 11.33 | 10.02 | 53.04 | 46.85 | 2.59 | 2.29 | 65.96 | 58.36 |
| Switzerland | 15.83 | 12.77 | 65.31 | 52.67 | 0.00 | 0.00 | 81.14 | 65.44 |
| Turkey | 3.59 | 6.65 | 19.77 | 39.85 | 3.85 | 7.14 | 10.22 | 33.74 |
| United Kingdom | 14.67 | 13.64 | 0.00 | 0.00 | 50.98 | 46.77 | 65.65 | 60.41 |
| United States | 13.65 | 13.65 | 4.68 | 4.68 | 5.45 | 5.45 | 23.78 | 23.78 |
| OECD | 12.17 | 13.68 | 37.38 | 34.89 | 15.15 | 17.37 | 64.71 | 66.14 |
| EU | 13.37 | 14.21 | 37.83 | 31.88 | 19.42 | 19.84 | 80.62 | 65.52 |

Source: OECD.

**Table 1.3.6d OECD Internet Access Basket for 40 Hours Off Peak Times (incl VAT) Sept 2000**

| | PSTN Fixed | | PSTN Usage | | ISP | | Total | |
|---|---|---|---|---|---|---|---|---|
| | USD | USD PPP | USD | USD PPP | USD | USD PPP | USD | USD PPP |
| Australia | 8.76 | 10.05 | 3.83 | 4.79 | 21.77 | 27.21 | 34.35 | 42.04 |
| Austria | 18.09 | 19.06 | 25.56 | 26.96 | 0.00 | 0.00 | 43.36 | 45.73 |
| Belgium | 14.65 | 16.09 | 28.00 | 29.56 | 5.59 | 6.14 | 47.13 | 51.79 |
| Canada | 16.76 | 20.44 | 0.00 | 0.00 | 12.37 | 15.09 | 29.13 | 35.53 |
| Czech Republic | 4.71 | 11.77 | 24.65 | 61.64 | 6.44 | 11.10 | 35.80 | 84.51 |
| Denmark | 18.24 | 15.33 | 0.00 | 0.00 | 31.71 | 26.65 | 49.96 | 41.98 |
| Finland | 11.55 | 11.41 | 15.91 | 15.30 | 7.26 | 7.17 | 37.42 | 36.97 |
| France | 10.66 | 11.11 | 0.00 | 0.00 | 48.45 | 48.39 | 57.12 | 59.50 |
| Germany | 13.31 | 13.72 | 0.00 | 0.00 | 35.88 | 35.99 | 49.19 | 50.71 |
| Greece | 7.59 | 10.26 | 7.59 | 10.26 | 15.82 | 21.38 | 31.01 | 41.90 |
| Hungary | 7.88 | 18.75 | 13.89 | 33.06 | 13.02 | 31.01 | 34.79 | 82.84 |
| Iceland | 6.06 | 5.33 | 25.16 | 20.13 | 11.24 | 8.99 | 43.06 | 34.44 |
| Ireland | 15.17 | 17.05 | 20.04 | 24.70 | 0.00 | 0.00 | 37.21 | 41.80 |
| Italy | 10.48 | 12.63 | 21.72 | 26.17 | 0.00 | 0.00 | 32.20 | 38.79 |
| Japan | 16.17 | 9.06 | 46.18 | 26.17 | 15.62 | 10.09 | 80.30 | 46.01 |
| Korea | 2.47 | 3.08 | 0.00 | 0.00 | 24.68 | 39.80 | 27.14 | 43.78 |
| Luxembourg | 11.80 | 12.09 | 0.00 | 0.00 | 42.86 | 45.97 | 54.46 | 58.06 |
| Mexico | 17.20 | 24.57 | 0.00 | 0.00 | 8.98 | 12.83 | 26.18 | 37.40 |
| Netherlands | 16.68 | 18.53 | 28.39 | 31.55 | 0.00 | 0.00 | 45.07 | 50.08 |
| New Zealand | 16.16 | 22.77 | 0.00 | 0.00 | 11.13 | 15.68 | 27.30 | 38.45 |
| Norway | 20.47 | 16.91 | 30.37 | 25.10 | 10.94 | 9.04 | 61.78 | 51.05 |
| Poland | 7.00 | 13.22 | 32.15 | 60.66 | 0.00 | 0.00 | 39.16 | 73.88 |
| Portugal | 11.82 | 17.38 | 16.50 | 24.40 | 10.86 | 15.97 | 39.27 | 57.75 |
| Spain | 9.09 | 11.96 | 0.00 | 0.00 | 14.67 | 19.31 | 23.76 | 31.27 |
| Sweden | 11.32 | 10.02 | 26.75 | 25.68 | 2.59 | 2.29 | 40.66 | 35.98 |
| Switzerland | 15.83 | 12.77 | 41.96 | 33.85 | 0.00 | 0.00 | 57.82 | 46.63 |
| Turkey | 3.59 | 6.65 | 6.48 | 11.97 | 3.85 | 7.14 | 13.91 | 25.76 |
| United Kingdom | 14.67 | 13.64 | 0.00 | 0.00 | 14.71 | 13.49 | 29.58 | 27.13 |
| United States | 13.65 | 13.65 | 4.68 | 4.68 | 5.45 | 5.45 | 23.78 | 23.78 |
| OECD | 12.17 | 13.68 | 14.61 | 17.22 | 12.90 | 15.10 | 39.69 | 46.20 |
| EU | 13.27 | 14.21 | 12.86 | 14.18 | 14.73 | 15.76 | 40.86 | 44.15 |

Source: OECD

**Table 1.3.7a OECD Internet Access Basket for 20 Hours USD PPP incl VAT 1998-2000**

| | 1998 | | 1999 | | September 2000 | | Change (%) 1998/2000 | | Change (%) 1999/2000 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Peak | Off-peak | Peak | Off-peak | Peak | Off-peak | Peak | Off-peak | Peak | Off-peak |
| Australia | 38.43 | 38.43 | 38.81 | 38.81 | 35.97 | 35.97 | -6 | -6 | -10 | -10 |
| Austria | 109.10 | 64.03 | 58.24 | 48.59 | 44.78 | 32.40 | -59 | -49 | -44 | -33 |
| Belgium | 97.70 | 46.29 | 82.32 | 41.94 | 51.79 | 26.56 | -47 | -23 | -37 | -15 |
| Canada | 30.92 | 30.92 | 31.45 | 31.45 | 35.53 | 35.53 | 15 | 15 | 13 | 13 |
| Czech Republic | 105.77 | 74.20 | 176.28 | 77.71 | 167.29 | 53.89 | 1 | -28 | -5 | -31 |
| Denmark | 54.04 | 31.73 | 53.63 | 27.99 | 30.51 | 30.51 | -44 | -4 | -43 | 9 |
| Finland | 38.38 | 38.77 | 32.15 | 26.37 | 29.88 | 21.78 | -5 | -40 | -7 | -4 |
| France | 72.06 | 46.27 | 68.60 | 38.15 | 33.85 | 33.85 | -53 | -30 | -44 | -12 |
| Germany | 58.44 | 58.84 | 48.15 | 48.15 | 34.12 | 34.12 | -50 | -50 | -30 | -26 |
| Greece | 60.15 | 60.15 | 61.38 | 60.38 | 41.90 | 36.77 | -30 | -39 | -30 | -44 |
| Hungary | 83.01 | 83.01 | 169.97 | 96.29 | 101.45 | 66.30 | 61 | -5 | -40 | -30 |
| Iceland | 41.66 | 31.31 | 41.54 | 28.26 | 29.83 | 24.36 | -29 | -22 | -28 | -14 |
| Ireland | 60.16 | 60.57 | 59.26 | 29.84 | 54.02 | 31.04 | -33 | -39 | -9 | 4 |
| Italy | 42.27 | 35.64 | 41.39 | 28.45 | 32.31 | 26.36 | -24 | -26 | -22 | -10 |
| Japan | 51.65 | 51.65 | 48.15 | 48.15 | 35.49 | 35.49 | -31 | -31 | -12 | -12 |
| Korea | 47.78 | 47.78 | 27.22 | 22.06 | 27.40 | 27.40 | -43 | -43 | 1 | 24 |
| Luxembourg | 73.06 | 52.68 | 91.93 | 61.86 | 68.60 | 33.87 | -26 | -36 | -36 | -39 |
| Mexico | 49.52 | 49.52 | 68.21 | 68.21 | 37.40 | 37.40 | -25 | -25 | -39 | -39 |
| Netherlands | 82.75 | 60.23 | 51.13 | 30.36 | 50.08 | 35.49 | -39 | -12 | -2 | 6 |
| New Zealand | 46.23 | 46.23 | 48.61 | 48.61 | 38.45 | 38.45 | -17 | -17 | -5 | -5 |
| Norway | 49.00 | 39.36 | 48.71 | 38.37 | 46.47 | 38.70 | -5 | -2 | -3 | -2 |
| Poland | 69.73 | 69.72 | 68.60 | 68.60 | 73.80 | 43.55 | 6 | -38 | 14 | -35 |
| Portugal | 61.20 | 46.12 | 77.35 | 68.12 | 47.31 | 46.62 | -23 | 1 | -39 | 24 |
| Spain | 42.09 | 42.09 | 58.65 | 58.65 | 46.53 | 26.32 | 8 | -38 | -19 | -44 |
| Sweden | 48.01 | 36.00 | 38.81 | 26.61 | 35.33 | 24.14 | -26 | -34 | -9 | -9 |
| Switzerland | 68.99 | 68.99 | 54.13 | 31.60 | 39.10 | 26.70 | -42 | -58 | -28 | -6 |
| Turkey | 44.50 | 37.62 | 46.81 | 41.53 | 20.44 | 17.76 | -54 | -53 | -56 | -57 |
| United Kingdom | 70.01 | 46.17 | 69.57 | 39.42 | 40.75 | 26.61 | -42 | -42 | -33 | -15 |
| United States | 39.77 | 39.77 | 35.18 | 35.18 | 21.43 | 21.43 | -46 | -46 | -39 | -39 |
| OECD | 58.13 | 46.02 | 58.75 | 43.75 | 44.09 | 34.19 | -24 | -26 | -25 | -22 |
| EU | 64.60 | 46.04 | 59.37 | 41.29 | 41.99 | 32.05 | -35 | -30 | -29 | -22 |

Source: OECD

**Table 1.3.7b OECD Internet Access Basket for 40 Hours USD PPP incl VAT 1999-2000**

| | 1999 | | September 2000 | | Peak change (%) | Off-peak change (%) |
|---|---|---|---|---|---|---|
| | Peak | Off-peak | Peak | Off-peak | | |
| Australia | 49.33 | 49.33 | 42.94 | 42.94 | -13 | -13 |
| Austria | 138.15 | 64.87 | 70.61 | 45.73 | -49 | -29 |
| Belgium | 147.00 | 68.23 | 81.35 | 51.79 | -45 | -24 |
| Canada | 31.45 | 31.45 | 35.53 | 35.53 | 13 | 13 |
| Czech Republic | 187.90 | 110.77 | 173.92 | 84.61 | -7 | -24 |
| Denmark | 81.53 | 42.25 | 48.09 | 41.96 | -41 | -1 |
| Finland | 43.73 | 32.97 | 41.16 | 38.97 | -6 | 18 |
| France | 85.73 | 62.07 | 59.50 | 59.50 | -31 | -4 |
| Germany | 76.76 | 76.76 | 50.71 | 50.71 | -34 | -34 |
| Greece | 89.46 | 89.46 | 52.16 | 41.90 | -41 | -53 |
| Hungary | 232.04 | 164.59 | 156.17 | 82.84 | -33 | -50 |
| Iceland | 63.44 | 36.97 | 45.34 | 34.44 | -29 | -7 |
| Ireland | 83.33 | 41.62 | 75.38 | 41.60 | -9 | 0 |
| Italy | 67.91 | 44.04 | 45.71 | 38.79 | -33 | -12 |
| Japan | 58.64 | 58.64 | 49.01 | 49.01 | -16 | -16 |
| Korea | 64.31 | 36.01 | 64.62 | 43.78 | 1 | 22 |
| Luxembourg | 152.09 | 97.03 | 99.94 | 58.58 | -34 | -40 |
| Mexico | 60.94 | 60.94 | 37.40 | 37.40 | -39 | -39 |
| Netherlands | 85.86 | 47.77 | 81.63 | 50.08 | -5 | 5 |
| New Zealand | 47.23 | 47.23 | 38.45 | 38.45 | -19 | -19 |
| Norway | 64.28 | 60.76 | 63.90 | 61.05 | -1 | 1 |
| Poland | 120.46 | 120.46 | 134.64 | 73.88 | 12 | -39 |
| Portugal | 134.27 | 82.27 | 77.24 | 67.75 | -35 | -35 |
| Spain | 85.87 | 85.87 | 77.02 | 31.27 | -10 | -64 |
| Sweden | 64.09 | 36.48 | 58.36 | 35.98 | -9 | -9 |
| Switzerland | 85.28 | 60.02 | 85.44 | 46.83 | 0 | -7 |
| Turkey | 57.75 | 51.19 | 33.74 | 35.76 | -42 | -50 |
| United Kingdom | 186.61 | 49.31 | 60.41 | 27.12 | -68 | -45 |
| United States | 37.30 | 37.30 | 23.76 | 23.76 | -36 | -36 |
| OECD | 82.63 | 65.30 | 66.14 | 46.20 | -20 | -27 |
| EU | 86.00 | 61.07 | 65.62 | 44.15 | -24 | -28 |

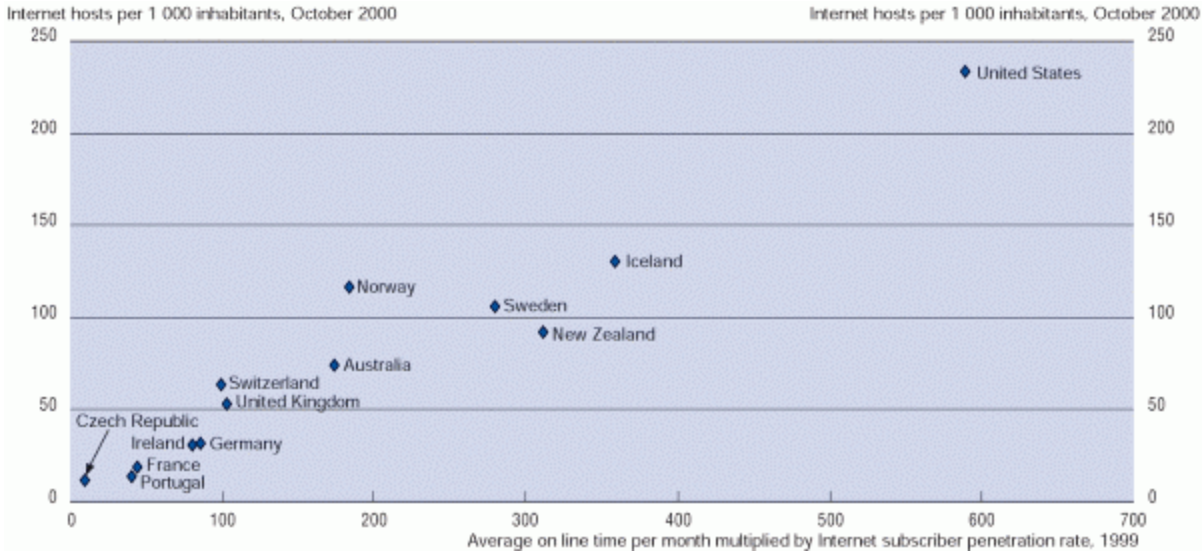
Source: OECD

### *1.3.9 Summary*

New Zealand continues to show high levels of connectivity to Internet services, as indicated in *The State of e-New Zealand*. Its position within the leading players, as at October 2000, amply illustrated by Figure 1.3.7. New Zealand not only demonstrates significant levels of Internet connectivity capacity, but also significant levels of utilisation of that capacity for the exchange of information. Prices are internationally competitive, and significantly less than those of Australia, although uptake of high-speed access is lower than Australia. This statistic alone, however, may not necessarily be a cause for concern, as it is recognised that a combination of flat-rate pricing, types of information transferred, and low-volume information transfers by small businesses may be encouraging users to retain dial-up networking.

Overall, these connectivity figures support the contention that New Zealanders are well-placed to participate in the economic and social benefits that use of the Internet promises.

**Figure 1.3.7 Online Time and Internet Hosts**




Source OECD; Netsizer (*www.netsizer.com*), April 2001.

## *1.4 Broadcasting*

Broadcasting has been added as a measure of connectivity to *The State of e-New Zealand* statistical analysis as it measures an important source of one-way information connectivity. Broadcasting technologies such as satellite and cable television are important for two reasons:

- they provide a technological connectivity base upon which future two-way communications may be based;

- the content and entertainment functionality that they provide has the potential to be both complemented and substituted by the products of other information technologies.

The recent growth of cable and satellite delivery networks, and the concomitant increase in competition, has created a shift in the structure and operation of the broadcasting industry. Annual growth within the OECD in the television broadcasting market has been 5.4% over the three years from 1997 – 1999 as shown in Table 1.4.1. New Zealand shows negative growth over this period although exchange rate fluctuations are partially attributable for this result.

**Table 1.4.1 Television Broadcasting Revenues in OECD (USD millions)**

| | Total market revenue | | | CAGR 1997-99 | Share of OECD countries (%) | | |
|---|---|---|---|---|---|---|---|
| | 1997 | 1998 | 1999 | | 1997 | 1998 | 1999 |
| Australia[1] | 2 496.52 | 2 244.03 | 2 425.55 | .. | 1.68 | 1.46 | 1.47 |
| Austria | 922.76 | 975.28 | 1 021.05 | 5.19 | 0.62 | 0.64 | 0.62 |
| Belgium | 758.41 | 806.85 | 844.06 | 5.50 | 0.51 | 0.53 | 0.51 |
| Canada | 4 067.39 | 4 063.78 | .. | .. | 2.74 | 2.66 | .. |
| Czech Republic[2] | 132.08 | 143.03 | .. | .. | 0.09 | 0.09 | .. |
| Denmark | 877.95 | 938.30 | 912.55 | 1.95 | 0.59 | 0.61 | 0.55 |
| Finland | 575.08 | 591.15 | 563.12 | -1.04 | 0.39 | 0.39 | 0.34 |
| France | 7 625.14 | 8 184.88 | 8 804.17 | 7.45 | 5.13 | 5.33 | 5.34 |
| Germany | 10 846.45 | 11 159.78 | 11 338.04 | 2.24 | 7.30 | 7.27 | 6.88 |
| Greece | 742.32 | 794.04 | 963.06 | 13.31 | 0.50 | 0.52 | 0.58 |
| Hungary | .. | .. | 241.41 | .. | .. | .. | 0.15 |
| Iceland | .. | .. | .. | .. | .. | .. | .. |
| Ireland | 588.65 | 601.13 | 905.41 | 24.02 | 0.40 | 0.39 | 0.55 |
| Italy | 5 122.80 | 5 305.13 | 5 536.33 | 3.96 | 3.45 | 3.46 | 3.36 |
| Japan | 27 430.96 | 25 339.93 | 30 114.56 | 4.78 | 18.46 | 16.51 | 18.27 |
| Korea | 2 399.15 | 1 236.54 | 1 913.36 | -10.70 | 1.61 | 0.81 | 1.16 |
| Luxembourg | 8.42 | 8.89 | 8.84 | 2.43 | 0.01 | 0.01 | 0.01 |
| Mexico | .. | .. | .. | .. | .. | .. | .. |
| Netherlands | 941.76 | 990.62 | 1 046.33 | 5.41 | 0.63 | 0.65 | 0.63 |
| New Zealand[3] | 415.23 | 342.25 | 380.42 | -4.28 | 0.28 | 0.22 | 0.23 |
| Norway[3] | 518.25 | 531.92 | 543.72 | 2.43 | 0.35 | 0.35 | 0.33 |
| Poland | .. | .. | .. | .. | .. | .. | .. |
| Portugal | 336.07 | 440.40 | 531.04 | 25.70 | 0.23 | 0.29 | 0.32 |
| Spain | 2 291.70 | 2 815.65 | 3 244.60 | 18.99 | 1.54 | 1.83 | 1.97 |
| Sweden | 947.70 | 1 157.35 | 1 296.58 | 16.97 | 0.64 | 0.75 | 0.79 |
| Switzerland[5] | 532.62 | 605.03 | 605.13 | 6.59 | 0.36 | 0.39 | 0.37 |
| Turkey | .. | .. | .. | .. | .. | .. | .. |
| United Kingdom | 10 646.86 | 12 012.12 | 16 069.85 | 22.86 | 7.17 | 7.83 | 9.75 |
| United States[6] | 67 360.00 | 72 150.00 | 75 550.00 | 5.90 | 45.33 | 47.02 | 45.83 |
| OECD | 148 584.27 | 153 458.09 | 164 849.20 | 5.33 | 100.00 | 100.00 | 100.00 |

*Note:* In general, estimates consist of advertising revenues, subscription revenues and public funding for terrestrial, cable and satellite broadcasters. Estimates for Australia, Austria, Belgium, Canada, Denmark, Ireland, Italy, Japan, the Netherlands, Norway and Spain include public funding for public broadcasters' radio services.
1. Excludes revenue from subscription broadcasting.
2. Estimates for the Czech Republic comprise only CT, the Czech public broadcaster
3. Includes revenue from public broadcaster and satellite operator only. The fall in revenue between 1997 and 1998 is the result of exchange rate fluctuations.
4. Excludes revenue from cable and satellite operators.
5. Figures for Switzerland comprise only SSR, the Swiss public broadcaster.
6. Excludes revenue from satellite broadcasting.
*Source:* OECD; European Audiovisual Observatory Statistical Yearbook 2000 (hereafter referred to as OBS); TVB; Universal McCann; IDATE, from the study "Development of Digital TV in the European Union" commissioned by the European Commission, Directorate General for Information Society. The complete study can be found at the following address: http://europa.eu.int/comm/information_society/policy/telecom/digtv/study1999_en.htm (hereafter referred to as the IDATE/EC Digital TV study).

Assignment of these market changes is due to a number of factors, including the increased competition that has developed among terrestrial broadcasters and those using new delivery networks, which has seen a growth in the number of channels available together with the now redundant policy of numbers of operators historically being limited by spectrum. Further,

increased specialisation and the introduction of the option for viewers to purchase a specified individualised package of channels, with a price set accordingly, has provided new sources of revenues to broadcasters.

### *1.4.1 Digital Broadcasting*

The transition from analogue to digital has the potential to substantially alter broadcasting to an even greater degree, in terms of both the range of services provided and the service delivery mechanism, with the increased efficient use of the spectrum having the capacity to introduce greater competition into the industry. However, these are still early days in the digital revolution, and the overall implications are, as yet, uncertain. Digital technology will provide broadcasters with the ability to provide a wider range of additional services, as well as improving sound and picture quality. It is also anticipated that interactive services will increase through this mechanism, allowing broadcasters to further customise their services.

**Table 1.4.2 Size of Digital TV Market**

| | % of TV households receiving digital TV | | | Number of subscribers to digital packages | | | | | | | | | Digital revenue as a share of total revenue, 1999 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Satellite | | | Cable | | | Terrestrial | | | |
| | 1997 | 1998 | 1999 | 1997 | 1998 | 1999 | 1997 | 1998 | 1999 | 1997 | 1998 | 1999 | |
| Australia | .. | .. | 5.5 | .. | .. | 400 000 | 0 | 0 | 0 | 0 | 0 | 0 | .. |
| Austria | 0.4 | 1 | 1.7 | .. | 35 000 | .. | 0 | 3 000 | 8 000 | 0 | 0 | 0 | 1.4 |
| Belgium | 0 | 0.6 | 1.2 | 0 | 0 | 0 | 0 | 23 000 | 48 000 | 0 | 0 | 0 | 1.7 |
| Canada | 0.1 | 2 | 8.3 | 4 000 | 227 000 | 550 800 | 0 | 0 | 400 000 | 0 | 0 | 0 | .. |
| Czech Republic | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Denmark | 0 | 2.2 | 4 | 0 | 4 000 | 30 000 | 0 | 48 000 | 65 000 | 0 | 0 | 0 | 1.3 |
| Finland | 0 | 0.1 | 0.4 | 0 | 3 000 | 10 000 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 |
| France | 5.5 | 9.3 | 11.8 | 1 091 500 | 1 951 000 | 2 574 000 | 100 000 | 220 000 | 321 000 | 0 | 0 | 0 | 13.3 |
| Germany | 0.6 | 1.8 | 3.9 | 112 000 | 252 000 | 520 000 | 108 000 | 410 000 | 780 000 | 0 | 0 | 0 | 2.7 |
| Greece | 0 | 0 | 0.3 | 0 | 0 | 10 000 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 |
| Hungary | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Iceland | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Ireland | 0 | 0.8 | 3 | 0 | 9 000 | 70 000 | 0 | 0 | 0 | 0 | 0 | 0 | 3.7 |
| Italy | 1.1 | 3 | 5.7 | 180 000 | 540 000 | 1 000 000 | 44 200 | 61 000 | 82 000 | 0 | 0 | 0 | 6.6 |
| Japan | .. | .. | .. | 0 | 1 243 000 | 1 983 000 | .. | .. | .. | 0 | 0 | 0 | .. |
| Korea | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Luxembourg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mexico | .. | .. | 2.5 | 152 212 | 307 982 | 490 981 | 0 | 0 | 0 | 0 | 0 | 0 | .. |
| Netherlands | 2.5 | 2.6 | 3.2 | 20 000 | 30 000 | 50 000 | 0 | 0 | 20 000 | 0 | 0 | 0 | 1.1 |
| New Zealand | 0 | 3 | 9 | 0 | 30 000 | 95 000 | 0 | 0 | 0 | 0 | 0 | 0 | .. |
| Norway | 0 | 0.3 | 3.2 | 0 | 5 000 | 55 000 | 0 | 0 | 1 000 | 0 | 0 | 0 | .. |
| Poland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Portugal | 0 | 0 | 1.2 | 0 | 0 | 50 000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spain | 3 | 8.5 | 11 | 350 000 | 954 000 | 1 250 000 | 0 | 10 000 | 50 000 | 0 | 0 | 0 | 14.9 |
| Sweden | 0 | 0.8 | 2.9 | 0 | 6 000 | 52 000 | 0 | 25 000 | 60 000 | 0 | 0 | 3 000 | 1.8 |
| Switzerland | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Turkey | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| United Kingdom | 0 | 1 | 11.4 | .. | 350 000 | 2 300 000 | 0 | 0 | 50 000 | 0 | 7 000 | 552 000 | 12.7 |
| United States | 5 | 8 | 14 | 5 047 000 | 7 200 000 | 10 078 000 | .. | 1 200 000 | 4 100 000 | 0 | 0 | 0 | .. |
| OECD | 0.87 | 2.14 | 4.53 | 6 956 712 | 13 146 982 | 21 568 781 | 252 200 | 2 000 000 | 5 985 000 | 0 | 7 000 | 555 000 | .. |

Source: OECD, IDATE/EC Digital TV study.

The percentage of New Zealand households with digital television in 1999 was 9%, with Australia at 5.5%, and comparing well with the overall OECD average at 4.53% (Table 1.4.2). With digital television being a more recent phenomenon, it may be that a pattern of earlier acceptance in New Zealand is emerging and we can expect Australians to increase their acceptance over the forthcoming period.

### *1.4.2 Revenue*

Subscription revenue in the television broadcasting market has increased in New Zealand at a rate similar to that of the OCED average, increasing the share of total market revenue from 28% to 34% over the period from 1997 to 1999. This compares to the OECD average of 29% to 33% over this same period (Table 1.4.3). At the same time, public funding decreased from 6.38% to 5.98% within New Zealand, following an OECD trend of average reduction from 14.17% to 13.24%.

**Table 1.4.3 Subscription Revenue in the Television Broadcasting Market (USD Millions)**

| | Total subscription revenue | | | CAGR 1997-99 | Share in total market revenue (%) | | |
|---|---|---|---|---|---|---|---|
| | 1997 | 1998 | 1999 | | 1997 | 1998 | 1999 |
| Australia | .. | .. | .. | .. | .. | .. | .. |
| Austria | 182.65 | 190.44 | 191.24 | 2.32 | 19.79 | 19.53 | 18.73 |
| Belgium | 101.15 | 100.03 | 98.95 | -1.09 | 13.34 | 12.40 | 11.72 |
| Canada | 1 910.87 | 1 964.86 | 2 201.34 | 7.33 | 46.98 | 48.11 | .. |
| Czech Republic | .. | .. | .. | .. | .. | .. | .. |
| Denmark | 214.55 | 238.07 | 237.98 | 5.32 | 24.44 | 25.37 | 26.08 |
| Finland | 69.85 | 79.03 | 80.29 | 7.21 | 12.15 | 13.37 | 14.26 |
| France | 2 402.01 | 2 747.04 | 3 213.72 | 15.67 | 31.50 | 33.56 | 36.50 |
| Germany | 2 702.59 | 2 850.24 | 2 928.34 | 4.09 | 24.92 | 25.54 | 25.83 |
| Greece | .. | .. | 132.81 | .. | .. | .. | 13.93 |
| Hungary | .. | .. | .. | .. | .. | .. | .. |
| Iceland | .. | .. | .. | .. | .. | .. | .. |
| Ireland | 248.80 | 260.23 | 389.19 | 25.07 | 42.27 | 43.29 | 42.99 |
| Italy | 337.62 | 322.06 | 597.80 | 33.07 | 6.59 | 6.07 | 10.80 |
| Japan | 2 849.82 | 3 235.58 | 4 269.42 | 22.40 | 10.39 | 12.77 | 14.18 |
| Korea | 121.78 | 102.82 | 147.43 | 10.03 | 5.08 | 8.32 | 7.71 |
| Luxembourg | 1.12 | 1.22 | 1.28 | 6.66 | 13.33 | 13.75 | 14.46 |
| Mexico | .. | .. | .. | .. | .. | .. | .. |
| Netherlands | 88.75 | 107.54 | 112.37 | 12.53 | 9.42 | 10.86 | 10.74 |
| New Zealand | 116.56 | 114.44 | 130.16 | 5.67 | 28.07 | 33.44 | 34.21 |
| Norway | .. | .. | .. | .. | .. | .. | .. |
| Poland | .. | .. | .. | .. | .. | .. | .. |
| Portugal | 62.11 | 109.96 | 134.28 | 47.03 | 18.48 | 24.97 | 25.29 |
| Spain | 542.09 | 837.22 | 934.09 | 31.27 | 23.65 | 29.73 | 28.79 |
| Sweden | 188.71 | 406.20 | 426.09 | 50.26 | 19.91 | 35.10 | 32.86 |
| Switzerland | .. | .. | .. | .. | .. | .. | .. |
| Turkey | .. | .. | .. | .. | .. | .. | .. |
| United Kingdom | 2 768.62 | 3 156.33 | 4 197.21 | 23.13 | 26.00 | 26.28 | 26.12 |
| United States | 28 400.00 | 30 900.00 | 33 200.00 | 8.12 | 42.16 | 42.83 | 43.94 |
| OECD | 43 309.64 | 47 723.34 | 53 623.97 | 11.27 | 29.15 | 31.10 | 32.53 |

*Note:* In general, figures consist of revenues from subscriptions to cable networks and to encrypted terrestrial and satellite channels.
See notes to Table 6.1.
*Source:* OECD; IDATE/EC Digital TV study; OBS.

Television broadcasting revenue as a percentage of GDP has increased at a quicker pace in New Zealand than in Australia. In 1997, both countries had the same share, 0.63%, with New Zealand reducing to 0.55% while Australia has reduced further to 0.52%. Revenue per inhabitant is lower in New Zealand at $99.82 in 1999, as compared to Australia at $127.88 ($US,PPP).

The share of public funding in the television broadcasting market is significantly higher in Australia than in New Zealand. In Australia the percentage as a share in total market revenue was 17.99%, whereas in New Zealand this was 5.98%.

### *1.4.3 Reception Method*

Table 1.4.4 shows New Zealand in 1999 with a high level of households that rely solely on terrestrial television as a means of receiving television broadcasting. However, this is reducing rapidly as satellite and (more recently than the statistics currently available) cable uptake increases. The number of households with a satellite dish in the two years from 1997 to 1999 increased nearly eight-fold to 7.9% of the population. This compares favourably to Australia at the same period with 5.8%, but less so with the OECD at 16.6%. Statistics regarding cable television uptake within New Zealand are not yet available, but with the OECD average of 40% of households connected, it is anticipated that New Zealand has some distance to go to reach comparable levels. Throughout the OECD the number of subscribers to satellite packages is about one quarter of the number subscribed to cable.

Of those subscribers to pay television services in New Zealand the bulk subscribe to terrestrial services at 71.6% in 1999, with the residual subscribing to satellite. Within Australia (and the OECD average) this is typically 75% cable and 25% satellite. New Zealand and Japan are the only non-European countries where cable is not the dominant form of pay television reception (Table 1.4.5). However, the geography and demographic characteristics of New Zealand (long, spread-out country with low average population density) are such that cable television, with high infrastructure costs, is viable only in metropolitan areas, and then only when bundled with other cable-based services (such as telephony)[21]. This leaves satellite as the more flexible, and hence more cost-effective solution, meaning New Zealand is unlikely to achieve the high level of cable penetration of European countries and the United States.

[21] Interview: Jack Matthews, (18/11/01). Departing CEO of Telstra Saturn. Interviewed by Russell Brown, Radio New Zealand.

**Table 1.4.4 Means of Receiving Television Services**

| | Households relying solely on terrestrial[1] | | | | | | Households connected to cable | | | | | | Households with satellite dish | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1997 | | 1998 | | 1999 | | 1997 | | 1998 | | 1999 | | 1997 | | 1998 | | 1999 | |
| | Number | % | Number | % | Number | % | Number | % | Number | % | Number | % | Number | % | Number | % | Number | % |
| Australia | 6 196 000 | 89.07 | 6 149 000 | 87.15 | 5 594 000 | 77.86 | 760 000 | 10.9 | 907 000 | 12.9 | 1 171 000 | 16.3 | .. | .. | .. | .. | 420 000 | 5.8 |
| Austria | 844 000 | 28.33 | 845 000 | 28.03 | 790 000 | 25.09 | 1 065 000 | 35.8 | 1 100 000 | 36.5 | 1 100 000 | 34.9 | 1 070 000 | 35.9 | 1 070 000 | 35.5 | 1 260 000 | 40.0 |
| Belgium | 0 | .. | 0 | .. | 0 | .. | 3 688 001 | 97.1 | 3 725 191 | 97.1 | 3 751 795 | 98.2 | 110 000 | 2.9 | 110 000 | 2.9 | 150 000 | 3.8 |
| Canada | 3 535 047 | 30.79 | 3 024 202 | 26.19 | 2 864 698 | 24.81 | 7 948 053 | 69.2 | 8 020 798 | 69.5 | 8 023 302 | 69.5 | .. | .. | 500 000 | 4.3 | 657 000 | 5.7 |
| Czech Republic | 2 432 924 | 68.44 | 2 013 628 | 56.95 | 2 199 163 | 58.77 | 512 076 | 14.4 | 792 372 | 23.2 | 923 837 | 24.8 | 610 000 | 17.2 | 610 000 | 17.9 | 610 000 | 16.4 |
| Denmark | 396 000 | 16.95 | 380 000 | 16.03 | 30 000 | 1.27 | 1 000 000 | 42.8 | 1 050 000 | 44.3 | 1 350 000 | 57.0 | 940 000 | 40.2 | 940 000 | 39.7 | 990 000 | 41.8 |
| Finland | 945 000 | 45.85 | 943 000 | 44.21 | 878 000 | 41.34 | 875 000 | 42.5 | 908 000 | 42.5 | 933 000 | 43.9 | 241 000 | 11.7 | 284 000 | 13.3 | 313 000 | 14.7 |
| France | 17 306 000 | 78.98 | 17 297 000 | 78.08 | 16 418 000 | 71.38 | 2 136 000 | 9.7 | 2 392 000 | 10.8 | 2 682 000 | 11.6 | 2 470 000 | 11.3 | 2 470 000 | 11.1 | 3 920 000 | 17.0 |
| Germany | 8 350 000 | 22.33 | 8 500 000 | 21.96 | 6 245 000 | 16.14 | 18 020 000 | 48.2 | 18 650 000 | 48.2 | 20 400 000 | 52.7 | 11 080 000 | 29.5 | 11 550 000 | 29.8 | 12 095 000 | 31.1 |
| Greece | 3 378 000 | 100.00 | 3 400 000 | .. | 3 400 000 | 100.00 | 0 | .. | 0 | .. | 0 | .. | .. | .. | .. | .. | .. | .. |
| Hungary | 269 000 | 10.39 | .. | .. | 52 000 | 1.92 | 1 490 000 | 57.6 | .. | .. | 1 820 000 | 67.1 | 830 000 | 32.1 | 830 000 | 30.8 | 840 000 | 31.0 |
| Iceland | 88 000 | 100.00 | 88 000 | 100.00 | 89 000 | 100.00 | 0 | .. | 0 | .. | 0 | .. | 0 | .. | 0 | .. | 0 | .. |
| Ireland | 545 000 | 50.93 | 450 000 | 41.07 | 494 000 | 41.17 | 430 000 | 40.2 | 535 000 | 49.5 | 596 000 | 49.7 | 95 000 | 8.9 | 95 000 | 8.8 | 110 000 | 9.2 |
| Italy | 18 171 800 | 95.76 | 18 182 000 | 95.68 | 17 148 000 | 90.11 | 44 200 | 0.2 | 61 000 | 0.3 | 82 000 | 0.4 | 760 000 | 4.0 | 760 000 | 4.0 | 1 800 000 | 9.5 |
| Japan | 18 328 256 | 50.61 | 17 497 907 | 47.81 | 12 307 118 | 33.63 | 6 719 744 | 18.6 | 7 936 093 | 21.7 | 9 470 882 | 25.9 | 11 163 000 | 30.8 | 11 163 000 | 30.5 | 14 819 000 | 40.5 |
| Korea | 13 257 439 | 94.16 | 13 757 597 | 94.31 | 13 167 202 | 88.00 | 821 561 | 5.8 | 829 403 | 5.7 | 1 794 798 | 12.0 | 0 | .. | 0 | .. | 0 | .. |
| Luxembourg | 0 | .. | 0 | .. | 0 | .. | 139 000 | 86.9 | 136 000 | 87.3 | 138 000 | 87.3 | 20 000 | 13.1 | 20 000 | 12.7 | 20 000 | 12.7 |
| Mexico[2] | .. | .. | .. | .. | 16 548 227 | 85.83 | 1 383 047 | 90.1 | 1 614 887 | 84.0 | 1 959 381 | 10.3 | 152 212 | 9.9 | 307 982 | 16.0 | 490 981 | 2.6 |
| Netherlands | 434 000 | 6.68 | 440 000 | 6.67 | 372 000 | 5.56 | 5 800 000 | 89.3 | 5 900 000 | 89.4 | 6 000 000 | 89.7 | 260 000 | 4.0 | 260 000 | 3.9 | 320 000 | 4.8 |
| New Zealand | 1 107 818 | 98.91 | 1 120 000 | 97.39 | 1 105 000 | 92.08 | .. | .. | .. | .. | .. | .. | 12 182 | 1.1 | 30 000 | 2.6 | 95 000 | 7.9 |
| Norway | 748 875 | 41.98 | 683 393 | 38.22 | 567 278 | 32.49 | 705 125 | 39.5 | 774 607 | 43.3 | 788 722 | 45.2 | 330 000 | 18.5 | 330 000 | 18.5 | 390 000 | 22.3 |
| Poland | 7 039 000 | 57.95 | 5 887 000 | 48.25 | 6 844 000 | 53.89 | 3 037 000 | 25.0 | 3 172 000 | 26.0 | 3 636 000 | 28.6 | 2 070 000 | 17.0 | 3 141 000 | 25.7 | 2 220 000 | 17.5 |
| Portugal | 2 957 000 | 79.92 | 2 844 000 | 74.84 | 2 820 000 | 71.21 | 383 000 | 10.4 | 596 000 | 15.7 | 760 000 | 19.2 | 360 000 | 9.7 | 360 000 | 9.5 | 380 000 | 9.6 |
| Spain | 10 511 000 | 89.18 | 10 470 000 | 87.25 | 10 340 000 | 86.17 | 145 000 | 1.2 | 400 000 | 3.3 | 430 000 | 3.6 | 1 130 000 | 9.6 | 1 130 000 | 9.4 | 1 230 000 | 10.3 |
| Sweden | 1 045 000 | 28.28 | 1 120 000 | 29.17 | 1 150 000 | 28.75 | 1 930 000 | 52.2 | 2 000 000 | 52.1 | 2 000 000 | 50.0 | 720 000 | 19.5 | 720 000 | 18.8 | 850 000 | 21.3 |
| Switzerland | 0 | .. | 0 | .. | 0 | .. | 2 503 254 | 86.8 | 2 543 541 | 87.0 | 2 582 571 | 87.2 | 260 000 | 9.4 | 260 000 | 9.3 | 280 000 | 9.8 |
| Turkey | 7 242 000 | 90.53 | 7 348 000 | 90.16 | 7 103 106 | 87.89 | 483 000 | 6.0 | 500 000 | 6.1 | 684 894 | 8.4 | 275 000 | 3.4 | 302 000 | 3.7 | 302 000 | 3.7 |
| United Kingdom | 17 190 000 | 73.46 | 16 916 000 | 71.68 | 15 944 000 | 67.56 | 1 900 000 | 8.1 | 2 374 000 | 10.1 | 2 826 000 | 12.0 | 4 310 000 | 18.4 | 4 310 000 | 18.3 | 4 890 000 | 20.5 |
| United States | 25 869 000 | 26.40 | 23 672 000 | 23.91 | 20 939 000 | 21.04 | 64 900 000 | 66.2 | 66 100 000 | 66.8 | 66 700 000 | 67.0 | 7 231 000 | 7.4 | 9 228 000 | 9.3 | 11 861 000 | 11.9 |
| OECD | 168 181 199 | 48.95 | 163 027 727 | 46.99 | 165 455 792 | 44.80 | 128 808 961 | 37.5 | 133 017 892 | 38.3 | 142 584 182 | 38.6 | 46 449 394 | 13.5 | 50 780 982 | 14.6 | 61 212 981 | 16.6 |

1. Households relying solely on terrestrial transmission is calculated as the total number of television households minus number of households with a satellite dish and number of households connected to cable. In the case of Belgium, Luxembourg and Switzerland, the number of households relying solely on terrestrial transmission has been set at zero as the data suggest that the number connected to cable plus the number with a satellite dish is greater than the number of households, in part because some businesses and organisations subscribe to cable.
2. Mexico also has a MMDS subscription service which had 334,208 subscribers in 1999.
*Source:* OECD, OBS, ITU.

### *1.4.4 Penetration*

In 1999, New Zealand had a higher penetration rate of direct broadcast satellite subscribers at 7.92% of households, compared to 5.57% in Australia (Table 1.4.6). During the period 1997 to 1999, Australia experienced 207% growth in the number of subscribers to pay television services from 10.9% penetration to 21.9%. During this same period the growth in New Zealand was somewhat slower at 16.0% to 19.1%, although growth was still high, at a level of 88%. New Zealand commenced this period with a significantly higher penetration rate than that of Australia, and during these two years Australia has caught up and, indeed, overtaken the penetration rate within New Zealand. In New Zealand cable networks also provide a telephony service, and service bundling is occurring.

### *1.4.5 Broadcasting Administration and Regulation*

New Zealand does not have any specific broadcasting licensing requirement for carriage regulation, as opposed to the majority of OECD countries, for example Australia with the Australian Broadcasting Authority. Regulation of frequency allocation is controlled by the Ministry of Economic Development with content regulation controlled by the Broadcasting Standards Authority.

New Zealand is unusual in that there are no major domestic and local content requirements, with only Austria, Japan and the United States having similar policies (although it is noted that proposals have been made to require specified percentages of local content in the future). For example in Australia, there are requirements for minimum broadcasting quantities of Australian programmes.

### *1.4.6 Summary*

The recent growth of cable and satellite delivery networks, and the concomitant increase in competition, has created a shift in the structure and operation of the broadcasting industry. New Zealand has been no exception to this trend. The number of subscribers to satellite services in New Zealand more than doubled in the period from 1997 to 1999, with terrestrial television forming the dominant type of pay television reception.

Television broadcasting revenue as a percentage of GDP has increased at a quicker pace in New Zealand than in Australia. In 1997 both countries had the same share of 0.63%, with New Zealand reducing to 0.55% while Australia have reduced further to 0.52%. Revenue per inhabitant is lower in New Zealand at $99.82 in 1999, as compared to Australia at $127.88.

In 1999 New Zealand had a higher penetration rate of direct broadcast satellite subscribers at 7.92%, whereas the level in Australia was 5.57%. During the period 1997 to 1999 Australia experienced 207% growth in the number of subscribers to pay television services from 10.9% penetration to 21.9%. During this same period the growth in New Zealand was somewhat slower at 16.0% to 19.1%, although still high, at a level of 88%. Clearly, New Zealand commenced this period with a significantly higher penetration rate than that of Australia, and during these two years Australia has caught up and indeed overtaken the penetration rate within New Zealand. At this same time, the percentage of households in Australia receiving digital television was 5.5% and in New Zealand this was 9%. With digital television being a more recent phenomenon, it may be that this pattern of earlier acceptance in New Zealand is repeating and we can expect Australia to increase their acceptance over the coming period.

These figures tend to indicate a faster growth in the uptake of electronic content for domestic entertainment in Australia than in New Zealand, which is consistent with the NielsenNet data showing longer average Internet ‘surfing’ sessions in Australia compared to New Zealand. The implications of this are discussed in the subsequent section on Uptake.

The share of public funding in the television broadcasting market is significantly higher in Australia than in New Zealand. In Australia the percentage as a share in total market revenue

was 17.99%, whereas in New Zealand this was 5.98%. It is recognised that this statistic is undoubtedly influenced by advertising revenues, restrictions on content and other such factors. However, the magnitude of this difference suggests that further analysis and investigation is required. It is possible that this disparity may reflect differences in the types of content viewed, and the levels of uptake of substitute and complementary entertainment content. For example, higher levels of discretionary content demanded via alternative mechanisms (e.g. Internet and pay television) in Australia may be occurring as consumers seek alternative content to the programming prescribed by state requirements (e.g. charters requiring defined proportions of locally-made content on state-owned television channels).

Regulatory differences are also found within the two countries. Australian regulation defines audio and video streaming over the Internet not to be broadcasting services whereas in New Zealand it is presumed that content of webcasting would be treated as broadcasting services. This regulatory difference may lead to different patterns of uptake of Internet services, due to the regulatory requirements on the content influencing the choice of medium.

Furthermore, regulatory differences are also found within the two countries. Australian regulation does not treat audio and video streaming over the Internet within the spectrum of broadcasting services whereas in New Zealand it is deemed likely that content of webcasting would be classified in this manner. New Zealand considers video on demand as broadcasting, whereas in Finland, Japan, Portugal or Sweden this is not the case.

### *1.5 Other Technologies*

While telephony, broadcasting and the Internet have dominated the technologies considered in international studies of connectivity, it is recognised that increasingly, new technologies enabling connectivity are continually being developed. In particular, it is noted that specialised technologies, such as game consoles, are capable of connecting with the Internet and, hence, constitute connectivity devices.

## Table 1.4.5 Number of Subscribers to Pay Television Services

| | Number | | | Penetration rate | | | Share in total market, 1999 | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1997 | 1998 | 1999 | 1997 | 1998 | 1999 | Cable | Satellite | Terrestrial |
| Australia | 760 000 | 907 000 | 1 571 000 | 10.9 | 12.9 | 21.9 | 74.5 | 25.5 | 0.0 |
| Austria | 1 122 000 | 1 150 000 | 1 100 000 | 37.7 | 38.1 | 34.9 | 100.0 | 0.0 | 0.0 |
| Belgium | 4 028 501 | 4 061 591 | 4 092 495 | 115.8 | 117.0 | 117.9 | 91.7 | 0.0 | 8.3 |
| Canada | 7 950 953 | 8 247 798 | 8 574 102 | 69.2 | 71.4 | 74.3 | 93.6 | 6.4 | 0.0 |
| Czech Republic | 512 076 | 792 372 | 923 837 | 14.4 | 23.2 | 24.8 | 100.0 | 0.0 | 0.0 |
| Denmark | 1 274 000 | 1 350 000 | 1 695 000 | 54.5 | 57.0 | 71.5 | 79.6 | 20.4 | 0.0 |
| Finland | 946 000 | 986 000 | 1 031 000 | 45.9 | 46.2 | 48.5 | 90.5 | 9.5 | 0.0 |
| France | 7 820 700 | 9 086 900 | 10 144 600 | 35.7 | 41.0 | 44.1 | 26.2 | 25.4 | 48.4 |
| Germany | 18 627 000 | 19 397 000 | 21 245 000 | 49.8 | 50.1 | 54.9 | 96.0 | 4.0 | 0.0 |
| Greece | 0 | 0 | 300 000 | 0.0 | 0.0 | 8.8 | 0.0 | 0.0 | 100.0 |
| Hungary | 1 490 000 | .. | 1 820 000 | 57.6 | .. | 67.1 | 100.0 | 0.0 | 0.0 |
| Iceland | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Ireland | 528 000 | 645 000 | 723 000 | 49.3 | 59.7 | 60.3 | 82.4 | 17.6 | 0.0 |
| Italy | 884 200 | 1 301 000 | 2 032 000 | 4.7 | 6.8 | 10.7 | 4.0 | 49.2 | 46.8 |
| Japan | 18 234 744 | 21 009 093 | 23 910 882 | 50.4 | 57.4 | 65.3 | 39.6 | 60.4 | 0.0 |
| Korea | 821 561 | 829 403 | 1 794 798 | 5.8 | 5.7 | 12.0 | 100.0 | 0.0 | 0.0 |
| Luxembourg | 133 000 | 138 000 | .. | 89.9 | 92.0 | .. | .. | .. | .. |
| Mexico[2] | 1 802 524 | 2 205 288 | 2 784 570 | .. | .. | 14.4 | 70.4 | 17.6 | 12.0 |
| Netherlands | 5 820 000 | 5 930 000 | 6 050 000 | 89.6 | 89.8 | 90.4 | 99.2 | 0.8 | 0.0 |
| New Zealand | 284 782 | 324 230 | 334 000 | 16.0 | 18.1 | 19.1 | 0.0 | 28.4 | 71.6 |
| Norway | 705 125 | 774 607 | 1 228 722 | 63.0 | 67.4 | 102.4 | 64.2 | 35.8 | 0.0 |
| Poland | 3 037 000 | 3 172 000 | 4 592 000 | 25.0 | 26.0 | 36.2 | 79.2 | 20.8 | 0.0 |
| Portugal | 383 000 | 596 000 | 810 000 | 10.4 | 15.7 | 20.5 | 93.8 | 6.2 | 0.0 |
| Spain | 1 960 000 | 2 948 000 | 3 446 000 | 16.6 | 24.6 | 28.7 | 12.5 | 36.3 | 51.2 |
| Sweden | 2 360 000 | 2 500 000 | 2 560 000 | 63.9 | 65.1 | 64.0 | 78.1 | 21.9 | 0.0 |
| Switzerland | 2 503 254 | 2 543 541 | 2 582 571 | 94.9 | 96.9 | 97.1 | 100.0 | 0.0 | 0.0 |
| Turkey | 483 000 | 500 000 | 684 894 | 6.0 | 6.1 | 8.4 | 100.0 | 0.0 | 0.0 |
| United Kingdom | 5 432 000 | 5 991 000 | 7 203 000 | 23.2 | 25.4 | 30.5 | 39.2 | 55.1 | 5.7 |
| United States | 69 947 000 | 73 300 000 | 76 778 000 | 71.4 | 74.0 | 77.2 | 86.9 | 13.1 | 0.0 |
| OECD | 159 850 420 | 1706 85 823 | 19 001 1471 | 46.8 | 49.3 | 51.5 | 73.1 | 20.7 | 12.7 |

1. Number of subscribers to cable, satellite and terrestrial subscription services.
2. For Mexico, terrestrial data refer to MMDS services.
*Source:* OECD, OBS, IDATE/E C Digital TV study.

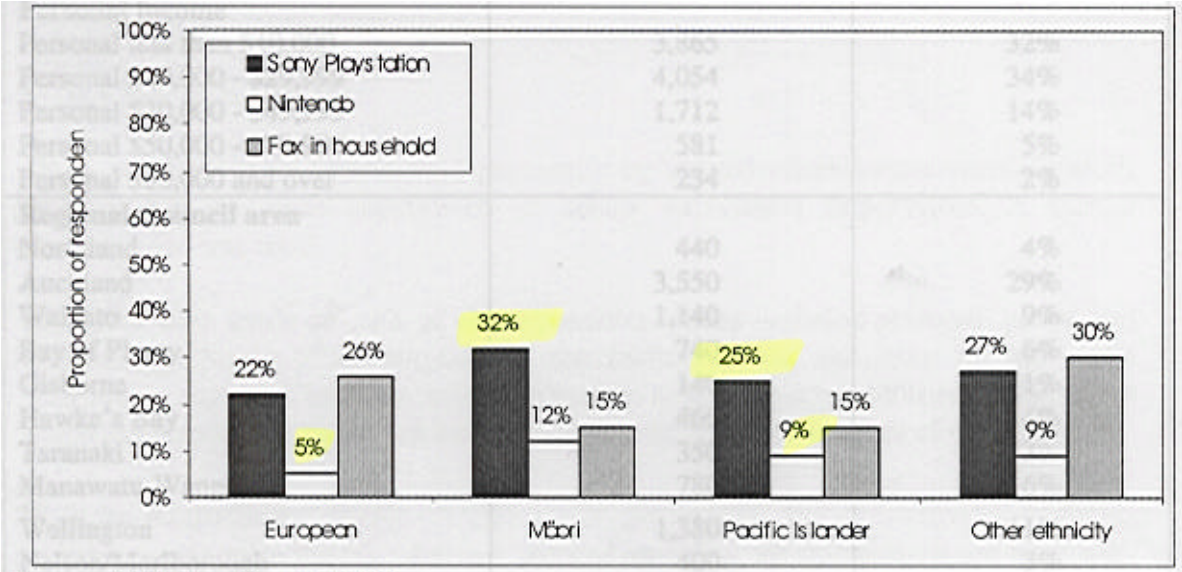
## Table 1.4.6 Number of Direct Broadcast Satellite Subscribers in OECD

| | Number of DBS subscribers | | | | | Number of digital DBS subscribers | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1997 | 1998 | 1999 | CAGR 1997-99 (%) | Penetration rate 1999 (%) | 1997 | 1998 | 1999 | CAGR 1997-99 (%) | Penetration rate 1999 (%) |
| Australia | .. | .. | 400 000 | .. | 5.57 | .. | .. | 400 000 | .. | 5.57 |
| Austria | 57 000 | 50 000 | .. | .. | .. | 11 000 | 27 000 | 35 000 | 78.38 | 1.11 |
| Belgium | 0 | 0 | 0 | .. | .. | 0 | 0 | 0 | .. | .. |
| Canada | 4 000 | 227 000 | 550 800 | 1 073.46 | 4.77 | 4 000 | 227 000 | 550 800 | 1 073.46 | 4.77 |
| Czech Republic | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Denmark | 274 000 | 300 000 | 345 000 | 12.21 | 14.56 | 0 | 4 000 | 30 000 | .. | 1.27 |
| Finland | 71 000 | 80 000 | 98 000 | 17.49 | 4.61 | 0 | 3 000 | 10 000 | .. | 0.47 |
| France | 1 091 500 | 1 951 000 | 2 574 000 | 53.57 | 11.19 | 1 091 500 | 1 951 000 | 2 574 000 | 53.57 | 11.19 |
| Germany | 607 000 | 747 000 | 845 000 | 17.99 | 2.18 | 112 000 | 252 000 | 520 000 | 115.47 | 1.34 |
| Greece | 0 | 0 | 10 000 | .. | 0.29 | 0 | 0 | 10 000 | .. | 0.29 |
| Hungary | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Iceland | 0 | 0 | 0 | .. | .. | 0 | 0 | 0 | 0 | 0.00 |
| Ireland | 98 000 | 110 000 | 127 000 | 13.84 | 10.58 | 0 | 9 000 | 70 000 | .. | 5.83 |
| Italy | 180 000 | 540 000 | 1 000 000 | 135.70 | 5.25 | 180 000 | 540 000 | 1 000 000 | 135.70 | 5.25 |
| Japan | 11 515 000 | 13 073 000 | 14 440 000 | 11.98 | 39.46 | 0 | 1 243 000 | 1 983 000 | .. | 5.42 |
| Korea | 0 | 0 | 0 | .. | .. | 0 | 0 | 0 | .. | .. |
| Luxembourg | 0 | 0 | 0 | .. | .. | 0 | 0 | 0 | .. | .. |
| Mexico | 152 212 | 307 982 | 490 981 | 79.60 | 2.54 | 152 212 | 307 982 | 490 981 | 79.60 | 2.54 |
| Netherlands | 20 000 | 30 000 | 50 000 | 58.11 | 0.75 | 20 000 | 30 000 | 50 000 | 58.11 | 0.75 |
| New Zealand | 12 182 | 30 000 | 95 000 | 179.26 | 7.92 | 0 | 30 000 | 95 000 | .. | 7.92 |
| Norway | 300 000 | 355 000 | 440 000 | 21.11 | 25.20 | 0 | 5 000 | 40 000 | .. | 2.29 |
| Poland | .. | .. | 956 000 | .. | 7.53 | .. | .. | .. | .. | .. |
| Portugal | 0 | 0 | 50 000 | .. | 1.26 | 0 | 0 | 50 000 | .. | 1.26 |
| Spain | 350 000 | 954 000 | 1 250 000 | 88.98 | 10.42 | 350 000 | 954 000 | 1 250 000 | 88.98 | 10.42 |
| Sweden | 430 000 | 500 000 | 550 000 | 14.12 | 14.00 | 0 | 6 000 | 52 000 | .. | 1.30 |
| Switzerland | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Turkey | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| United Kingdom | 3 532 000 | 3 547 000 | 3 966 000 | 5.97 | 16.81 | 0 | 350 000 | 2 300 000 | .. | 9.75 |
| United States | 5 047 000 | 7 200 000 | 10 078 000 | 41.31 | 10.13 | 5 047 000 | 7 200 000 | 10 078 000 | 41.31 | 10.13 |
| OECD | 23 740 894 | 30 601 982 | 38 325 781 | 27.06 | 10.39 | 6 967 712 | 12 911 982 | 21 037 981 | 73.76 | 5.70 |

Source: OECD, OBS, IDATE/E C Digital TV study.

While figures for international comparison are not available, NielsenNet statistics in Figure 1.5.1 show high levels of uptake of Sony Playstation and Nintendo consoles. These statistics indicate an avenue of potential connectivity, based upon the specific uses to which these technologies are employed – gaming.

**Figure 1.5.1 Game Console Ownership, by Ethnicity**



**Source:** ACNielsen Netwatch 2000

## *1.6 Summary*

Overall, New Zealand's levels of connectivity are high by international standards. Comparatively low telephony and ISP charges, combined with unmetered telephony, low domain name registration charges and a conducive regulatory environment have resulted in internationally high levels of New Zealand connection to the infrastructures underpinning an electronically-based information economy. There is considerable evidence of New Zealanders as early adopters of new connectivity infrastructures. The patterns are consistent across all forms of infrastructure – telecommunications, Internet, and broadcasting, supporting the contention that New Zealand is well placed to profit from the benefits promised by an electronically-based information economy.

# 2. Capability

Capability measures provide insights into the resources available to an economy or society to be applied to productive and welfare-enhancing endeavour. Thus, they are measures of the quantity of resources available (that is, the stock of skills and assets), along with some analysis of the quality of those resources. Together, quantity and quality measures enable projections of potential yields to be made from applying the resources (that is, estimates of how well we think we could be doing, given the resources and skills available). While capability measures indicate potential, they are nonetheless only indicators of potential, not actual performance. Capability and connectivity measures, combined with uptake, yield actual output performance measures. (Scoping Report p 86).

It is still unclear how Capability measures translate into electronic commerce performance measures, as such they did not form part of the hypothesis testing in *The State of e-New Zealand*. However, for completeness, we include some measures in this report, to provide a benchmark against which future analysis may prove beneficial. The majority of statistics reported here are contained in the Ministry of Economic Development's March 2001 document *Statistics on Information Technology in New Zealand*.

## *2.1 Hardware*

In order to participate in an information economy dominated by electronic technologies, hardware and software are required, both by firms and individuals. These must also be backed up by services to install, and maintain the technological base. As New Zealand has a very small computer hardware manufacturing sector, the majority of equipment required is imported. Hardware imports thus provide a good proxy for the quantity of computer and communications equipment available for use in New Zealand.

New Zealand's imports of computer hardware have increased by 25% in nominal terms between 1999 and 2000 (23% in 1998-9, 10% in 1997-98) – Figure 2.1.1. While currency movements would have accounted for some of this growth (Figure 2.1.2 shows the bulk of imports have come from the USA and Asia), there has been a noticeable growth (76%) in wireless communications hardware, consistent with the growth in mobile telephony indicated in section 1.2.

**Figure 2.1.1 IT Related Hardware Imports by Type**

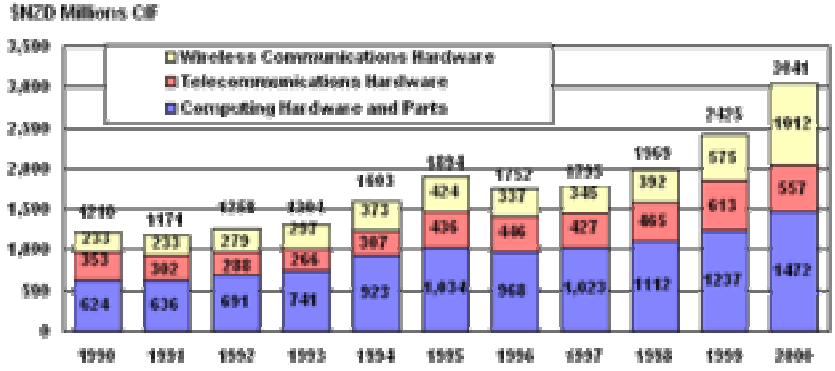
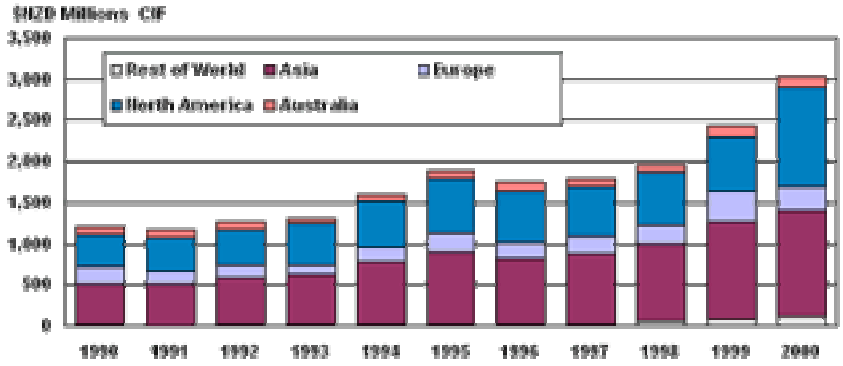



**Figure 2.1.2 IT Related Hardware Imports by Source**




## *2.2 Investment*

Total annual investment in the Information Technology sector (excluding telecommunications) has shown steady growth throughout the period 1994-2000 (Figure 2.2.1). Service continues to command the largest share of IT investment, commanding 47.6% of spending in 2000, with strong growth over the late 1990s (rising from 37.6% in 1994). Table 2.2.1 shows a significant increase in training expenditure from 1998-2000 (increases of 46.8% and 41.1% between 1999-2000 and 1998-99 respectively), reflecting an increased commitment to the development of human capital in the sector (see section 2.3), although training still accounts for only 1.6% of total expenditure in 2000.

Spending on software has averaged 9.7% of IT expenditure over the period examined (Table 2.2.2). Proportionate spending on communications hardware has increased over the past 3 years after a decline relative to other spending in the mid 1990s. This is consistent with the OECD investment figures cited in section 1.2.6.

**Figure 2.2.1 New Zealand End User Computer Hardware, Software and Services Market, Excluding Telecommunications Services (NZ$ Millions)**

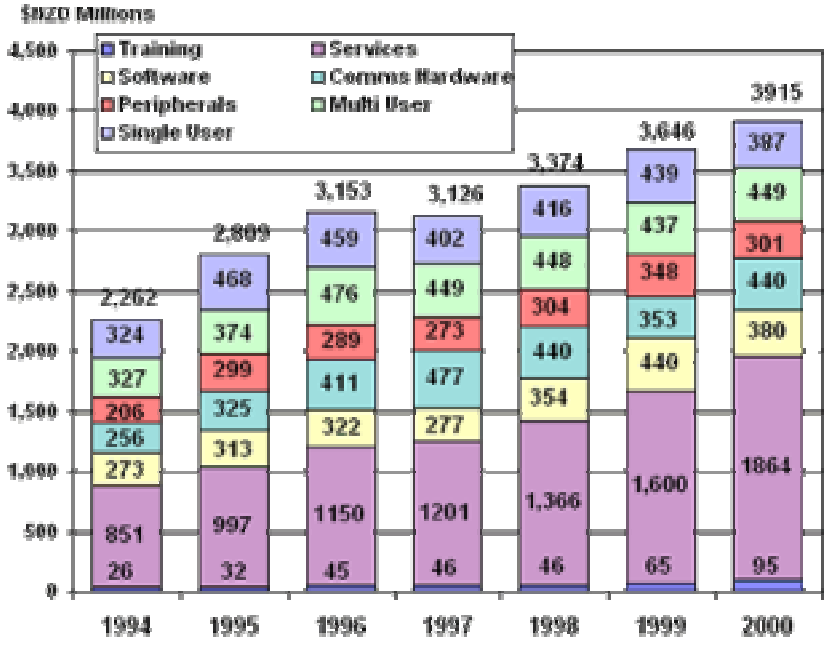



**Table 2.2.1 Changes in End User Sales Since 1996 (Percent)**

| | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|
| Computer h/w: single user systems | -12.4 | 3.5 | 5.4 | -11.9 |
| Computer h/w: multi-user systems | -5.8 | -0.2 | -2.5 | 2.7 |
| Peripheral computer equipment | -5.7 | 11.6 | 14.3 | -13.4 |
| Communications hardware and cables | 15.9 | -7.8 | -19.8 | 24.9 |
| Software sales | -13.9 | 27.7 | 24.3 | -13.7 |
| Computer services | 4.5 | 13.7 | 17.2 | 16.5 |
| Training and education in IT | 2.4 | -1.3 | 41.1 | 46.8 |
| Communication services | 13.5 | 12.2 | -4.6 | 4.2 |
| Total New Zealand end-user sales | 6.2 | 10.2 | 1.8 | 5.3 |

**Table 2.2.2 Percentage of End User Sales by Sector, 1994 – 2000**

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | Avge % | 2000% |
|---|---|---|---|---|---|---|---|---|---|
| **Training** | 1.1% | 1.1% | 1.4% | 1.5% | 1.4% | 1.8% | 2.4% | 1.6% | 2.4% |
| **Services** | 37.6% | 35.5% | 36.5% | 38.4% | 40.5% | 43.5% | 47.6% | 40.5% | 47.6% |
| **Software** | 12.1% | 11.1% | 10.2% | 8.9% | 10.5% | 12.0% | 9.7% | 10.6% | 9.7% |
| **Comms Hardware** | 11.3% | 11.6% | 13.0% | 15.3% | 13.0% | 9.6% | 11.2% | 12.1% | 11.2% |
| **Peripherals** | 9.1% | 10.6% | 9.2% | 8.7% | 9.0% | 9.5% | 7.7% | 9.1% | 7.7% |
| **Multi User** | 14.4% | 13.3% | 15.1% | 14.4% | 13.3% | 11.9% | 11.5% | 13.3% | 11.5% |
| **Single User** | 14.3% | 16.7% | 14.6% | 12.9% | 12.3% | 11.9% | 9.9% | 13.0% | 9.9% |

## *2.3 Human Capability*

### *2.3.1 Information Technology Workforce*

Section 2.2 indicates that spending on training has risen as a share of total end user IT spending. Table 2.3.1 shows the growth of employment in the IT industry and IT occupations between the 1991 and 1996 censuses. While total growth of all occupations grew 16.5% between 1991 and 1996, growth of IT occupations in all industries, at 21.4%, outstripped this. And while growth in all occupations in the IT industry was only 4%, growth in IT occupations in the IT industry grew by 21.2%, indicating that non-IT occupations in the IT industry declined in real terms over that period (Table 2.3.2).

Figure 2.3.1 shows the proportionate change in the makeup of the IT workforce since 1990. Of particular note is the increase in the proportion of the workforce engaged in Computer Consultancy, and the declining proportion engaged in the Telecoms Services sector. The decline in the Telecoms Services workforce is consistent with the OECD finding of decreased staff numbers and increased productivity in this sector over the same period (section 1.2.4). Increases are also evident in the Electronic Equipment Manufacturing and Computer Wholesaling sectors, consistent with the increased stocks of IT equipment evidenced in section 2.1.

It is significant to note the emergence of a new category of workforce since 1998: Information Storage and Retrieval Services. The proportionate growth of this sector has been, over its short life, the most significant, indicating the growth in the stock of information accumulated and requiring management. While methodologies to record the value of this information stock have not yet been developed (Scoping Report), the dramatic growth of the number of staff required to manage the resource is indicative of the rate at which the stock is growing.

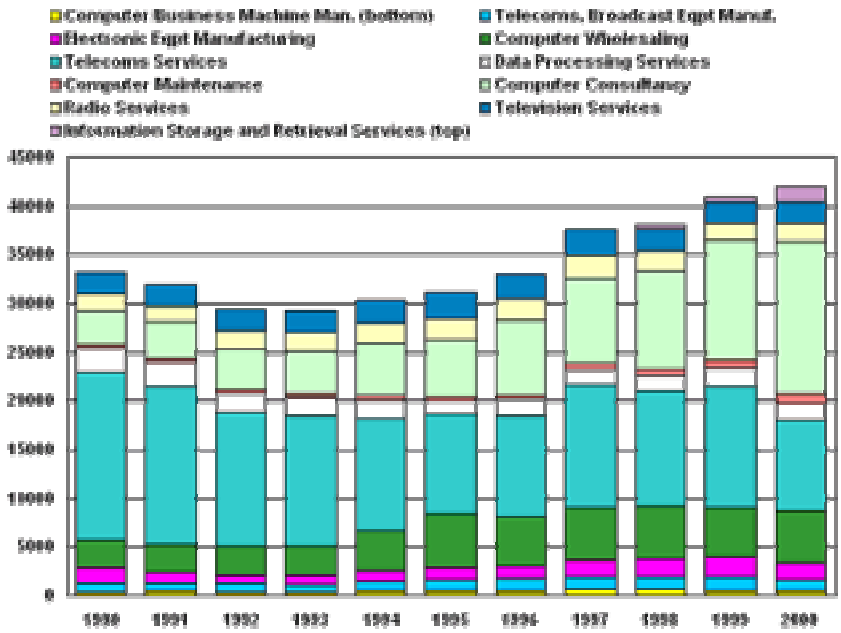
**Table 2.3.1 Numbers Working in IT Occupations**

| | IT Occupations | | All Occupations | |
|---|---|---|---|---|
| | *1991* | *1996* | *1991* | *1996* |
| IT Industry | 8,826 | 10,695 | 40,200 | 41,823 |
| All Industry | 27,717 | 33,642 | 1,400,376 | 1,630,809 |

**Table 2.3.2 Proportion of Workforce in IT Occupations**

| | No. Employed | | | | % Change of Working Pop. |
|---|---|---|---|---|---|
| | *1991* | | *1996* | | |
| Working Pop. | 1,400,376 | | 1,630,809 | | |
| IT Occ. IT Ind. | 8,826 | (0.6%) | 10,695 | (0.7%) | 4.1% |
| IT Occ. All Ind. | 27,717 | (2.1%) | 33,642 | (2.1%) | 4.2% |
| All Occ. IT Ind | 40,200 | (2.9%) | 41,823 | (2.6%) | -10.7% |
| IT Employed* | 59,091 | (4.2%) | 64,770 | (4%) | -5.9% |

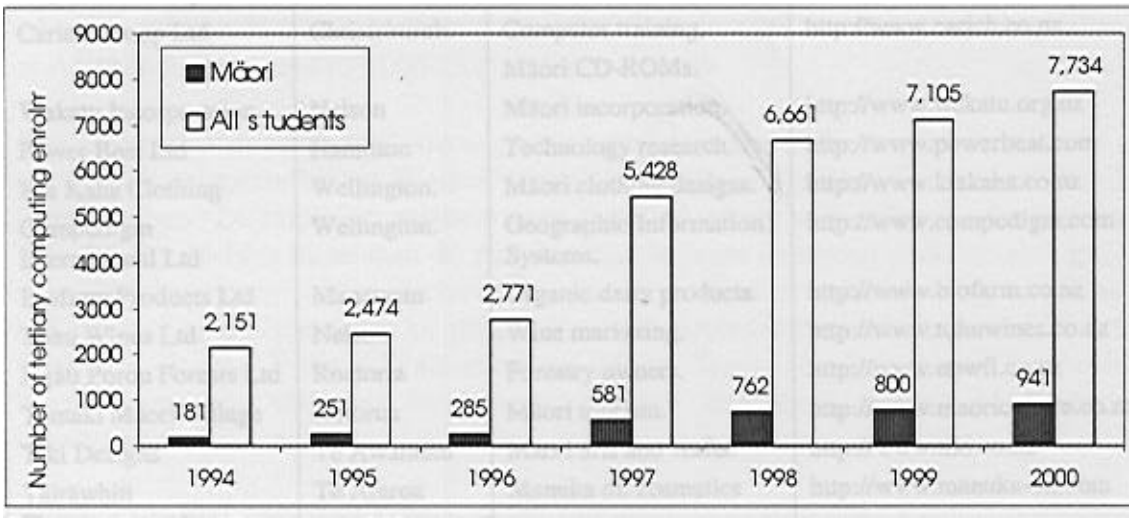
**Figure 2.3.1 Employment in IT Industries 1990-1999 by ANZSIC Classification**



### *2.3.2 Individual Skill Levels*

While specific workforce training is identified in section 2.1, there have also been significant gains in upskilling of the population in general, as illustrated by Figure 2.3.2. Despite relatively static population growth over the period 1994 to 2000, the number of New Zealanders enrolled in tertiary computer education has increased by a massive 260%. Maori enrolments have increased by 420% in the same period. This indicates that the number of individuals with computer-based tertiary education skills has increased significantly.

**Figure 2.3.2 Tertiary enrolments**




*Source: Te Puni Kokiri*

As the Te Puni Kokiri document does not identify exactly which courses, and hence skills, these enrolments relate to, it is difficult to determine how these enrolments are spread between hardware, software and e-commerce skills. However, the growth in enrolments is indicative of a significant amount of upskilling directly relevant to the use of computers, concomitant with the growth in investment illustrated above.

It is recognised, however, that these skills relate specifically to tertiary-based computer learning relevant to the development of technologies (e.g. new hardware) and applications (e.g. software applications) for computers. They do not allow benchmarking of the skill levels required to implement and use fundamental applications such as keyboarding, word processing, spreadsheets and web pages. These are the key skills required by the majority of the population to participate in electronic applications, and are not reflected in the tertiary education statistics. The distinction is similar to that between the skills of engineers and mechanics, who design and build cars, and those required to drive cars. While enhancements in welfare are made possible by new car designs, the actual welfare gains are only made when people buy and drive the new vehicles. Further, just as it does not take the level of skill of an engineer or mechanic for drivers

to participate in these benefits, computer engineering and technician skills are not required to realise benefits from information technologies. However, it does require a specific subset of skills, which is not routinely measured. Moreover, entrepreneurial skills are also required to see the possible applications of these technologies to current and future applications. To date, these have not been routinely measured. Hence, we caution against benchmarking human capital capability merely against tertiary computer skills.

## *2.4 Summary*

The addition of measures of capability to *The State of e-New Zealand* recognises the need to examine levels of connectivity with respect to the ability of the economy to utilise this connectivity, resulting in levels of uptake that are consistent with the potential. That the key indicators here – human capability, and investment in hardware and software, are growing consistently with the growth of connectivity indicates that the benefits promised by this connectivity are capable of being yielded when these applications are taken up. When these are in alignment, it is more likely that the benefits in performance, which to date are difficult to measure, will be realised.

# 3. Uptake

While connectivity and capability statistics offer measures of potential benefit, the process of converting potential into subsequent benefits requires linking of capabilities and connectivity with the uptake of technologies. Like connectivity and capability statistics, uptake statistics track utilisation of specific skills and technologies, but these measure only utilisation, not the consequent benefits (or detriments) that arise from their use.

This section surveys uptake measures of applications utilising information and electronic technologies to create, process, store, transmit and utilise information, as distinct from the infrastructure measures identified in the Connectivity section. Thus, despite the reliance upon electronic technologies that enable these applications to be used, the key factors underpinning the effects yielded by uptake of these applications are the changes in prices, speed, medium and method of utilisation of information. Further, uptake measures alone are merely "tracking signals" of what individuals and businesses are using connectivity and capability for. Interpretation of the consequences requires detailed understanding of how these behaviours impact upon wider performance measurements. (*Scoping Report* p89-90).

Nonetheless, uptake statistics give some indication of the types of economic and social benefits that may ensue from application of connectivity and capability. The following measures give a flavour of some of the applications that have already yielded benefits for New Zealand.

## *3.1 Electronic Banking*

In *The State of e-New Zealand*, we demonstrated the near-ubiquitous state of electronic banking in New Zealand. The centralised clearance system for trading banks had nurtured the development of Automatic Teller Machine (ATM) and Electronic Funds Transfer at Point of Sale (EFTPOS), which in turn offered benefits to banks, retailers and customers, to the extent that New Zealand had world-leading uptake figures for each of these technologies. The role of these technologies in preparing people culturally, and equipping them with skills relevant to the use of other electronic technologies where information substitutes for other 'hard' products (such as coinage), was also discussed (*The State of e-New Zealand* pp 20-21).

Twelve months on, New Zealand's position as a world leader has further consolidated. While Australia continues to lead New Zealand in the number of ATMs per head of population (Figure 3.1.1), New Zealand's dominance in the number of EFTPOS terminals per head continues,

indicating a greater facility to substitute information for cash by New Zealanders than Australians[22].

**Figure 3.1.1 Persons Per ATM**

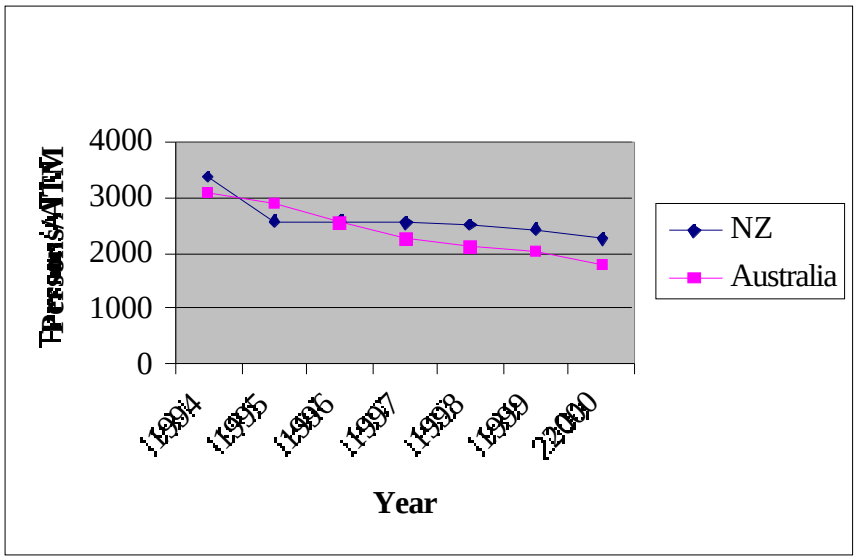
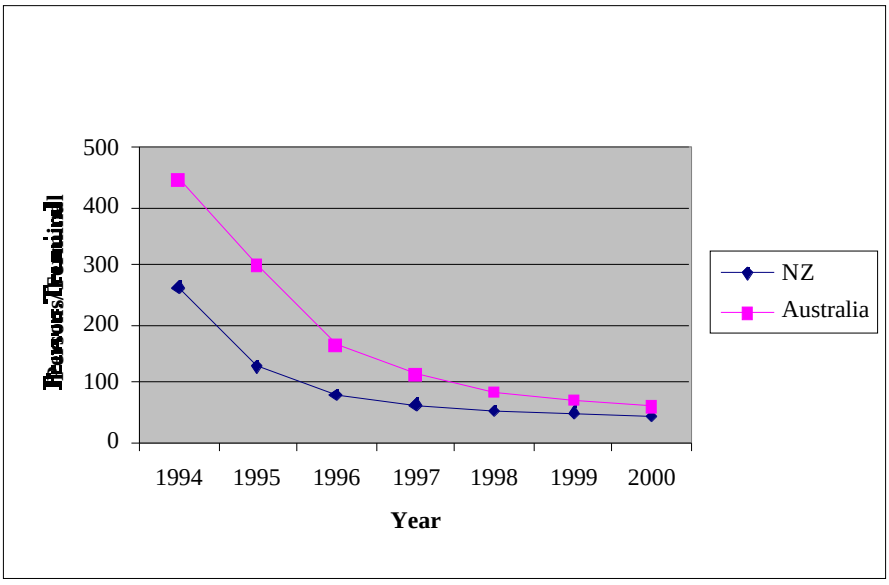



**Figure 3.1.2 Persons per EFTPOS Terminal**




This dominance is further reinforced by Table 3.1.1, which not only shows that New Zealand has a greater number of EFTPOS terminals in use per head of population than Australia, but that these terminals are each used to process 45% more transactions than Australian terminals, and

[22] Greater use of ATMs by Australians indicates a continued use of physical cash dispensed from machines.

that on average, New Zealanders processes nearly twice as many EFTPOS transactions in a year than the average Australian (121 per annum as opposed to 62).

**Table 3.1.1 EFTPOS Transactions: Australia and New Zealand**

| EFTPOS TRANSACTIONS (Australia) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (Source - NOIE Current State of Play July 2000 + ABS Population Statistics) | | | | | | | | |
| | | | | | | | | | |
| | | Terminals | Trans/ | Number | number | Popn | Persons/ | Trans/ | Trans/ |
| | Terminals | % inc | month | (million) | % inc | (millions) | Terminal | Person | Terminal |
| 1989 | 15000 | | | | | | | | |
| 1990 | 20000 | 33% | | | | | | | |
| 1991 | 25000 | 25% | | | | | | | |
| 1992 | 30000 | 20% | | | | | | | |
| 1993 | 33000 | 10% | | | | 17.70 | | | |
| 1994 | 40000 | 21% | 61 | 732 | | 17.90 | 448 | 41 | 18300 |
| 1995 | 60000 | 50% | 68 | 816 | 11% | 18.10 | 302 | 45 | 13600 |
| 1996 | 110000 | 83% | 78 | 936 | 15% | 18.30 | 166 | 51 | 8509 |
| 1997 | 160000 | 45% | 79 | 948 | 1% | 18.50 | 116 | 51 | 5925 |
| 1998 | 220000 | 38% | 84 | 1008 | 6% | 18.80 | 85 | 54 | 4582 |
| 1999 | 265000 | 20% | 90 | 1080 | 7% | 19.00 | 72 | 57 | 4075 |
| 2000 | 320000 | 21% | 100 | 1200 | 11% | 19.20 | 60 | 63 | 3750 |

**EFTPOS TRANSACTIONS (New Zealand)**

**Source – KPMG Financial Institutions Performance Survey 2001**

**And Statistics New Zealand**

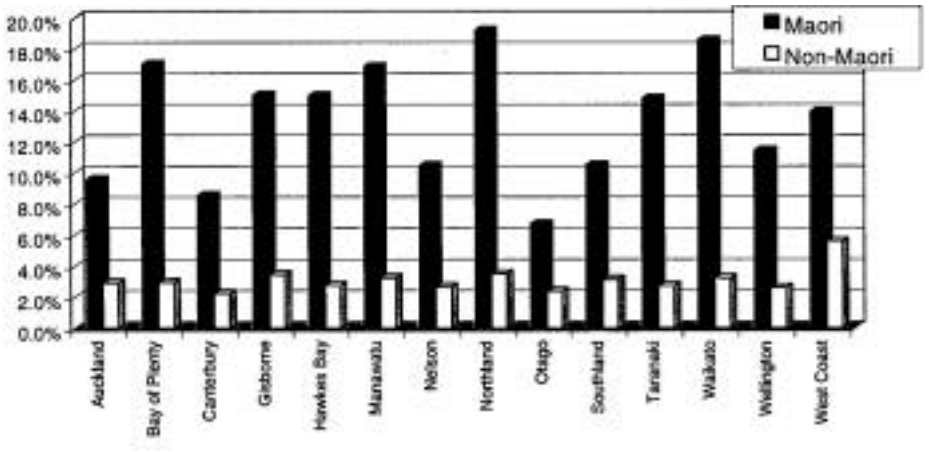
| | Terminals | | Transactions | | Popn | Persons/ | Trans/ | Trans/ |
|---|---|---|---|---|---|---|---|---|
| | Terminals | % inc | (million) | % inc | (millions) | Terminal | Person | Terminal |
| 1993 | | | 70 | | | | | |
| 1994 | 13600 | | 112.5 | 61% | 3.60 | 265 | 31 | 8272 |
| 1995 | 28700 | 111% | 181.7 | 62% | 3.65 | 127 | 50 | 6331 |
| 1996 | 46360 | 62% | 263.5 | 45% | 3.71 | 80 | 71 | 5684 |
| 1997 | 59992 | 29% | 343.5 | 30% | 3.76 | 63 | 91 | 5726 |
| 1998 | 70424 | 17% | 401.3 | 17% | 3.79 | 54 | 106 | 5698 |
| 1999 | 76889 | 9% | 450 | 12% | 3.81 | 50 | 118 | 5853 |
| 2000 | 85394 | 11% | 464 | 3% | 3.83 | 45 | 121 | 5434 |

It is noticeable, however, that in both transaction number and terminal number, EFTPOS in New Zealand is 'bottoming out'. This implies that the technology is now quite stable and mature, thereby substantiating the claim that this technology, and the ease of substitution of information for cash in retail purchasing, is now ubiquitous.

### *3.2 Telephony Uptake*

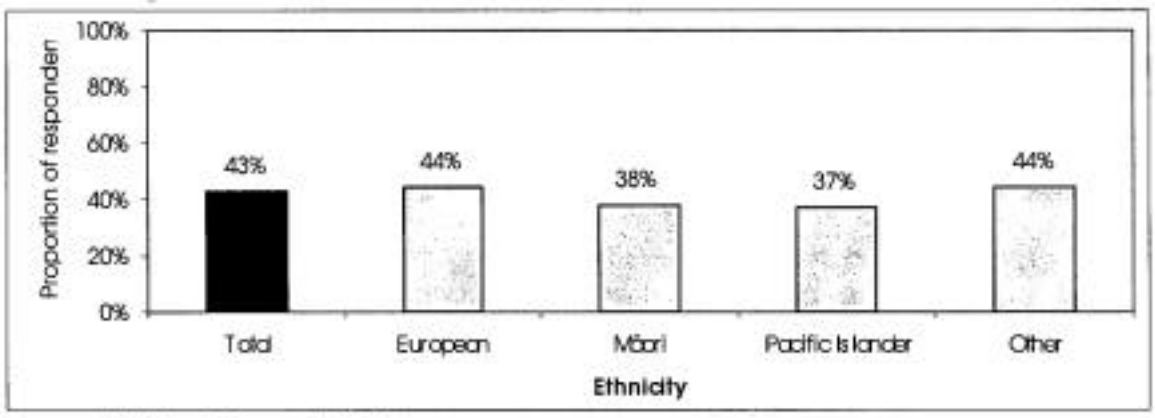
Total population uptake of telephony is illustrated in section 1.1. Statistics New Zealand 1996 Census data cited in the Te Puni Kokiri report (Figure 3.2.1) shows the breakdown of absence of telephone uptake by household, by ethnic group and by region. These figures reveal a higher proportion of Maori households without telephone access, with significantly higher proportions of non-uptake in predominantly rural areas (eg. Northland, Bay of Plenty, Gisborne, West Coast).

**Figure 3.2.1 Percentage of Households Without Telephones**




This disparity of telephone uptake does not appear to be represented, however, in the figures for mobile telephone uptake where Maori uptake of cellphones (38%) is only marginally smaller than the national average (43%) – Figure 3.2.2. While it is impossible to separate out cellphone use by urban and rural location, it may well be that, as proposed in *The State of e-New Zealand*, mobile telephony and prepaid mobile in particular, provides a cost-effective and more flexible method of communication in rural areas than urban, and that there may be some substitution of mobile for land lines as a consequence. With the growth of mobile telephone access to the Internet (e.g. Wireless Area Protocol, DoCoMo in Japan), it may be that rural areas will not be so dependent in the future upon wire-based telecommunications, in particular for small volume, personal data communications. It is recommended that further research be undertaken to explore the extent of this substitution.

**Figure 3.2.2 Cellphone Use by Ethnicity**




**Source:** ACNielsen Netwatch 2000

## *3.3 Internet and E-Commerce Applications*

In *The State of e-New Zealand*, we highlighted the need to identify business usage of applications by the type of firms participating – by ownership (public or private), firm size (large, medium and small) and geography – as well as the uses they were putting connectivity and capability to. Since the production of that document, four significant studies have documented uptake of Internet and e-Commerce applications in New Zealand:

- the MED/BRC document *Electronic Commerce in New Zealand: A survey of Business Use of the Internet* provided an initial analysis of business level uptake of Internet services
- *Adoption and Implementation of e-Business in New Zealand: Empirical Results 2001* by the Department of Strategic Management and Leadership at Waikato University built upon the MED/BRC survey
- *The Rural-Urban Digital Divide in New Zealand* by ISCR examined regional differences in business uptake of email and websites
- Te Puni Kokiri's July 2001 document *Maori Access to Information Technology* utilises predominantly ACNielsen Netwatch survey data to analyse individual and domestic uptake of Internet applications.

These studies demonstrate a consistent theme – internationally high levels of awareness and utilisation of electronic technologies, and the Internet in particular, for a variety of business and personal purposes. The significant omission in these studies is, however, the absence of information pertaining to business to business electronic interconnection that does not rely upon the Internet. Galbi (2000) identifies that in the United States, 98% of data transferred via telecommunications networks is not Internet-related. Rather, it relates to private direct connections via leased lines, either within businesses, or between contractually linked businesses.

To date, no data identifying this percentage in New Zealand is available. Deducing from anecdotal evidence, the telecommunications data showing high prices for 64k leased lines, the geography of New Zealand and concomitant the patterns of laying telecommunication trunks and branches, the small number of large scale businesses and the large number of small-scale businesses, it would be expected that the proportions of businesses utilising alternative methods of data interconnection, such as the Internet, would be larger than in the USA. Indeed, this scenario is consistent with the high levels of Internet Connectivity illustrated in section 1.3.

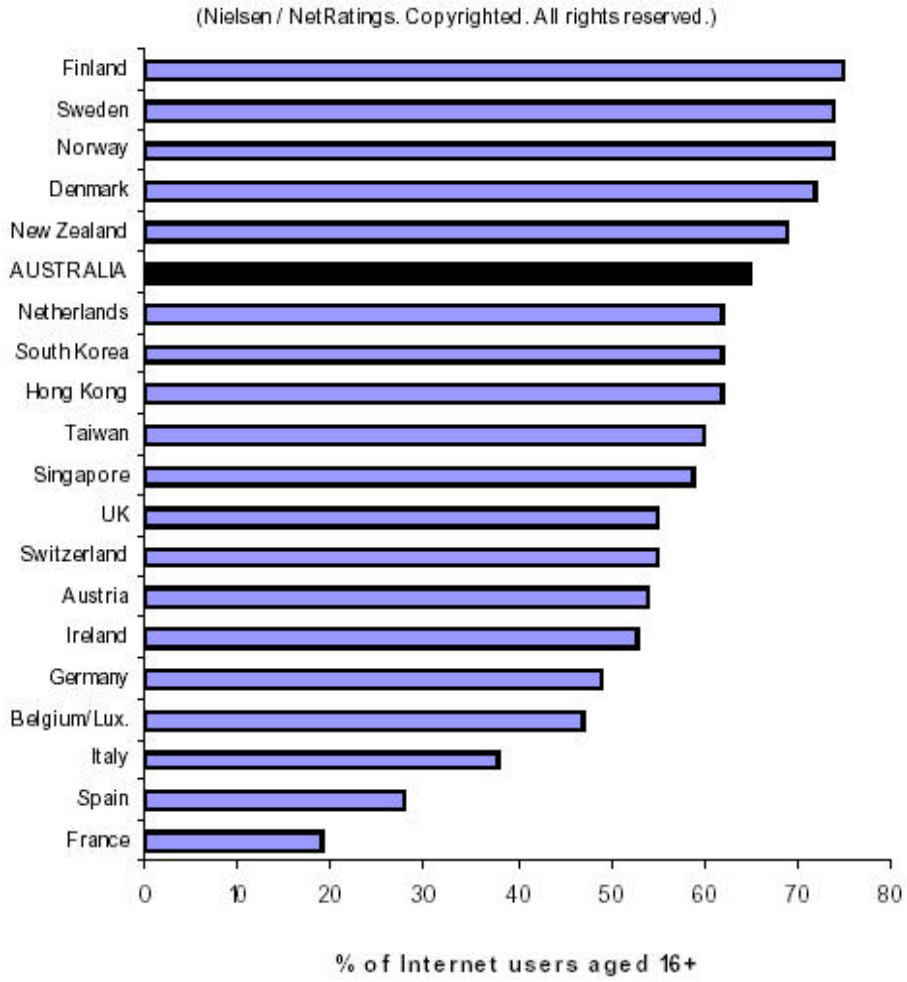
The question remains, however, what this Internet connectivity is being used for. Clear differences appear to be emerging between business and personal use.

### *3.3.1 Internet Uptake for Personal Use*

The number of New Zealanders over 16 years with Internet access from any location is high by world standards – fifth in the world in the fourth quarter of 2000 (69%), ahead of Australia (65%) but trailing the Scandinavian countries (Nielsen NetRatings,– Figure 3.3.1). Further analysis shows that the percentage accessing the Internet via a home PC is equal to Australia, indicating that New Zealanders' access via other avenues, such as work, school, libraries etc. is higher than that in Australia. This is consistent with the slightly lower levels of domestic PC ownership in New Zealand compared to Australia evidenced in section 1.2. Internet access in New Zealand relative to that in Australia does not seem to be inhibited by lower levels of PC ownership, as access is available in a range of substitute locations. Indeed, the indication is that there is considerably greater use of alternative locations in New Zealand.

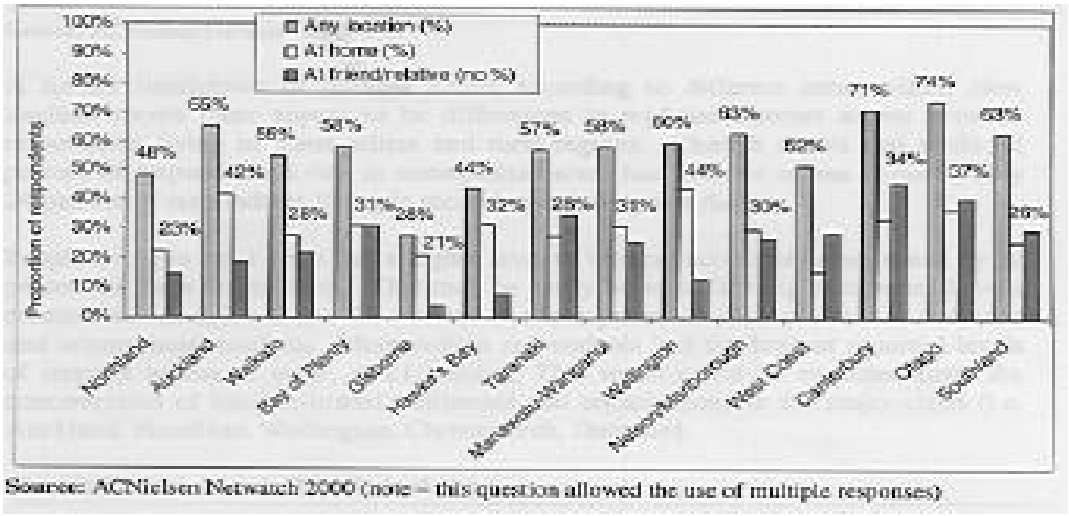
New Zealand regional uptake of the Internet for personal use shows higher use by metropolitan users (67% of the population from any location) than provincial urban (58%) and rural (55%) (Te Puni Kokiri Chart 8 p 16). Highest proportional use is in Otago (74%) and Canterbury (71%), with Gisborne (28%) trailing. (Figure 3.3.2). The distinct South Island leading North Island trend for personal uptake of Internet usage mimics that for business use found in *The Rural-Urban Digital Divide*, and is again most probably a function of the higher costs of communication and access to information via other sources (telephone, library visits) in smaller, more remote although more prosperous South Island locations. It is also significant that use of the Internet at sites such as libraries and Internet cafes is much more significant in Canterbury (32% use it at libraries, 20% at Internet cafes) and Otago (22% and 19% respectively) than in Auckland (5% and 2%) and Wellington (3% and 2%) (Te Puni Kokiri Chart 7 p 16).

**Figure 3.3.1 % of Population 16+ with Access from any Location – Qtr 4 2000**



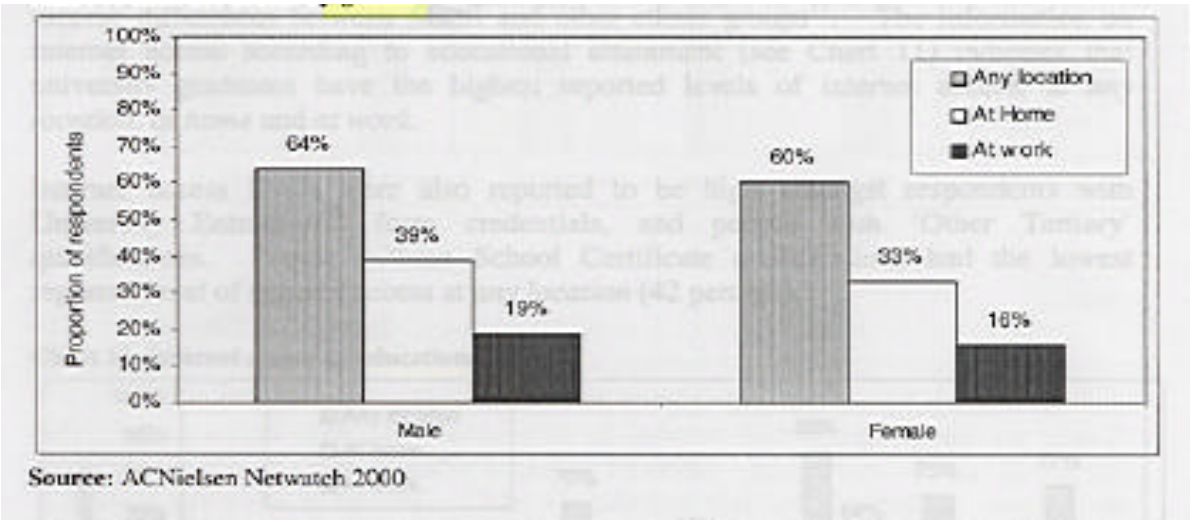

Demographic characteristics show that there is a slightly higher access level by males (64%) than females (60%), with males also more likely to have access to the Internet at work (39% versus 33%) – Figure 3.3.3. This follows the trend demonstrated in Australia where overall Internet usage by males is 53% with females at 47% (source: NOIE). Europeans indicate greater levels of access (65%) than Maori (46%) and Pacific Islanders (35%), but the highest levels of access are exhibited by people claiming 'other' ethnicity (75%) – Figure 3.3.4. Highest levels of access (81%) are recorded by people aged 10 to 19 years, decreasing steadily as age increases, reaching 31% for people aged 60 plus years. Again, a similar pattern is seen in Australia, with the 18 – 24 age group where 74% access the Internet. Access percentages for all groups; however, exceed Australian percentages (NOIE) but most significantly in the oldest group (55 plus in Australia), where the comparable November 2000 figure showed only 20% of elderly people accessing the Internet – Figure 3.3.5.

**Figure 3.3.2 Internet Access by Regional Council Area**



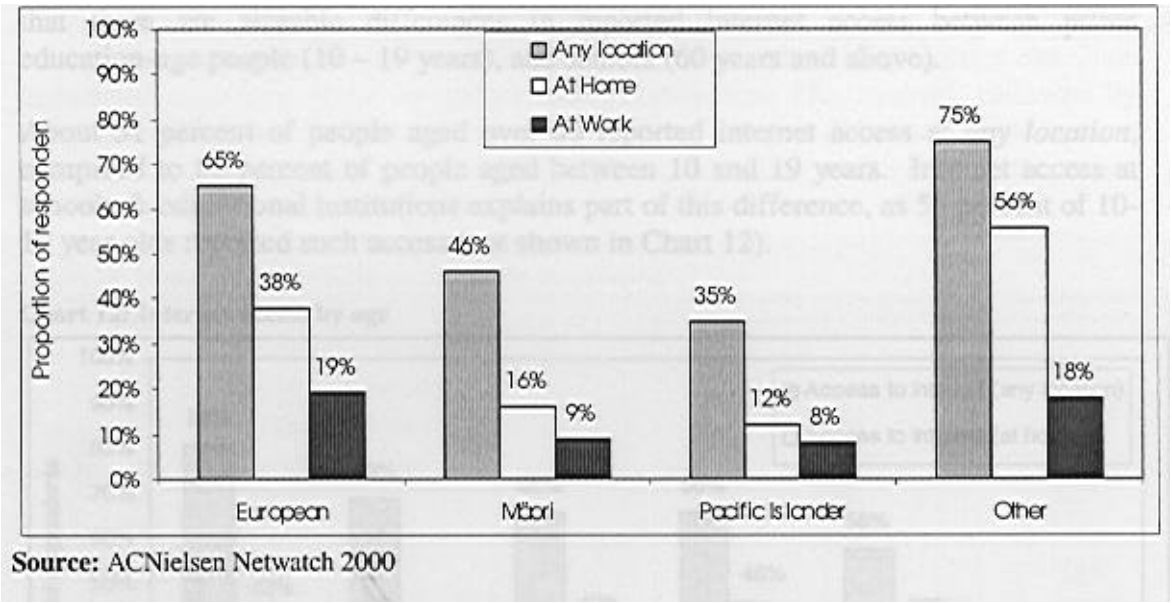
Source: ACNielsen Netwatch 2000 (note – this question allowed the use of multiple responses)

**Figure 3.3.3 Internet Access by Gender**



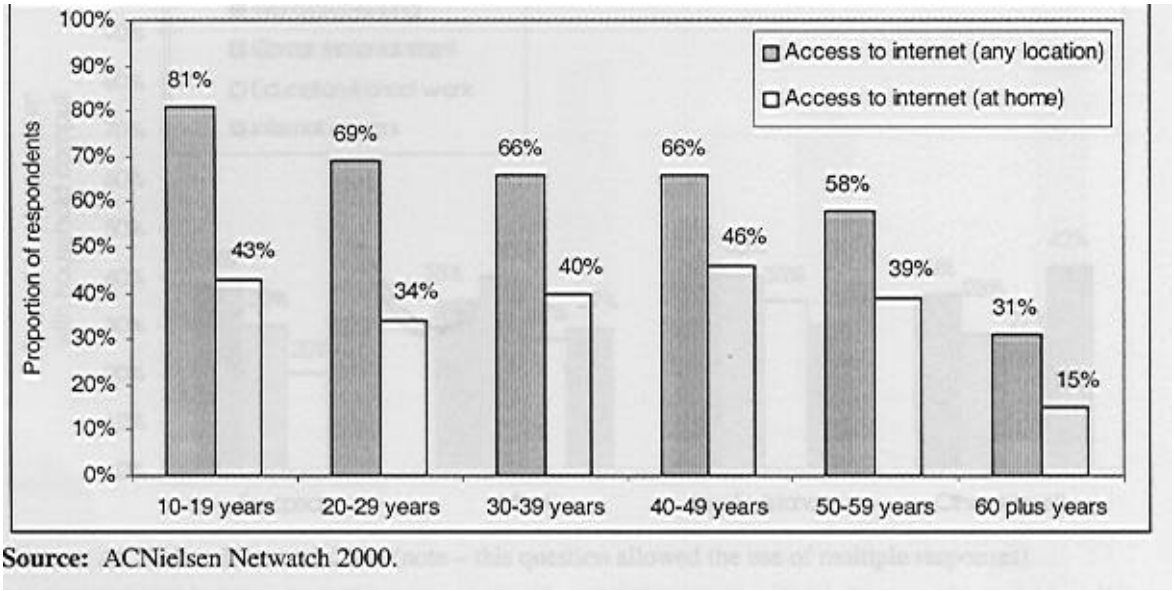
Source: ACNielsen Netwatch 2000

**Figure 3.3.4 Internet Access by Ethnicity**



Source: ACNielsen Netwatch 2000

**Figure 3.3.5 Internet Access by Age**



Source: ACNielsen Netwatch 2000.

Personal usage statistics show that while European and 'other' ethnic groups use computers mostly for word processing (38% and 36%), Internet access (31% and 42%), games and entertainment (30% and 28%) and education/work (20% and 27%), where there is a computer in a Maori household, it is used for predominantly for games (40%), followed by word processing (35%), Internet access (29%) and education/work (27%). Computers in Pacific Island households are the most extensively utilised, with word processing (43%) being the most used

application, followed by games (40%), education/work (35%) and Internet access (30%). Internet usage is equally spread between email and web browsing for Europeans (37% and 38%) and 'other' ethnicities (50% each), while for Maori respondents, web browsing was used slightly more than email (23% and 20%), again indicating greater use of technologies for recreational purposes than communication amongst this group, as indicated in ownership of other electronic games technologies. Furthermore, this is consistent with the lower levels of fixed line telephony in Maori households (section 3.2). This may potentially be explained by either lower ability to access a fixed telephone line for Internet access in Maori households, or a different demand for technologies such as telephones and email to communicate with others, due to different communication patterns.

The Te Puni Kokiri data also show steadily increasing ability to access the Internet as household income rises (Figure 3.3.6). However, when personal income is considered, those with incomes lower than $10,000 are more likely to have access to the Internet than those with incomes in the bands $10,000-$19,999 and $20,000-$29,999. This appears to be driven by greater ability to access the Internet at home and at school (Figure 3.3.7), so is probably a reflection of the numbers of adults over 18 with little income being dependent upon families and schools to provide Internet connectivity.

**Figure 3.3.6 Internet Access by Household Income**

**Figure 3.3.7 Internet Access by Personal Income**



### *3.3.2 Internet Uptake for Business Use*

The research papers shedding most light on business use of the Internet are the BRC/MED, Waikato University and ISCR Rural-Urban Digital Divide studies.

Using email and website listing data from the Yellow Pages Business Directory, the *Rural-Urban Digital Divide* finds that businesses in the South Island have proportionately higher listings, and hence presumed use, of email than their North Island counterparts (Figure 3.3.8). Further, affluent provincial centres (e.g. Nelson, Marlborough, Otago) indicate higher listing of email addresses than their metropolitan counterparts (e.g. Auckland, Wellington) – Figure 3.3.9. However, this does not appear to carry through to listing of website details – Figure 3.3.11. This is consistent with the theory that the higher costs of rural communications lead to earlier substitution of other methods of communication (e.g. phone, fax, physical mail, face-to-face) by email, which has similar functionality. The same patterns are not evident with websites, as the constrained format of website exchanges does not allow perfect substitution of other communication methods. While some components are substituted, websites cannot replicate the free form of exchange of a fax, physical mail, email or phone call.

**Figure 3.3.8 Email and Website Percentages – North and South Islands**

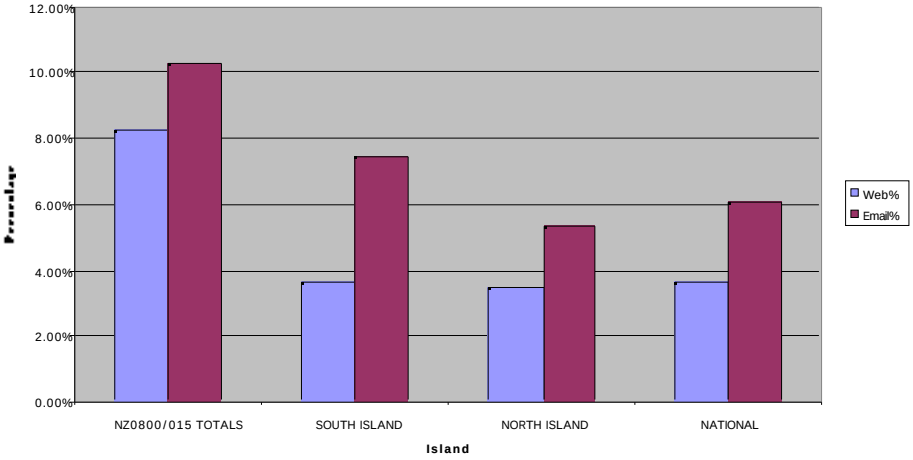
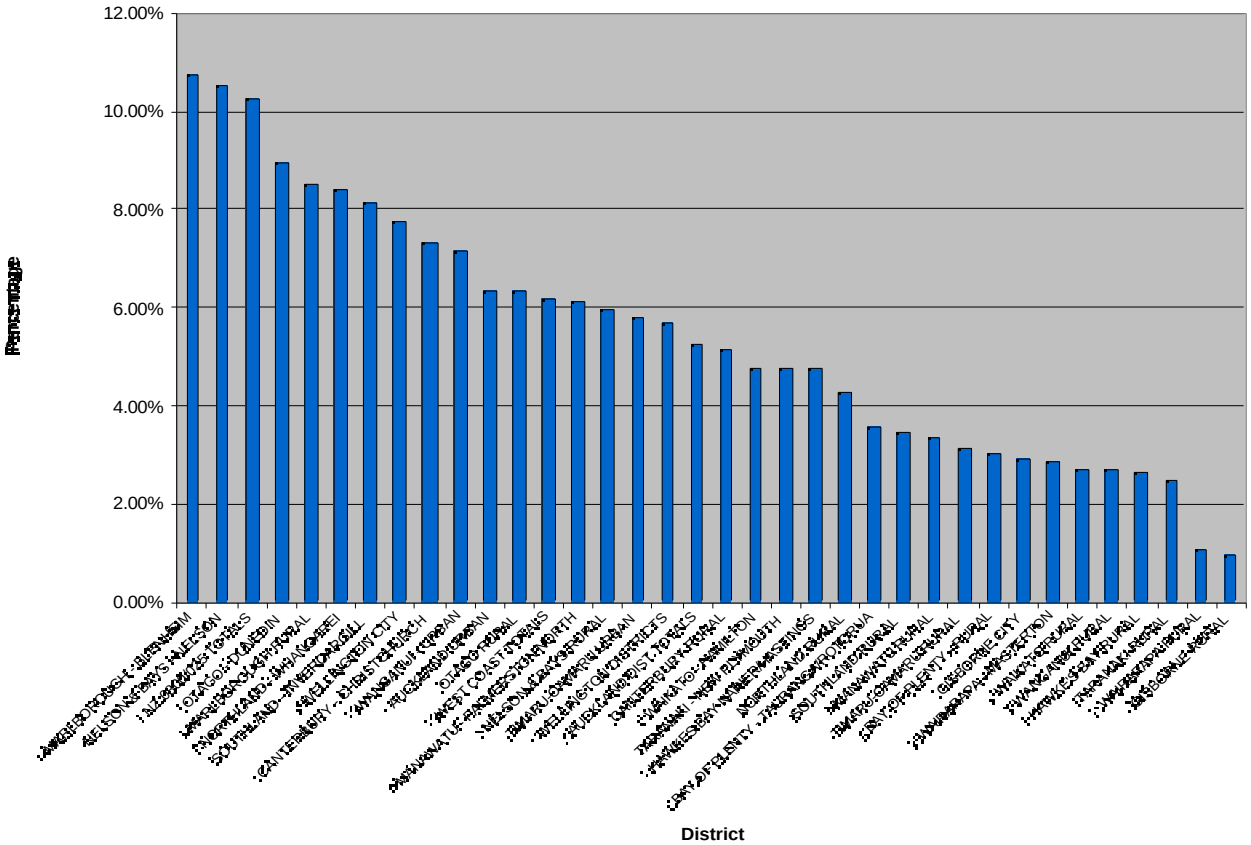


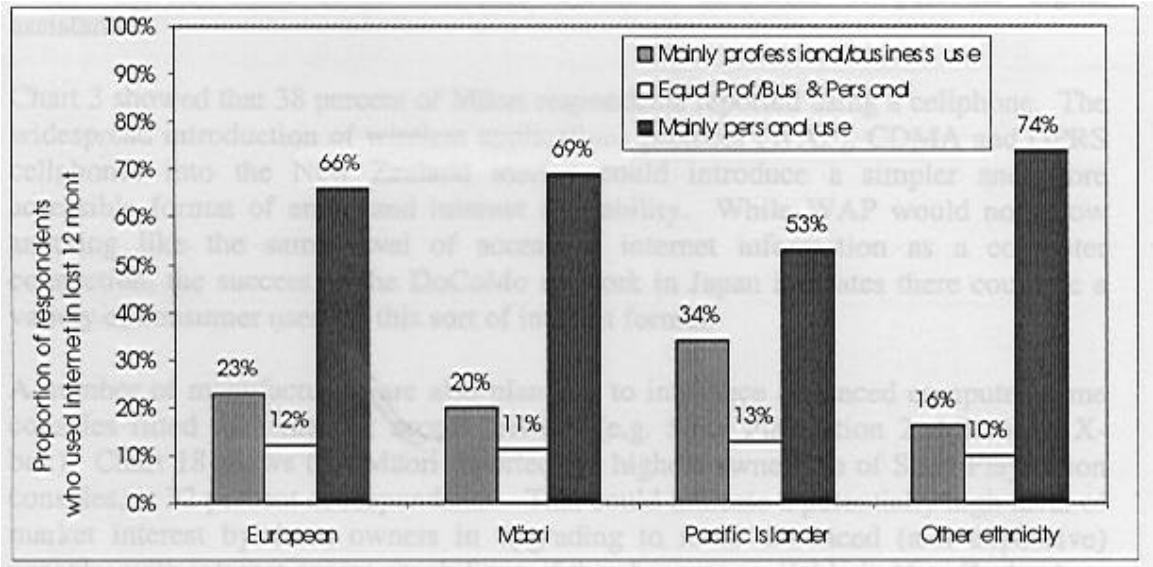

**Figure 3.3.9 Business Email Listings: Rural-Urban**




The BRC/MED and Waikato University studies use survey-based methods to gain an understanding of the types of Internet applications used by businesses. The BRC/MED study in September 2000 was the first study of its type in New Zealand, and shows high levels of Internet uptake by New Zealand businesses, with levels at least as high as, and (given time differences in sampling) in many cases higher than comparable businesses (by size and sector) in Australia.

The Waikato study focuses more specifically on the business applications using the Internet. Both studies find that email is the most frequently used application (99.6% of businesses in the Waikato study use email), followed by searching for information (98.4%) and sending and receiving files (95%). There is evidence of significant inter-firm transacting emerging, with 55.6% purchasing supplies online, and 47.7% using the Internet for competitor intelligence. Apart from email and website use, however, use of the Internet for marketing remains the predominant application (e.g. promotion 42.2%, market research 54.8%). Online training (19.8%) is the least-used application. Online sales to customers (23.5%) and businesses (24.1%) are also little-used at present (although, as argued in the *Scoping Report* and *The State of e-New Zealand*, this may be influenced by the small scale of New Zealand businesses leading to a much later optimal time to invest in new technologies, and the degree of sophistication and maturity of the centralised bank clearing system, which may provide a very cost-effective and efficient substitute for direct exchange between many companies).

**Figure 3.3.10 Internet Usage by Ethnicity**




**Source:** ACNielsen Netwatch 2000

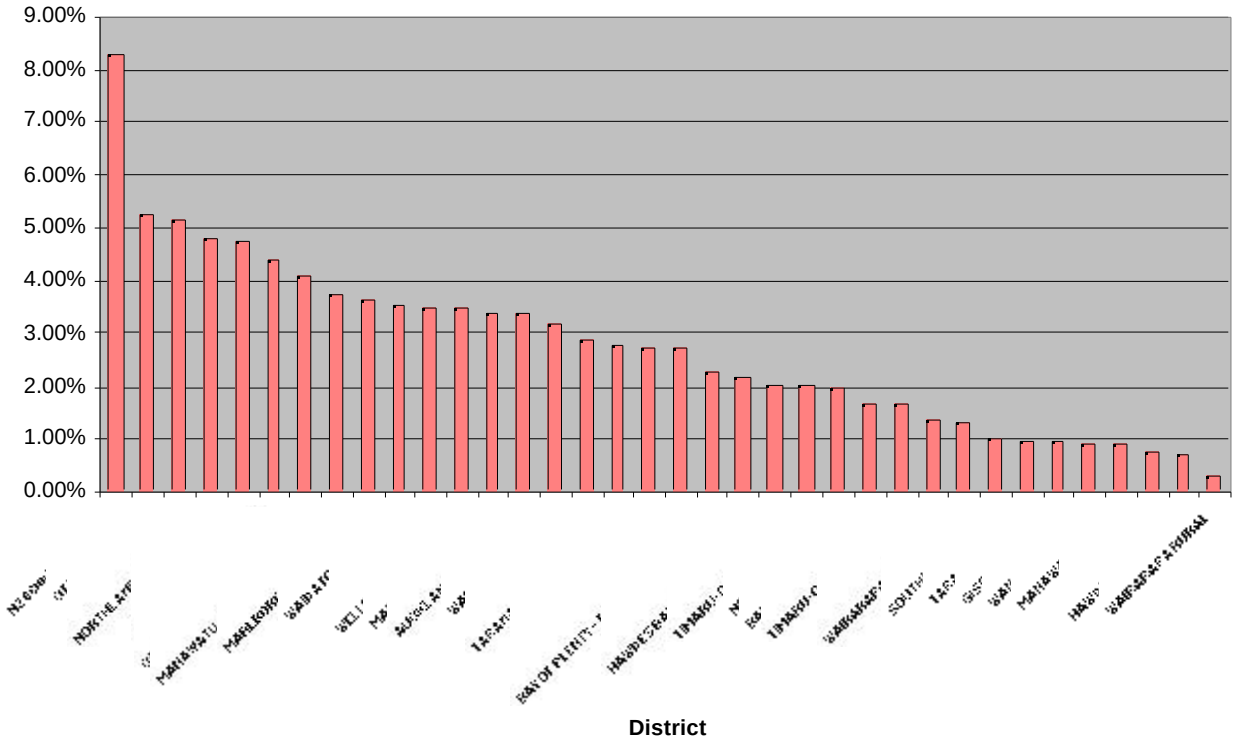
Research published by the Ministry of Maori Development[23] shows small cultural differences in the split between personal and business usage of the Internet. Figures show 23% of European Internet users and 20% of Maori Internet users mainly use the Internet for professional or business purposes, with a higher level amongst Pacific Islander users of 34%. Similar levels are found between the three samples with 11-13% stating usage is split between personal and business use. The Internet user population describing themselves as 'other ethnicity' provide

[23] We acknowledge the small variations shown here will be influenced by sampling variability.

the most disparate sample information, with 16% using the Internet for business use, and 74% for personal use. Figure 3.3.10 refers.

Whilst computer use is widespread, the proportion of New Zealand organizations with a website is 54%. The Waikato University study reports 21% of organisations having the capability to take online orders, with only 8% of these having the ability to accept payments in the same way. Within the sample studied, 20% involved business-to-business (B2B) transactions with 19% being business-to-consumer (B2C). These results point towards significant opportunity within New Zealand for organisations to expand their Internet related e-Business activities, with the proviso that this extra usage is supported by a trade-off between the costs and benefits of engaging in such activities. Internet trading for Internet trading's sake, in isolation from the costs and benefits, and without the support of a sound business case, does not constitute an efficient use of scarce resources. It may well be that the small average size of New Zealand businesses, and the types of inter-business transacting that they engage in, may not yet be sufficient or sufficiently standardised, to justify the investment in Internet-based trading (*Scoping Report*, pp 109-112).

**Figure 3.3.11 Business Website Listings: Rural-Urban**




It is significant to note in this analysis that the emphasis of these studies is still on the use of the Internet for online buying and selling. Yet, the overwhelming message of these statistics is that

businesses already see the exchange of information to support all aspects of the operation of the business as the primary use of the connectivity offered by this technology. While it is recognised that streamlined, customised and standardised transactions online may offer further benefits (for example, additional savings of transaction costs), these should not overshadow the very real benefits that have already accrued from the extensive use of email and websites. That New Zealand's use of these applications for business purposes exceeds that of Australia implies that the benefit to New Zealand has been commensurately greater on a per business basis.

Of the reasons provided for the use of e-Business, an increase in efficiency, external promotion and the development of new markets were those that featured most prominently. They were followed by the need to stay ahead of competitors and the introduction of new sales channels. These point to the customer service benefits that are perceived to be available through the use of the Internet.

Overall, factors that are considered inhibitors to e-Business within New Zealand are largely similar to those found in Australian research, with factors such as high costs and limited technology skills featuring highly. An interesting factor within the New Zealand results from the Waikato University study was the most important feature ranked by companies with a Website bwas low customer use of e-Commerce.

Whilst New Zealanders rate secure transactions highly, only one in five websites within New Zealand is capable of providing this service. As at July 2000, 95% of all secure servers were registered to addresses within the OECD countries. New Zealand still rates above the OECD average with 12.7 servers per 100,000 inhabitants, with Australia at this time having 14.9.

Certain industries are comparable within the Australian and New Zealand data collected to date. These include business services, manufacturing, retailing and transportation. Whilst banking is the predominant activity in all these sectors in Australia, the activities most relevant to uptake are those relating to buying and selling activities, thus the comparisons have been detailed on ability of websites to take orders and receive payments.

Within the New Zealand manufacturing industry 21% of organisations use their website for taking orders, which is significantly higher than the Australian industry at approximately 11%. Other industries have different patterns, with New Zealand and Australian retail and transport industries being identical at 41% and 28% respectively. Business services in New Zealand are ahead of Australia at 32% and 28% respectively (sources NOIE; Waikato Management School).

# 4. Performance

While measures of Connectivity and Capability indicate potential uses, and Uptake indicates actual utilisation of specific information technologies, it is only when linked through uses of information, that their ultimate effects can be translated into wider measures of economic performance and social impact. Thus, it could be interpreted that Connectivity, Capability and Uptake represent lower-level transaction, firm and individual measures, while Performance focuses on the wider system outcomes. For example, Lawrence and Diewert (1999) use this approach in an attempt to assess New Zealand's economic performance as a result of the structural changes since deregulation in the 1980s and early 1990s. If changes brought about by the introduction of electronic technologies could have been expected to result in significant changes in economic outcomes, then similar methodologies should be able to be applied to measure the resultant changes in performance. (*Scoping Report*, p 64)

At the highest possible level of aggregation, performance measures should show whether an economy (or a society) is able to produce more outputs (of all types) for a given level of inputs (of all types) as a result of changing the technologies (human, mechanical, organisational, policy etc.) it applies – that is, productivity gain. While this methodology can be applied at all levels of activity, right down to the level of the productivity of individual transactions, it is recognised that all transactions occur in the context of systems. Systems interact with each other, and there will inevitably be flow-on and feedback effects as changes in one system affect the inputs and technology choices of other systems. Furthermore, these effects need to be examined not just within static slices of time, but over time, as the impacts affect different systems in different time cycles (dynamic effects, leads, lags etc.). Micro-analysis of the performance of individual transactions and systems may offer insight, but the net outcomes require a much larger world-view if all of the interactions are to be captured. (Scoping Report, p 101).

Thus, we justified in the *Scoping Report* the need for a set of economy- and society-wide measures against which to benchmark the ultimate economic and social outcomes of each of the connectivity, capability and uptake factors. However, the increasing use of information as a input and an output of production processes (proportionate to other factors), facilitated by the technologies via which we measure Connectivity and Uptake in particular, renders traditional measures of economic and social performance, such as national and industry sector productivity, unreliable and inaccurate (Howell (2001a)). This is reinforced by OECD studies, especially that of Colecchia (1999).

So while we may record measures of Connectivity, Capability and Uptake, as in the preceding three sections, to date, there is no accepted methodology via which we can quantify the benefit

(or detriment) to economic and social performance as a consequence of their use. To a large extent, judgements about the optimal level of each of these indicators are underpinned by a tacit assumption that more of these each of these indicators is undeniably better for the economy and society. This assumption, while indicative, may be misleading in some cases, especially when market saturation is approached (e.g. 100% of businesses, as discussed above, are unlikely to require ownership of a dedicated PC, yet "more" PCs is considered 'better' – so is 99% really better than 95%, if 99% ownership may indicate that 4% of businesses have tied up resources in an underutilised computer that could have more efficiently been applied elsewhere?).

Theoretically, productivity remains the best indicator for assessing both the efficiency of processes, and the allocation of resources among competing processes. Yet changing patterns of information usage are challenging the reliability of even this metric (Scoping Report p 101, Lawrence and Diewert (1999), and, for example, the substantial literature on the so-called 'productivity paradox' whereby national productivity does not appear to have grown in proportion to the intuitively productivity-enhancing use of new technologies such as computers).

Consequently, we have opted not to include any measures of economy- or society-wide performance in this report, as in the absence of unequivocal evidence that all costs and benefits are captured, use of such statistics may be false or misleading.

# 5. Summary

We return now to the hypothesis:

> That, in the absence of any indication to the contrary, high levels of infrastructure uptake imply high levels of utilisation of electronic commerce applications in New Zealand.

The statistics of sections 1 and 3 show that New Zealand does, indeed, evidence high levels of electronic infrastructure connectivity and uptake. There is also significant evidence of increasing capability, both in human and information technology capital. Computer use in New Zealand businesses and homes is widespread. A sound telecommunications base, offering a variety of technologies (land-based and wireless) at prices that are (for domestic customers) lower than the OECD average, and based upon unmetered tariffs, provides a foundation for the electronic communications required in an information-based economy. The strong telecommunications infrastructure provides a foundation for levels of Internet connectivity and utilisation amongst the highest in the world. In particular, practically all measures of connectivity examined in this study lead those of our closest neighbour and the country with the trading profile most similar to ours: Australia.

Strong levels of connectivity are supported by equally high levels of uptake of specific applications. Use of EFTPOS and ATMs is almost ubiquitous in New Zealand, with EFTPOS use nearly double that in Australia. Use of email and websites by both businesses and individuals is extremely high, with use of email in particular reflecting a demand-driven uptake when the benefits accrued exceed the costs, rather than the supply-side taking the lead. This could be expected to result in a more efficient application of investment in technologies than if availability of applications, rather than user need and benefit, drives uptake.

Furthermore, the statistics evidenced here provide a consistent story. New Zealand has lower per person domestic usage of the Internet than Australia, but higher levels of individual access at work and other locations. If work-based access is more utilised in New Zealand, this rationalises the higher number of Internet hosts and domain names compared to Australia. Uptake of specific business applications is dependent upon the scale and scope of New Zealand businesses. The high levels of uptake compared to larger countries is even more remarkable given the disadvantages of scale and scope faced by businesses in a small, geographically isolated open economy. That New Zealand can provide services such as ISP connectivity at world-leading prices, and telephony services at competitive prices vis-à-vis other countries despite these disadvantages is to be applauded.

That benefits have already accrued from this extensive connectivity and uptake is without doubt. The challenge is to continue to build upon the infrastructure that has led to this world-leading state, and to continue to develop and utilise technologies and applications that support the use of information in creating value in our businesses and in our private lives. For while infrastructure and connectivity provide the base (the 'pipes') for carrying information, value is created from the uptake of applications that use that information for producing the goods and services that will ultimately, through their sale and consumption, determine our relative wellbeing in a global economy.

## References


Alger, Dan, and Joanne Leung. 1999. *The Relative Costs of Local Telephony Across Five Countries*. ISCR Research Paper. http://www.iscr.org.nz/research/

Boles de Boer, David; Lewis Evans and Bronwyn Howell. 2000. *The State of e-New Zealand.* Wellington: ISCR http://www.iscr.org.nz/research/

Boles de Boer, Lewis Evans and Bronwyn Howell. 2000. *Governance of the Internet: emerging issues.* Wellington: ISCR http://www.iscr.org.nz/research/

Clark, Delwyn N. 2001. *Net Readiness in New Zealand Industries: Empirical Results, 2001.* Department of Strategic Management & Leadership, University of Waikato Management School.

Colecchia, Alessandra. *Defining and Measuring Electronic Commerce: Towards the development of an OECD methodology*. Conference on the Measurement of Electronic Commerce, Singapore 6-8 December 1999.

Galbi, Douglas. 2000. *Growth in the "New Economy": U.S. Bandwidth Use and Pricing Across the 1990s.* Washington: Federation Communications Commission

Goolsbee, Austan. 2000. *The Value of Broadband and the Deadweight Loss of Taxing New Technology.* University of Chicago Graduate School of Business Working Paper.

Howell, Bronwyn. 2001. *Scoping Report: e-Commerce Performance Measurement for New Zealand*. Wellington: ISCR. www.iscr.org.nz/research/

Howell, Bronwyn. 2001a. *Information, Technology and the Productivity Paradox.* Paper presented at the PhD Conference in Economics and Business, Perth, Australia, November 7-9 2001.

Howell, Bronwyn. 2000. *The Rural-Urban "Digital Divide" in New Zealand: Fact or Fable?* Wellington: ISCR www.iscr.org.nz/research/

KPMG. 2001. 2001 *Financial Institutions Performance Survey.* Wellington: KPMG.

Lawrence, Denis and Erwin Diewert. 1999. *Measuring New Zealand's Productivity.* Report prepared for the Department of Labour, Reserve Bank of New Zealand and The Treasury.

Lehr, William; and Lee McKnight. 2000. *A Broadband Access Market Framework: Towards Consumer Level Agreements.* Paper presented at the 28th Annual Telecommunications Policy Research Conference, Alexandria, Virginia, September 2000.

Ministry of Economic Development. 1999. *Electronic Government. Briefing to the Minister of State Services and Minister of Information Technology.* Wellington. http://www.ssc.govt.nz/Documents/Government_Information_and_Technology_Management.htm

Ministry of Economic Development. 2001. *Electronic Commerce in New Zealand: A survey of Business Use of the Internet.* Wellington:MED. http://med.govt.nz/

Ministry of Economic Development. 2001. *Statistics on Information Technology in New Zealand 2001*. Wellington:MED. http://med.govt.nz/pbt/infotech/currentstats

Ministry of Maori Development. 2001. *Maori Access to Information Technology.* Wellington: Te Puni Kokiri. http://www.tpk.govt.nz

National Office for the Information Economy. 2001. *The Current State of Play* May *2001*. Canberra:NOIE. http://noie.gov.au/

OECD Committee for Information, Computer and Communications Policy. 1997. *Measuring Electronic Commerce*. OCDE/GD(97)185. Paris: OECD. http://www.oecd.org/

OECD Information Society. 2001. *Communications Outlook.* Paris: OECD. http://www.oecd.org/

OECD Working Party on Telecommunications and Information Services Policies. 1998. *Internet Infrastructure Indicators.* DSTI/ICCP/TISP(98)7. Paris: OECD. http://www.oecd.org/

OECD Directorate for Science, Technology and Industry Committee for Information, Computer and Communications Policy Working Party on Telecommunication and Information Services Policies. July 27 2000. *Local Access Pricing and E-Commerce.* Paris:OECD. http://www.oecd.org/

Varaiya, Pravin; Hal Varian, Richard Edell, Karyen Chu and Walter Beckert. 1999. *INDEX: a status report.* EECS, SIMS, Economics at UC Berkeley.